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BIOMEDICAL RESEARCH STUDIES IN ACCELERATION, IMPACT, WEIGHTLESSNESS, VIBRATION, AND EMERGENCY ESCAPE AND RESTRAINT SYSTEMS: A COMPREHENSIVE BIBLIOGRAPHY

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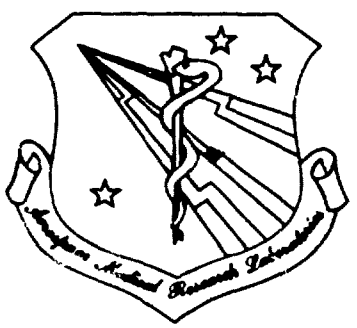

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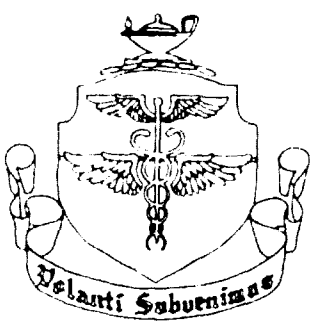

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BIOMEDICAL RESEARCH STUDIES IN ACCELERATION, IMPACT, WEIGHTLESSNESS, VIBRATION, AND EMERGENCY ESCAPE AND RESTRAINT SYSTEMS: A COMPREHENSIVE BIBLIOGRAPHY

DECEMBER 1963

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FOREWORD

This bibliography was jointly sponsored by the Civil Aeromedical Research Institute (CARI), Federal Aviation Agency; 6570th Aerospace Medical Research Laboratories (6570 AMRL) and USAF School of Aerospace Medicine (USAF SAM), both of the Aerospace Medical Division, Air Force Systems Command. The work was conducted under CARI Project AM 901.61-60.8; 6570 AMRL Project 7222, Task 722202; and USAF SAM Project 7930, Task 793003. The bibliography was funded in part under Air Force Contract D. O. (33-657)62-382 between Aerospace Medical Research Laboratories and Civil Aeromedical Research Institute.

This bibliography has been cataloged by Civil Aeromedical Research Institute as CARI Report 63-30.

ABSTRACT

This bibliography, the result of joint effort by the Civil Aeromedical Research Institute of the Federal Aviation Agency, the Aerospace Medical Research Laboratories, and the USAF School of Aerospace Medicine, is the basic volume of a planned series to be continued in annual supplements. The bibliography attempts a comprehensive listing of all scientific research in the areas of acceleration, vibration, deceleration, weightlessness, and protection and survival research. Scope of the fields surveyed includes rather broad areas of prolonged acceleration including blast and impact, vibration, weightlessness, and restraint and escape systems including capsules, ejection, and evacuation. The bibliography is arranged alphabetically by author into four sections, and contains 10,306 entries (Acceleration, 6,470; Vibration, 1,058; Weightlessness, 873; and Escape and Restraint, 1,905). Approximately 70 percent of the entries include abstracts. Although this attempt has been comprehensive, covering materials appearing as early as 1818 and as late as November 1963, the bibliography is intended only to aid, and not supplant, formal literature search by the working scientist.

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PREFACE

ACKNOWLEDGEMENTS

BIBLIOGRAPHY

A. SUBJECT INDEX

I. PROLONGED ACCELERATION, IMPACT, AND BLAST

Includes angular, and linear acceleration, windblast, concussive blast, and vestibular responses.

II. VIBRATION

Includes vibration and oscillation.

III. WEIGHTLESSNESS

Includes research involving man in the "weightless" condition (also known as Null Gravity, Zero-G, Subgravity, Zero W, or the agravic state).

IV. RESTRAINT, PROTECTION AND EMERGENCY ESCAPE SYSTEMS

This category includes physiological aspects of seating, restraint, protective systems and devices, and emergency escape systems (ejection, capsules, parachute).

B. AUTHORS

Each of the four sections is organized in alphabetical order by major author.

PREFACE

Earlier this year President Kennedy stated "One of the major opportunities for enhancing the effectiveness of our national scientific and technical effort and the efficiency of Government management of research and development lies in the improvement of our ability to communicate information about current research efforts and the results of past efforts." (Science, Government, and Information. The Responsibilities of the Technical Community, and the Government in the Transfer of Information. A Report of the President's Science Advisory Committee. The White House. January 10, 1963. p. III). This work has attempted to fulfill specific recommendations made by the President's Science Advisory Committee in the above report.

In the past decade the problem of keeping current with research in progress, within even very limited areas of specialization, has become increasingly difficult. Literature searches in a particular subject area are often complicated by the papers published in obscure or cross-disciplinary subject fields. As a result of the geometric progression of knowledge, scientists cannot devote the time necessary to adequately search the literature either to discover whether the work has already been done or to find all of the pertinent research references related to the contemplated work (see Little Science, Big Science, by Derek D.S. Price, Columbia University Press, 1963).

This is particularly true for aviation and aerospace medical research. Specialized areas of investigation, such as weightlessness or prolonged acceleration involve scientists, physicians, and engineers studying common problems through quite diverse approaches. Results of such research are found scattered throughout the literature; for example, recent acceleration work has been reported in such diverse publications as Poultry Science, Journal of the Institute of Aeronautical Sciences, Alumni Bulletin of the University of Pennsylvania, Popular Mechanics, and the American Journal of Roentgenology, Radium Therapy, and Nuclear Medicine. In addition, for every published paper, useful work has often been done but not published. Results of research presented at scientific meetings usually precedes journal publication and due to the lag time required by program cut-off dates, even these data may be "old." Thus a considerable proportion of the total knowledge remains unpublished: raw data stuffed in laboratory cabinets, notes in personal communications, unpublished speeches, "in-house" memorandum response to specific problems, or a multitude of places not readily accessible to all scientists. For illustration, unless engaged in a specific government contract, a university professor interested in acceleration might be unaware of much research reported only in government reports, contained in classified documents, or of a proprietary nature.

This bibliography is therefore intended to aid, but not supplant, formal literature search by scientists working in the area of acceleration, vibration, deceleration, and weightlessness as well as protection and survival research. It is hoped that this may prove a useful research tool as a "jumping off" point.

Historically this bibliography is the result of a combined program by the Physical Anthropology Section, Protection and Survival Branch, Civil Aeromedical Research Institute, Federal Aviation Agency, Oklahoma City, Oklahoma; Environmental Stress Branch, Aerospace Medical Research Laboratories, Aerospace Medical Division, Wright-Patterson Air Force Base, Ohio; and Biodynamics Section, USAF School of Aerospace Medicine, Aerospace Medical Division, Brooks Air Force Base, Texas, with ancillary support from numerous research organizations throughout the world. When it was initially discovered that all three groups were working individually on a similar project (with the Wright-Patterson project dating back some seven years) our efforts were combined, with continuing support from the Aerospace Medical Research Laboratories under Contract D.O. (33-657) 62-382. At the time that this project was originally initiated, in 1960, there existed no up-to-date acceleration bibliography, although availability of such work was obviously needed. Since that time, five bibliographies have been published by other groups, but none have provided a sufficiently comprehensive basis for the literature survey required by working scientists.

In November 1961, the ad hoc working group at the Impact Acceleration Symposium held at Brooks AFB, and supported by the National Academy of Sciences-National Research Council, agreed to cooperate in this program and recommended a central depository for acceleration research data at the Civil Aeromedical Research Institute. Objectives of our long range program include; (1) compilation and periodic distribution of annotated supplements of this bibliography, (2) obtaining copies of all available acceleration research publications, (3) compilation of an easily used reference card abstract system (McBee rim punch cards), (4) establishment of a universal index coding system for information retrieval, (5) evaluation and correlation of current knowledge of human tolerance to acceleration, vibration, impact and weightlessness force fields.

For the past two years a staff of 5-8 individuals, including translators, have worked on this project full-time, with additional clerical assistance provided by the USAF School of Aerospace Medicine and the Civil Aeromedical Research Institute. A number of organizations and individual scientists throughout the world are cooperating in this program by sending copies of all acceleration reports to the Civil Aeromedical Research Institute, and lines of communication have been established with most interested researchers. Each new report is added to the McBee rim punch card system, abstracted, and all other references rechecked against the master file.

It is anticipated that duplicate sets of the McBee card abstracts will be available to authorized organizations or scientists. A second file containing classified data or information of a proprietary nature is maintained separately and not included in this bibliography.

It is often difficult to delineate areas to be included in a bibliography of this nature. We have attempted to restrict this bibliography to the four rather broad areas of prolonged acceleration (blast and impact), vibration, weightlessness, and restraint and escape systems (capsule, ejection, and evacuation). Scientists desirous of further categorizing these areas can do so by utilizing the abstracted punch cards soon to be available. We have tended to include rather than exclude some of the peripheral areas if it seemed that the reference might be of biomedical use; however, psychological areas have been largely excluded unless they directly bear on vestibular responses or physiological aspects. The four-category breakdown is complete for each section (i.e., anything dealing with acceleration is in that section and duplicate entries are made for other sections). The breakdown is arbitrary and established to make classification easier.

Masters were printed directly from the file cards, thereby enabling us to save time and expense and avoid retyping and re-proofreading. As a result the finished product is not as slick as one could wish but we believe content more important.

A work of this nature can never claim total completeness, thus it would be appreciated if any excluded references would be brought to the attention of the authors. While each reference has been checked and rechecked for accuracy with the original work (unless noted), some errors are bound to occur. We should like to know about these also. We hope that this bibliography, and the periodic supplements (and possibly a classified supplement), to be published periodically, will prove useful to the aeromedical researcher.

ACKNOWLEDGEMENTS

The success of an attempt to compile a comprehensive work of this nature is completely dependent upon the generous cooperation of a large number of individual scientists and organizations. Hundreds of foreign and U.S. scientists, university, private research, industrial, and governmental research organizations were contacted during the course of this work. This project simply could not have been done without the interested cooperation of many people. Those whose participation merits particular gratitude must include the following, although others provided assistance for which the authors are grateful.

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We are also most appreciative of the efforts of Dr. John P. Marbarger, Editor, Aerospace Medicine, and Director of Research in the Aeromedical and Physical Environment Laboratory, University of Illinois, in arranging supplementary distribution of this bibliography to members of the Aerospace Medical Association. Additional thanks are due to:

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PROLONGED ACCELERATION, IMPACT, AND BLAST

ACCELERATION

A

1

Abelson, P.H. 1962 THE VENUS MISSION.
Science, 138(3545):1069, 7 Dec. 1962.

ABSTRACT: The article contains a description of Mariner II including the launching, mission, and future prospects.

2

Abramovitz, M., S. F. Schmidt, and R. D. Van Dyke 1953 INVESTIGATION OF THE USE OF A STICK FORCE PROPORTIONAL TO PITCHING ACCELERATION FOR NORMAL-ACCELERATION WARNING
(National Advisory Committee for Aeronautics, Washington, D. C.)
RM A53E21 Aug. 1953 ASTIA AD 15 538

ABSTRACT: The feasibility of providing an additional stick force which leads the normal acceleration, in order to serve as a prior warning of excessive normal acceleration in rapid maneuvers, is investigated both experimentally in flight and analytically. It is determined that large stick forces proportional to rate of change of normal acceleration can be provided without adversely affecting the control-system dynamic stability, and that pilots consider the feel characteristics introduced by such a force to be very desirable. (NACA abstract)

3

Achilich, J.H. 1959 THE HUMAN DISORIENTATION DEVICE -A SIMULATOR OF ANGULARLY-ACCELERATED MOTION. Ire Trans. Military Electronics.
MIL-3(3):99-104, July 1959

SUMMARY: The Human Disorientation Device has been developed as a research tool in the field of aviation medicine for the generation of angularly accelerated motion to enable the accomplishment of medical research in the field of animal or human responses to angular acceleration.

The device will produce accurately known and controlled values of angular acceleration about two axes of rotation when the subject is seated so that his head is located at the point specified by the intersection of the axes.

16

Advisory Group for Aeronautical Research & Development 1961 A TABLE OF EQUIVALENTS OF ACCELERATION TERMINOLOGIES. Rivista di medicina aeronautica e spaziale (Roma) 24(4):644-651, Oct.-Dec. 1961

ABSTRACT: A Table of Equivalents of Acceleration Terminologies is presented which has been prepared by the Committee on Acceleration of the Advisory Group for Aeronautical Research and Development, Aero Space Medical Panel. In this table the terms are grouped as to the type of acceleration, the body axis concerned, and the physiological consequences of acceleration. The Committee recommends the following: (1) that writers and researchers in the field of acceleration related to mammalian subjects restrict their descriptive terminologies and symbols to those contained in the table; (2) that the table be used as a ready reference for equivalent translation of acceleration terminologies; (3) that large G be used as the unit of physiological acceleration at all times; and (4) that the metric system be used in applying these acceleration terminologies and symbols.

17

Aeronautical Research Council 1953 THE BIOLOGY OF FLYING. REPORT OF A SYMPOSIUM HELD AT THE BRITISH ASSOCIATION MEETING IN BELFAST, SEPTEMBER, 1952.
(Aeronautical Research Council, Gt. Grit.)
ARC rept. no. 15,927; Engineering Physics Sub-comm. rept. no. EP 240
21 May 1953 ASTIA AD 23 124

ABSTRACT: The papers which are included deal with (1) the problems encountered in civil flying, (2) the physiological problems in flying high-performance military aircraft, (3) skill and the airman, and (4) the engineering problems of conditioning aircraft for human occupation and control. (ASTIA)

18

Aerospace Corp. 1961 BIBLIOGRAPHY OF REPORTS PREPARED BY AEROSPACE CORPORATION FOR PERIOD ENDING DECEMBER 1960 (Aerospace Corp., Los Angeles, Calif.)
ASTIA AD-251 546.

19

Agadzhania N. A. and A. R. Mansurov 1962 EFFECT ON THE ANIMAL ORGANISM OF OXYGEN DEFICIENCY AND PROLONGED RADIAL ACCELERATION.
In Biull. Eksp. Biol. Med. 53:42-46, April 1962 (Russian)

20

Agadzhanyan, N.A. & A.R. Mansurov 1962 THE EFFECT OF OXYGEN DEFICIENCY AND PROLONGED RADIAL ACCELERATION ON AN ANIMAL ORGANISM. Byull. Eksptl. Biol. I Med. (Moscow) 53(4):42-46 (Joint Publications Research Service, Washington, D.C., JPRS-15346, 19 Sept. 1962). NASA N62-17780

ABSTRACT: Animal studies are conducted to determine the effects of oxygen deficiency on conditioned reflex reactions of respiration and cardiac activity and the effects of acceleration on the organs of the thoracic cavity. Pressure chamber experiments were conducted at ground conditions as well as at simulated altitudes of 2000 to 10,000 meters. The dogs used in the tests were conditioned by the techniques of V.P. Protopopov. The acceleration tests were conducted in a centrifuge with a radius of 3.66 meters. The X-ray equipment was attached to the centrifuge for taking photographs during acceleration.

21

Agadzhanian, N.A. and Mansurov, A.R. 1962 VLIIANIE NA ORGANIZM ZHIVOTNYKH KISLORODNOGO GOLODANIIA I DLITEL'NYKH RADIAL'NYKH USKORENII (THE EFFECT OF HYPOXIA AND PROLONGED RADIAL ACCELERATIONS ON THE ANIMAL ORGANISM) Biulletin' eksperimental' noi biologii i meditsiny (Moskva), 53 (4): 42-46 April 1962.

ABSTRACT: Conditioned motor, respiratory, and cardiovascular reflex reactions were studied in dogs at simulated altitudes ranging from 2,000 to 10,000 m. An X-ray study was also made of the changes in the position of organs in the thoracic area in relation to various g values during acceleration on a centrifuge. In hypoxia at simulated altitudes of 6000-9000m. the vegatative components of the conditioned reflexes were almost completely depressed and replaced by the unconditioned ones as manifested by intensification of the respiratory function and cardiac activity. At altitudes above 9000 m. the cardiac and respiratory functions were markedly disturbed and periodic breathing and cardiac arrhythmia appeared. Action of the centripetal forces in the head-tail direction resulted in a reduction of the size and intensity of the cardiac shadow, as well as a shift in the position and deformation of the internal organs. The character and the extent of the changes in the roentgenological picture of internal organs is a function of the value and duration of the accelerative forces and of the initial functional state of the central nervous system.

22

AGARD, NATO 1955 COLLECTED PAPERS ON AVIATION MEDICINE. (Presented at Aeromedical Panel Meetings of the AGARD, Palais De Chaillot, Paris) (London: Butterworths Scientific Publications, 1955). AGARDograph No. 6.

ABSTRACT: Contents include the following papers: "La Recherche Aéromédicale et la Technique Aéronautique" ("Aeromedical Research and Aeromedical Technique") by P. Bergeret; "A Brief Survey of Aviation Medicine" by P. B. Lee-Potter; "Aeromedical Interests--Looking Forward" by O. O. Benson; "Les Variations de Tolérance à la Respiration en Surpression" ("The Variations of Breathing Endurances in High Pressure") by R. Grandpierre and F. Violette; "La Vitesse Inspiratoire Dans L'Anoxie Anoxique Comme Méthode D'Exploration De La Fonction Respiratoire" ("The Speed of Inhalation in Anoxia with the Method of Exploration of the Respiratory Function") by T. Lo Monaco; "Medical Tests for Detecting Latent Epilepsia and Fluctuations in the Level of Consciousness by P. M. van Wulfften Palthe; "Arctic Survival Problems by K. Rodahl; "British Theory and Practice in the Layout of Aircraft Cockpits" by H. P. Ruffel Smith; "Physiological Requirements of Pressure Cabins" by H. L. Roxburgh; "Consequences of Loss of Cabin Pressure" by D. I. Fryer; "Recent Advances of Instrumentation of Interest in Aviation Medicine" by C. S. White et al.; "The Nature of Cold-Induced Tissue Injury" by R. B. Lewis; "The High Intensity Noise Problem in the U.S. Navy" by C. P. Phoebus; "Tolerance to Abrupt Deceleration" by J. P. Stapp; "La Vision Nocturne" ("Night Vision") by A. Mercier; "Some Problems in Testing Colour Vision" by M. A. Bouman and P. L. Walraven; "Heterophoria" by G. Ten Doesschate; and "Practical Aspects of Heterophoria in Aviation" by J. C. Neely.

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AGARD, Committee on Acceleration 1962 TABLE OF EQUIVALENT ACCELERATION TERMINOLOGIES. In M.K. Cragun, ed., The Fifth Stapp Automotive Crash and Field Demonstration, Sept. 14-16, 1961. Pp. 255-258

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Air Information Division 1960 SOVIET RESEARCH ON GRAVITATION. AN ANALYSIS OF PUBLISHED LITERATURE. (Science and Technology Section, Air Information Division, Washington, D.C.) AID Report. 60-61, Oct. 1960. ASTIA AD 246 700

CONTENTS:

Correlation of Stanyukovich's public statements on weightlessness with views expressed by other Soviet-area scientists;
The problem of gravitation;
Status of Soviet research on gravitation;
Correl tion of Soviet and Western research;
General references;
Bibliography - Soviet area;
Bibliography - Western world;
Annual total of publications on gravitation in USSR and other Soviet-area countries;
Biographies;
Map showing geographic locations of outstanding specialists on gravitation in the Soviet area;
English translations of articles in the Russian language.

25

Air Information Div. 1961 FURTHER DETAILS ON GAGARIN FLIGHT
Library of Congress, Air Information Div., Science and Technol. Section, Washington, D. C.
AID rept. no. 61-113, 27 July 1961
ASTIA AD 261 454

ABSTRACT: Three articles have appeared recently which contain information not found in any of the more than 60 Soviet sources published in connection with Gagarin's flight. The first article was written by Professor G. V. Petrovich and published in the Vestnik of the Academy of Sciences USSR. The second is a TASS interview with Professor V. V. Dobronravov, Doctor of Physical and Mathematical Sciences. The third was written by Inna Yavorskaya, whose title is given as Scientific Secretary of the Interplanetary Travel Commission of the Academy of Sciences USSR. This report recounts certain details found in these three articles and discusses their implications. Some of the information presented appears to support certain inferences drawn in previous AID reports.

26

Akesson, S. 1948 ACCELERATIONSPARERKAN OCH HJARNAS BLODFORSORJNING (EFFECT OF ACCELERATION ON BLOOD SUPPLY OF BRAIN)
Nord. Med. 37: 70-76.

27

Akesson, S. 1948 BLOOD SUPPLY TO THE BRAIN DURING ACCELERATION
Acta Physiologica Scandinavica (Stockholm) 15:237-244

ABSTRACT: The possibility that the blood circulation in the brain, in an erect position, particularly under the influence of higher degrees of positive acceleration, is facilitated by a siphonic effect is discussed. A prerequisite for this is that the vessels do not close at any point of the siphon. The weak points are the jugular veins and the small vessels in the brain. Direct measurements of the pressure of the cerebrospinal fluid during compression tests on the neck show that the jugular veins are far more pressure-resistant than was earlier believed. It seems plausible that the small vessels in the brain are, in the first place, protected from collapse by the hydrostatic equilibrium between the blood and the cerebrospinal fluid. In all probability, a local artery-dilating mechanism, at imminent over-pressure in the cerebrospinal fluid, will contribute towards keeping the vessels open. It has been shown in Man that the pressure in the cerebrospinal fluid can be raised to degrees above the probable pressure in the cerebral capillaries without loss of consciousness and without any significant increase of the blood pressure.

28

Akrep, J.P. 1959 THEORY OF THE LIQUID COLUMN ACCELEROMETER (Quartermaster Food and Container Inst. for the Armed Forces, Chicago, Ill.) Technical report no. 195.

ABSTRACT: A new principle of accelerometer construction for evaluating non-vibratory phenomena employs a liquid column as the reacting mass and utilizes the apparent change in density of a contained liquid as a means of measuring acceleration. Basic advantages appear to be simplicity, elimination of frequency response problems in the sensing element, self-powering of the information pulse, and wide flexibility in range due to ease of changing liquid densities, column height, and transducer ranges. A design study is outlined for a low cost accelerometer for package testing. (Author)

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Alakseev, A.P. 1957 KANALIZU PARASHIUTNOGO TRAVMATIZMA. (The Analysis of Parachute Trauma) Voennomed Zh. 2:76-77, Feb. 1957

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Alandarov, N.S. 1936 UEBER UEBUNGSFESTIGKEIT AM VESTIBULAR APPARAT. (Value of Training the Vestibular Apparatus.) Voenno san Delo. 2(3):94-95,

ABSTRACT; One hundred and twenty persons were trained by Kulikovskij's method for two months and then re-examined after a lapse of five months. It was shown that the condition of the vestibular apparatus was not so good at this period as immediately after training. The results of training are therefore unstable. Examination five months after the training period showed improvement in 59.2 percent, exacerbation in 17.5 per cent and no change in 23.3 per cent. Training of the vestibular apparatus has therefore a certain practical value and should be given shortly before actual flying exercises.

ABSTRACT: Journal of Aviation Medicine 7(4): 214-215, December 1936

31

Albay Cemal Ispahi 1940 CONSIDERATIONS MEDICAUX SUR LE PARACHUTISME (Turkisch) (Medical Considerations on the Parachutist) (Askeri Sihhiye Mecm. 69:105-107)

32

Alderson, Samuel W. June 1961 ANTHROPOMORPHIC TEST DUMMIES IN CRASH INJURY RESEARCH
(Paper, Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Material Center, Philadelphia, Pa. June 14-15, 1961)

ABSTRACT: Anthropomorphic test dummies are essential for crash research studies because of unacceptable hazards to live subjects. To be valid test subjects, anthropomorphic test dummies must duplicate the dynamic response of the human and must develop internal stresses similar to those of the human. Although mathematical models of spring-mass systems may describe some human responses, such an approach is inadequate in assessing the potential for injury. It is believed that the most valid basis for determining human survivability under conditions of high acceleration is to find thresholds of injury by cadaver testing. Although there are significant differences between the injury thresholds of cadavers and living men, cadaver data may be extrapolated to the living by considering similar relationships observed experimentally between dead and living animals. Present anthropomorphic test dummies are capable of providing gross and crude data but cannot give the quantitative information needed to guide the design and development of protective devices to minimize injury under violent dynamic conditions.

33

Aldman, B. 1960 PHOTOGRAMMETRIC METHOD FOR DETERMINATION OF SHORT-TIME DECELERATIONS. Svensk lantmäteritidskrift 3:2-5

34

Aldman, B. 1961 SEATBELTS: THE VALUE OF THE AUTOMOBILE SAFETY BELT.
(A Series of Lectures given on Behalf of The Swedish National Council for Road Safety Research, Stockhom, Sweden)
International Road Safety and Traffic Review (London) 9:43-46.

35

Aldman, B. 1962 BIODYNAMIC STUDIES ON IMPACT PROTECTION
Acta Physiologica Scandinavica (Stockholm) Vol. 56, Supplementum 192.

SUMMARY: In the introduction the significance of the stretching properties of the straps in a body restraint is indicated and it is also pointed out that this problem has been very little discussed in the literature. The difficulties involved in the study of effects of short-term, hhgh peaks of deceleration are mentioned and the importance of such studies for the biodynamics of trauma is stressed. The review of earlier investigations includes the more important research activities in this field and some theories about the human tolerances to impact acceleration stress in the short-duration impact zone and that different opinions exist about the decisive physical quantity for injuries in this zone, indicating the need for more accurate recording methods.

A critical analysis is made of the recording methods used in earlier work and the accuracy of high-speed photography is evaluated. The background to and the planning of the present investigation are described in order to explain the procedure used in solving the problems.

The duration of the deceleration period and the time lag between the deceleration of vehicle and occupant, using different restraining devices in European-built cars, were verified in car-barrier impact tests. The experience from these tests showed the necessity of studying the elongation process in the straps under standardized laboratory conditions and also the need for better recording methods. The photogrammetric method for this study is presented, the accuracy and usefulness of this method is discussed, and the results from the study of dynamic testing of textile straps are presented.

A method of recording strain waves in the straps is described. An equipment for the study of deforming waves in bone structures is described and some results from such studies reported. The disc stereocamera, a new application of photogrammetric principles for recording the deformation in various materials under dynamic load, is briefly described and a test on the accuracy of this recording method is presented as a comparison with that of the high-speed film technique.

An apparatus called the steering-wheel catapult is described. It was designed for a study of the extent to which the human body is decelerated by the contact with the vehicle of arms and legs. This catapult has also been found useful for investigating desirable qualities in the design of steering-wheel assemblies. High-speed film technique was used for the recording of the effect of different types of body restraints on anthropometric dummies under standardized conditions. Results from these tests are given, illustrating the necessity of testing dynamically the effect of different strap arrangements in judging how effectively the load from the straps is distributed over structures suitable for taking up such high loads. A roentgen technique for displacement studies of internal organs during deceleration of the whole body is described, and its usefulness and accuracy are exemplified by the presentation of a resonance curve for the heart of a test animal, obtained by this method. In order to stimulate the collection of data, now lacking, on human tolerance to acceleration stress in the short-duration impact zone, this publication is mainly concerned with the presentation of methods for such studies; it reports a limited number of results only to prove the usefulness of the described methods. The interrection (sic) between the safety belt and the seat of the car is discussed and the necessity of properly designed seats for optimal protection of car occupants in case of an accident is emphasized. (Author)

36

Aldman, Bertil 1962 INVESTIGATIONS ON LONG-STRETCHING BODY RESTRAINTS
In Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, (National Academy of Sciences, National Research Council) Publication No. 977, pp. 355-362

ABSTRACT: It has been demonstrated by several investigators that in experimental car collisions there is a time delay for the deceleration of the restrained dummy relative the car. That time delay was verified for European cars in an experimental series of car-barrier impacts made in Sweden in 1958. In my investigations I have chosen another way which is necessary if the space in the vehicle is so limited that an upper torso restraint is desired and that is to use long-stretching straps for the restraint.

37

Aleksandrov, A. 1957 MAN AND THE COSMOS
Trans. of Meditsinskii Rabotnik (USSR) 20(105):3, 1957
(Office of Technical Services, Washington, D.C.)
Sept. 1960 61-27432

ABSTRACT: Some of the physiological aspects of space flight are discussed in "popular" terms.

38

Aleksandrov, A. 1958 CHELOVEK I KOSMOS (MAN AND COSMOS)
Med. rabot. No. 105, p. 3, 31 Dec. 1957
English translation: U. S. Central Intelligence Agency, Foreign Documents Division, Scientific Information Rept. No. 1, pp. 83-85, 27 Feb. 1958

39

Aleksandrov, S. G. and R. Ye Fedorov 1959 BIOLOGICAL STUDIES ON SPUTNIKS II AND III.
Trans. of mono. Sovetskiye Sputniki i Komicheskaya Raketa (Soviet Sputniks and Space Rocket) Moscow, p. 157-160, 1959.
(Office of Technical Services, Washington, D.C.)
Dec. 9, 1959 60-13205

40

Aleksandrov, N. 1960 RETURN FROM SPACE
Sovetskaya aviatsiya P. 3; 30 August 1960.

41

Alekseyev, S. M., Y. V. Balkind, A. M. Gershkovich, V. S. Yeremin, A. S. Povitskiy, & N. L. Umanskiy 1961 SOVREMENNYYE SREDSTVA AVARIYNOGO POKIDANIYA SAMOLETA (MODERN FACILITIES FOR THE EMERGENCY ABANDONMENT OF AN AIRPLANE) (Moscow: Oborongiz, 1961)

ABSTRACT: Based on non-Soviet sources, the book reviews briefly the development of flyers' escape equipment, describes the construction of ejection seats, and gives design and calculation data for ejection seats and ejection-seat parachutes. Information is included on the calculation of the trajectory of the ejected seat, its stabilization, and the aerodynamic loads involved. Attention is given to methods of escaping from aircraft flying at high speeds and at high and low altitudes. Information on problems connected with oxygen equipment, protective clothing, and testing facilities is also included. No personalities are mentioned (CARI)

42

Alekseyev, S.M., Y.V. Balkina et al. 1962 ELEMENTS OF THE MOVEMENT OF A PARACHUTIST AND DESIGNING THE PARACHUTE. (Translated by Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.) Trans. No. FTD-TT-61-466. From Sovremennyye Sredstva Avariynogo Pokidaniya Samoleta (Moscow: Oborongiz, 1961), Chapter 3. Pp. 69-122.

ABSTRACT: The basic principles of the working of safety parachutes were investigated to determine the basic elements of their design and construction. Parachute fabrics, aerodynamic loading during the parachute opening and the length of the parachute risers are considered. (Author)

43

Alexander, C. B. J. 1956 MEDICAL ASPECTS OF PARATROOPER TRAINING. Aero Med. Soc. J. (New Delhi) 3(1):38-47, April 1956

ABSTRACT: A brief description is presented of the history of parachuting in India and of the Indian Air Force program for the selection and training of paratroopers Injuries encountered during training are discussed and classified by their occurrence during ground training and during jumping (at exit, during parachute development, and during landing). Data concerning the occurrence of various types of injuries in the years 1950 and 1951 are presented, and data from 1950 are compared with the injury rates of American, British, and French paratrooper schools.

44

Alexander, G. 1961 FLIGHT PROVES MAN CAN FUNCTION IN SPACE. Aviation Week 70(20):31-32, 15 May 1961

ABSTRACT: A description is given of the pilot functions performed and the stresses and loads (weightlessness, peak gravity and re-entry loads) to which pilot and capsule were subjected during the 15 minute Mercury-Redstone flight on May 5, 1961.

45

Alexander, G. 1961 NASA DEVELOPS HIGH-MOBILITY SPACE SUIT. Aviation Week and Space Technology 75(1):57-59, July 3, 1961.

ABSTRACT: Support and restraint suit for space pilots, light and mobile enough so that it can be worn as personal equipment and adjustable to any individual's form, has been developed and centrifuge-tested by the National Aeronautics and Space Administration's Ames Research Center, Calif. The system's design requirements called for a high degree of pilot mobility; adaptability to a variety of pilot sizes and shapes; and adequate support against high g forces applied posteriorly, anteriorly, or vertically along the spinal axis. This article gives a detailed description of the space suit. (CARI)

46

Alexander, Leo 1945 MISCELLANEOUS AVIATION MEDICAL MATTERS ASTIA ATI 12814

ABSTRACT: Various aviation-medical data are given of German experiments on animals and humans concerning rapid and low descent from great altitudes comparable with free fall and descent by parachute. Special problems are discussed pertaining to the patho-physiological effect of low temperatures, method of resuscitation necessitated by accidents, anoxia, altitude tolerance, and decompression, as well as safety and rescue.

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Alexander, S. J., M. Cotzin, C. J. Hill, Jr., E. A. Ricciuti, & G. R. Wendt 1945 WESLEYAN UNIVERSITY STUDIES OF MOTION SICKNESS: I. THE EFFECTS OF VARIATION OF TIME INTERVALS BETWEEN ACCELERATIONS UPON SICKNESS RATES. J. Psychology 19:49-62

INTRODUCTION AND SUMMARY: This is the first of a series of investigations designed to discover the physical and physiological conditions of motion sickness so that a rational preventive procedure may be devised. This first experiment was designed to test the hypothesis that the time interval elapsing between the acceleration

phase and deceleration phase of a cyclic vertical movement is a factor in production of sickness. Using a "wave machine" similar to an elevator subjects were exposed to waves having a period of constant velocity during the up and down motions. This constant velocity was always 400 feet per minute reached in approximately 0.33 secs. The duration of the period of constant velocity was 0.2 secs., 0.7 secs., 1.1 secs., or 1.6 secs. (approximately) for different groups of subjects. Other significant variables were controlled or counter-balanced. The result was in accordance with our prediction; the wave with a 0.2 sec. period of constant velocity produced very little sickness; the wave with a 1.1 sec. period of constant velocity produced the most sickness. The correctness of the result was supported by internal analysis of the results, by results of a preliminary experiment, and by results of check experiments. It is concluded that time interval between accelerations is a factor in production of motion sickness. The paper includes a general statement of the purposes and procedures of this series of experiments, and will serve as a reference for all. (Author)

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Alexander, S. J., M. Cotzin, C. J. Hill, Jr., E. A. Ricciuti, & G. R. Wendt 1945
WESLEYAN UNIVERSITY STUDIES OF MOTION SICKNESS: II. A SECOND APPROACH TO THE PROBLEM OF THE EFFECTS OF VARIATION OF TIME INTERVALS BETWEEN ACCELERATIONS UPON SICKNESS RATES. J. Psychology 19:63-68

INTRODUCTION AND SUMMARY: In Report I (1) we showed that when wave cycle duration is increased by insertion of a period of constant velocity in the wave, sickness rates increase. Maximum sickness was found with a 16-cycles per minute wave having a 1.13 second period of constant velocity. In the present experiment the wave cycle duration was held constant at approximately 22 cycles per minute while varying the duration of a period of constant velocity in the wave for different groups of subjects. Peak values of acceleration were held constant. Time intervals between accelerations were controlled by varying the length of time of application of the acceleration, and thus the velocity. Three durations of the period of constant velocity were used: 0.68 seconds, obtained when the constant velocity reached was 400 ft. per min., 0.82 seconds at 300 ft. per min., and 1.12 seconds at 200 ft. per min. It was found that the first of these conditions produced the greatest sickness, the last the least sickness, in approximately the ratio of 3:1. It was therefore concluded that when cycle duration is held constant, the time interval between accelerations is a less potent condition of motion sickness than is the total wave energy. (Author)

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Alexander, S. J., M. Cotzin, C. J. Hill, Jr., E. A. Ricciuti, & G. R. Wendt 1945
WESLEYAN UNIVERSITY STUDIES OF MOTION SICKNESS: III. THE EFFECTS OF VARIOUS ACCELERATIONS UPON SICKNESS RATES. J. Psychology 20:3-8

INTRODUCTION AND SUMMARY: This investigation was designed to discover how motion sickness rates on our vertical accelerator are affected by acceleration level. Four acceleration values were used, 0.20, 0.25, 0.36, and 0.65 "g" while keeping total energy per wave at a constant value such that the motion had a mid-wave velocity of 400 feet per minute. By this means wave frequencies of 13, 16, 22, and 32 cycles per minute were obtained; these are the same frequencies as were used in the first study of this series, where time interval between accelerations was varied. Other significant variables were counterbalanced or controlled. The results on 120 subjects showed that a moderate acceleration value produced maximum sickness; the highest acceleration value produced the least sickness. The obtained sickness rates were: 40, 43, 53 and 13 per cent in going from the lowest to the highest acceleration. The corresponding "sickness indices" (giving a double weight to vomiting and single weight to lesser sickness) were: 53, 63, 77, 20. (Author)

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Alexander, S. J., M. Cotzin, C. J. Hill, Jr., E. A. Ricciuti, & G. R. Wendt 1945
WESLEYAN UNIVERSITY STUDIES OF MOTION SICKNESS: IV. THE EFFECTS OF WAVES CONTAINING TWO ACCELERATION LEVELS UPON SICKNESS. J. Psychology 20:9-18

INTRODUCTION AND SUMMARY: This investigation was designed to discover how motion sickness rates on our vertical accelerator are affected by waves whose top and bottom halves are at different acceleration levels, in comparison with waves where top and bottom are of the same acceleration. The primary purpose of this comparison was to discover whether sickness is a function of over-all wave frequency or of duration or magnitude of component accelerations. Two sets of data were taken, using a total of five wave-types. All waves were of the same total energy, reaching a mid-wave velocity of 400 feet per minute. In the first experiment on 99 subjects sickness rates of a symmetrical 16-cycle per minute wave with similar half-waves (acceleration = 0.65 and 0.17 g), each by itself relatively non-nauseating (when used in equal acceleration waves). The obtained sickness rates were: equal acceleration, 48%; low acceleration in bottom half of wave and high acceleration in top half, 9%; low acceleration in top half of wave and high in bottom half, 21%. Corresponding "sickness indices" (giving double weight to vomiting and single weight to lesser sickness) were: 82, 15, and 30. In the

second experiment on 48 subjects sickness rates of two asymmetrical 21-cycle per minute waves were compared, made up of a relatively non-nauseating half-wave (acceleration =0.65g) and a nauseating half-wave (acceleration =0.25g). With 0.25 g at the bottom, 29% were sick; with 0.25 g at the top, 33% were sick. Sickness indices were 38 and 42. The sickness rate with the four unequal acceleration waves are about what would have been expected if the duration or magnitude of component accelerations were the primary condition of sickness. Acceptance of this view and of its apparent implication that response of some resonant mechanical system is involved in motion sickness should be deferred until it is developed in further experiments, because there is no independent evidence that such a slow period mechanical system is present. Other implications of the results are presented. (Author)

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Alexander, S. J., M. Cotzin, C. J. Hill, Jr., E. A. Ricciuti, & G. R. Wendt 1945
WESLEYAN UNIVERSITY STUDIES OF MOTION SICKNESS: V. INCIDENCE OF SICKNESS AT VARIOUS HOURS OF THE DAY. J. Psychology 20:19-24

INTRODUCTION AND SUMMARY: In two series of experiments, one with 330 naval aviation cadets and one with 120 naval officer-candidate trainees, the incidence of motion sickness resulting from 20 mins' exposure of blindfolded subjects on a vertical accelerator was analyzed for any relationship to hour of the day. All other known important variables were counterbalanced or controlled. The analysis revealed no reliable evidence of a relationship of incidence of sickness to mealtime or to the period of the day. The variance among hours was such as might have been expected by chance. There was some consistency among experiments in the amount of sickness at different hours, but there are no obvious hypotheses to account for the obtained distributions of sickness rates. (Author)

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Alexander, S. J., M. Cotzin, C. J. Hill, Jr., E. A. Ricciuti, & G. R. Wendt 1945
WESLEYAN UNIVERSITY STUDIES OF MOTION SICKNESS: VI. PREDICTION OF SICKNESS ON A VERTICAL ACCELERATOR BY MEANS OF A MOTION SICKNESS HISTORY QUESTIONNAIRE
J. Psychology 20:25-30

INTRODUCTION AND SUMMARY: In a series of five experiments using a total of 477 naval officer-candidates, the incidence of motion sickness resulting from a 20-minutes' exposure of blindfolded subjects on a vertical accelerator was analyzed for its relationship to previous history of motion sickness as determined by questionnaire. The experimental groups were so counterbalanced that each of three sus-

ceptibility categories, according to the questionnaire, was equally represented with each of the 14 wave-types used. All other known important variables were counterbalanced or controlled. The over-all results showed a reliable and moderately high relation between sickness history and experimentally produced sickness. The obtained over-all rates of sickness on the vertical accelerator in each group of subjects divided according to past history were: susceptibles, 45%; intermediates, 24%; non-susceptibles, 14%. The corresponding 'sickness indices' (giving a double weight to vomiting and single weight to lesser sickness) were: 65, 35, and 21. The results are interpreted as indicating that machine sickness has factors in common with other forms of motion sickness. It is also suggested that a questionnaire might yield a useful prediction of sickness in military situations and might be used as an elimination or selection device. (Author)

53

Alexander, S. J., M. Cotzin, C. J. Hill, Jr., E. A. Ricciuti, & G. R. Wendt 1945 WESLEYAN UNIVERSITY STUDIES OF MOTION SICKNESS: VII. THE EFFECTS OF SICKNESS UPON PERFORMANCE. J. Psychology 20:31-39

INTRODUCTION AND SUMMARY: Certain performance tests have been administered to subjects before and after exposure to motion on our vertical accelerator. The data were analyzed to determine whether those who become motion sick showed deficit in performance. Of the four tests used only one, the Mashburn Complex Coordinator, showed a statistically reliable harmful effect of motion sickness, the obtained deficit being about 4%. The deficit in a test of running through sand and weaving around obstacles was 0.4% and in a 60 yard dash the deficit was 0.5%. Neither of these is statistically reliable. In a dart-throwing test the deficit was approximately 7%, but due to the unreliability of this test (reliability coefficient= +.43) this result is not proof of a true deficit. These results are interpreted as indicating that a brief exposure to motion (20 mins or until vomiting occurred) probably, has no important effects upon laboratory motor performance tests. Other analyses showed that neither susceptibility to machine sickness nor past history of sickness bears any relation to normal motor performance ability on any of the tests administered before exposure to motion. (Author)

54

Alexander, S. J., J. S. Helmick, J. H. Taylor, & G. R. Wendt 1946 STUDIES IN MOTION SICKNESS: II. EXPERIMENTAL COMPARISON OF VARIOUS AUTONOMIC RESPONSES IN INDIVIDUALS SUSCEPTIBLE AND NONSUSCEPTIBLE TO MOTION SICKNESS. (Civil Aeronautics Administration, Washington, D. C.) Rept. No. 66, Aug. 1946

SUMMARY: This is one of a series of studies in which certain physiological reactions in individuals susceptible and non-susceptible to motion sickness were compared experimentally. In the present experiment five susceptibles and five non-susceptibles served as subjects on each of six days during which their reac-

tions to epinephrine (adrenaline), to acetyl-beta-methyl-choline (mecholyl), to hyperventilation, to breath holding, and to immersion of the foot in ice water were studied. The experiment constituted an indirect approach to the problems of whether susceptibility is a matter of blood chemistry, of abnormal sensitivity to one or another of the substances released at autonomic nerve endings, or of vasomotor instability.
All of the measures employed in this study have been used by the authors and other investigators in previous or subsequent studies. For this reason it seems wise to withhold conclusions about the present data and to refrain from presentation of reliabilities of differences, since the results of all studies taken together are negative for each of the measures employed. The data available from the present study for comparison of susceptibles and non-susceptibles are as follows: resting respiration, blood pressures, pulse rate, perspiration and salivation, response of the same variables to mecholyl and to adrenaline, and response of the circulatory and respiratory measures to immersion of the foot in ice water, to breath holding for twenty seconds, and to hyperventilation for three minutes. Various observational data such as dermographia, abdominal noises, etc., were recorded but none yielded data which were methodologically adequate for use. (CAA)

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Alexander, S. J., J. S. Helmick, C. J. Hill, & G. R. Wendt 1946 STUDIES IN MOTION SICKNESS: III. A SECOND EXPERIMENTAL COMPARISON OF AUTONOMIC RESPONSES IN INDIVIDUALS SUSCEPTIBLE AND NON-SUSCEPTIBLE TO MOTION SICKNESS. (Civil Aeronautics Administration, Washington, D. C.) Rept. No. 66; Aug.1946

SUMMARY: This is one of a series of studies in which certain physiological reactions in individuals susceptible and non-susceptible to motion sickness were compared. It differed from previous studies in that experimental conditions were more carefully controlled, more objective recording of responses was employed, and certain new measures were investigated. Eleven susceptibles and twelve non-susceptibles served as subjects on each of two days during which the following were studied: dermographia, cold pressor test, breath holding test with positive and then with negative pressure, reaction to injection of mecholyl, and reaction to tilt on the tilt table. Data on respiration, pulse rate, variability of pulse duration, blood pressure, skin temperature, forehead sweating and salivation were recorded. The findings presented include means and standard deviations of response and changes in response from day 1 to day 2, test reliabilities, test intercorrelations, and differences between susceptibles and non-susceptibles. Reliabilities and intercorrelations are in many respects lower than would be expected from tests so commonly used clinically. None of the measures served to distinguish between susceptibles and non-susceptibles, either as single tests or as a whole, with the possible exception of pulse duration variability and day 1 to day 2 changes from habituation to the conditions of the experiment.

56

Alexander, S.J., M. Cotzin, J.B. Klee, and G.R. Wendt 1947 STUDIES OF MOTION SICKNESS: XVI. THE EFFECTS UPON SICKNESS RATES OF WAVES OF VARIOUS FREQUENCIES BUT IDENTICAL ACCELERATION. J. Exp. Psychol., 37:440-448

SUMMARY: This is the last of a series of investigations done by means of the vertical accelerator at Wesleyan University. It was designed to discover how motion sickness rates are affected by wave frequency when the accelerations in the waves are held fixed. Usine waves with a constant acceleration of 0.20 g, frequency was controlled by control of the duration of application of upward and downward accelerations. By this means wave frequencies of 13, 16, 22 and 32 cycles per min. were obtained, having amplitudes of 9 feet, 5 feet 4 in., 2 feet 6 in., and 1 foot 1 in. These frequencies are the same as were used in previous studies in this series, where time between accelerations, level of acceleration and other aspects of the waves were varied. Other significant variable s were counterbalanced or controlled. The results on 120 Ss showed that sickness varied with the energy per wave; the biggest wave produced the most sickness, the smallest wave the least. The obtained sickness rates were 37, 37, 10 and 7 percent in going from the large slow wave to the small fast wave. The corresponding 'sickness indices' (giving double weight to vomiting and single weight to lesser sickness) were: 53, 47, 10 and 7.
The results of the entire series of studies of the dependence of motion sickness on wave-characteristics are reviewed and certain tentative conclusions drawn. It is shown that some waves were 20 times as nauseating as others, per unit of energy, and that such variations depended on at least four factors: wave-duration, acceleration-level, distribution of accelerations and energy per wave.

Data are presented showing the relationship of sickness to hour of the day and to previous history of sickness.

57

Allard, A. 1952 LE MAL DE L'AIR (Air Sickness)
Bruxelles médical (Brussels) 32: 327-334

58

Allen, G., & C. Fernandez 1959 EXPERIMENTAL OBSERVATIONS IN POSTURAL NYSTAGMUS: Extensive Lesions in Posterior Vermis of the Cerebellum. (School of Avia. Med., USAF Aerospace Medical Center, (ATC) Brooks AFB Texas) Research Rept. No. 59-74, Aug. 1959. ASTIA AD 226 822

Ablation of the posterior vermis of the cerebellum was performed in the cat. Histologic controls showed that the lesion included the pyramis, uvula, and nodulus, but tuber vermis and nuclei fastigii may be encroached upon. The result was a syndrome characterized by disequilibrium and postural nystagmus during the unstabilized period of cerebellar deficiency, followed by compensation.

The postural nystagmus was a "benign paroxysmal type", which was consistently vertical toward the nose and which appeared mainly when the animal was in a supine position. It was fatigable after several repeated tests and disappeared within a few days or weeks. It could not be reproduced in bilateral labyrinthectomized animals.

It was indicated that (1) the term paroxysmal identified the clinical syndrome but not the location of the cause which may be peripheral or central. (2) The term benign is confusing because it may imply that this type of postural nystagmus is limited to peripheral lesions which follow a mild course. (3) Disappearance of postural nystagmus after destruction of the vestibular organ by operation or disease does not necessarily mean that the positional nystagmus was caused by a lesion in that organ.

Our experiments supported the concept that the paleocerebullum plays an important role in the regulation of vestibular reflexes. Some lesions of this area seemed to release the vestibular centers from cerebellar inhibition. It was postulated that this loss of inhibition, together with the existence of incoming signals from the peripheral receptors, carrying the information of position change of the head, were the primary conditions that elicited the postural nystagmus in our animals. The neural mechanism of the disturbance is still obscure.
(DACO)

59

Allen, R. 1961 QUICK WAY OUT.
Aeronautics, 43(3):24-27

ABSTRACT: History of the ejection seat and a description of the several types developed by Martin Baker.

60

Alvarez, J.Z. EFECTOS DE LA ACELERACION. (Effects of Acceleration)
(Servicios De Medicina De Aviacion)

61

Ambler, R., J.R. Berkshire, and W.F. O'Connor 1961 THE SELECTION OF POTENTIAL ASTRONAUTS.
Aerospace Medicine 32(3):218, March 1961.

ABSTRACT: Since June 1959 all naval air trainees have been given the opportunity to volunteer for astronaut training. This study compares the aptitudes and abilities of those who volunteer with those of the Mercury

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Astronauts, with the final group of 31 from which the Mercury Astronauts were drawn, and with men who did not volunteer. Of 1350 trainees studied 330 volunteered. On tests of intellectual and technical ability 24 per cent of the volunteers scored within the range of abilities displayed by the Mercury Astronauts, and 48 per cent scored within the range of the 31 man Mercury group. The volunteers were superior to the non-volunteers on parameters of aptitude, pre-flight performance, flight, and motivation. The advantages of early selection and implications for longitudinal study are discussed.

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Ambler, R., J. R. Berkshire, & W. F. O'Connor 1961 THE SELECTION OF POTENTIAL ASTRONAUTS. (Paper, 32nd Annual Meeting of the Aerospace Medical Assoc., Palmer House, Chicago, Illinois, April 24-27, 1961)

64

Amelar, R. D. & C. Solomon 1954 THE WAGES OF BOXING IS TRAUMA. DETECTION OF RENAL INJURY AFTER FIGHTS. J. Urology, 72:145, August 1954

ABSTRACT: Blows to the kidney region, in addition to the strenuous exercise, produce trauma to the kidneys, according to findings from examination of boxers' urine soon after their bouts. The interesting problem of the effect of repeated trauma producing scarring in the kidneys and an eventual decrease of the renal function remains to be studied. This could be done in retired boxers too old to fight in the ring.

65

American Machine and Foundry Co., 1960 FEASIBILITY STUDY FOR AN ADVANCED DEVICE FOR STUDYING THE EFFECTS OF ACCELERATION ON MAN. (American Machine and Foundry Co., Alexandria, Va.) WADD TR 60-187, ASTIA AD-236 044, March 1960

CONTENTS:

Basic technical considerations
Radius of vehicle path
Acceleration tolerances
Vehicle concepts
Selection of vehicle configuration for six degrees of freedom motion
Vehicle description
High g vehicle
Support concepts
Peripheral support system
Drive concepts
Rocket drive
Momentum principle
Operating requirements

Jet drive
Steam jet drive
Electric motor peripheral drive
Direct current drive
Alternating current motor drive
Arm concepts
The active cantilever
The semiactive torsion arm
The passive arm
The facility complex
The pit structure
The control center

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American Seating Co. n.d. INERTIA LOCKING REEL (The 0-3903 Inertia Locking Reel Shoulder Harness Take-up). (The American Seating Co., Grand Rapids, Mich.)

ABSTRACT: The #0-3903 type inertia locking reel is a safety device which restrains the forward movement of pilot or passenger in the event of abrupt deceleration of an airplane in which it is installed. It is intended to be mounted on the back of the seat or on some part of the air frame directly behind the seat with the base of the mechanism in a vertical position, the mounting plate toward the front of the plane, and the attachment end of the harness cable pointing upward.

67

Ames, S.W., S. Rosenfeld & C.F. Lombard 1951 DIRECT MEASUREMENT OF RENAL VESSEL PRESSURES UNDER STRESS OF ACCELERATION. J. Appl. Physiol. 3(7):399-403. Jan. 1951.

ABSTRACT: The renal arteries and veins of young goats (kids) were cannulated and blood pressures measured under the stress of repeated 15-second exposures to both positive 2 and 3 G and negative 2 and 3 G. The sequence of blood pressure changes and alterations of pulse rates are described in oscillographic photographs, figures 1 and 2, and the data are summarized in table I. The findings are discussed. These experiments indicate that sufficient change occurs in renal blood pressures under both positive and negative G to depress renal function and probably to reduce urinary output.

68

Ames, S. W., S. Rosenfeld and C. F. Lombard 1951 DIRECT MEASUREMENT OF RENAL VESSEL PRESSURES UNDER STRESS OF ACCELERATION
(Office of Naval Research, Washington, D. C.)
January 1951 Contract N6ori77
Also see J. Applied Physiol. 3(6), January 1951.

SUMMARY: The renal arteries and veins of young goats (kids) were cannulated and blood pressures measured under the stress of repeated 15-second exposures to both positive 2 and 3 G and negative 2 and 3 G. The sequence of blood pressure changes and alterations of pulse rates are described in oscillographic photographs, figures 1 and 2, and the data are summarized in table 1. The findings are discussed. These experiments indicate that sufficient change occurs in renal blood pressures under both positive and negative G to depress renal function and probably to reduce urinary output.

69

Ames, W. H. 1947 TOLERANCE TO ACCELERATION IN THE AUTOMATIC PILOT EJECTION SEAT. Bulletin of U. S. Army Medical Dept. 7(9):776-786, Sept. 1947

ABSTRACT: The development of the jet-propelled aircraft with speeds in excess of 550 mph made it mandatory that some type of powered ejector be provided which could catapult the pilot from the cockpit with sufficient velocity to clear the tail structure of the airplane. The Aero Medical Laboratory's interest in this project was in the determination of the tolerance of the human body to the accelerative force required to eject a pilot and seat from an airplane traveling at 600 mph. In essence, the problem presented to the Laboratory was: Can the body be treated as a projectile that must be subjected to the acceleration required to achieve a terminal velocity of 60 ft. per second in the stroke length available in a standard aircraft cockpit. The figure of 60 was based on calculations showing that this velocity would be required for a pilot and seat to clear the vertical stabilizer of an airplane traveling at 600 mph. This article reports the results of the investigations conducted by the Aero Medical Laboratory. (CARI)

70

Ames, W.H., H.M. Sweeney & H.E. Savely 1947 HUMAN TOLERANCE TO ACCELERATION IN PILOT EJECTION. J. Aviation Med. 18(6):548-553

ABSTRACT: In view of individual varioations, it is apparent that the accelerations applied to the subject should be kept to the minimum required to

achieve the desired terminal velocity and that the rate of application of the g forces be kept as low as possible. The present ejection seat equipment developed by the Army Air Forces and the Ordnance Department provides a terminal velocity of 60 feet per second with a maximum of 14 to 16 g on the subject at a rate of application of 175 to 200 g per second. This system provides a means of emergency escape from high speed aircraft with a maximum g well under what is considered the physiological tolerance to high linear acceleration.
In service use, it is evident that a thorough indoctrination should be given all pilots of aircraft equipped with ejection seats so that they may become conditioned to the sequence of events prior to ejection and appreciate the necessity of assuming the proper body position. This indoctrination should consist of a demonstration of the equipment, movies of actual live ejections, such as the two made in August, 1946, at Wright Field, and an ejection on the 100-foot ejection seat test tower.

71

Ames, W.H. 1948 HUMAN TOLERANCE TO HIGH LINEAR ACCELERATIONS OF SHORT DURATION. Military Surgeon, 103(2):96-99, Aug

ABSTRACT: The results of the studies conducted by the Air Materiel Command on the factors involved in human tolerance to high accelerations of short duration as applied from head to foot.

72

Ames, W.H., and H.E. Savely 1948 MOTION OF THE HEAD DURING SIMULATED SEAT EJECTION. (Engineering Division, Air Materiel Command, U.S. Air Force) MCREXD 695-661, 6 Jan. 1948. ASTIA ATI 67688.

ABSTRACT: This report contains the results of studies to determine the effects of fore-aft adjustment of the head rest on motion of the head during simulated ejection on a test tower. After completion of the tests, it was concluded that the danger of injury to the neck during simulated seat ejection on a test tower can be effectively controlled by proper fore-aft position of the head rest and the assumption of the proper body position. If hyperflexion of the neck occurs during accelerations of approximately 12 g or over, some degree of injury to the neck can be expected. No experimental methods are available for assessing the degree of injury which may occur.

73

Ammons, R.B. 1947 ACQUISITION OF MOTOR SKILL: II. ROTARY PURSUIT PERFORMANCE WITH CONTINUOUS PRACTICE BEFORE AND AFTER A SINGLE REST. J. Exp. Psychol. 37:393-411

SUMMARY: Undergraduate women (N = 510) were given 1/3, 1, 3, 8, or 17 min. continuous practice on pursuit rotors, rested 1/3, 2, 5, 10, 20, 60, or 360 min., then practiced eight min. more. The data obtained were analyzed to show the effects of duration of pre-rest practice and length of interpolated rest on several variables defined in terms of the rotary pursuit performance curve.

The conclusions confirm, give quantitative value to, and extend generalizations and predictions made in a previous paper. Further experimentation aimed at obtaining exact mathematical equations might well lead to a precise theory of rotary pursuit learning.

74

Amtmann, H.H. Oct. 1948 PROPOSAL FOR A HIGH PERFORMANCE PRONE POSITION TEST AIRPLANE. USAF Aero Med. Lab., Memo Rept. MCRXED-695-72-D.

75

Amtmann, H.H. 1948 PROPOSAL FOR A NEW AIRCRAFT CONTROL SYSTEM FOR CONVENTIONAL AND PRONE POSITIONS. AAF Memo Report TSEAA-695-72C

76

Ananoff, Alexandre 1950 L'ASTRONAUTIQUE (ASTRONAUTICS) (Paris: Librarie Artheme Fayard, 1950)

ABSTRACT: According to a review in Rocket-Science 4:48, June 1950, two-thirds of this book is devoted to space flight and such things as the space station, step rockets, manned space flights, astrogation and the numerous chemical and physical problems of space flight.

77

Anderson, B. 1958 SPACE TRAVEL (California Inst. Of Technology, Jet Propulsion Lab., Pasadena, Calif.) Literature search no. 66; 18 April 1958.

ABSTRACT: A compilation of unclassified references associated with the problems of space travel with special emphasis on the physiological aspects.

78

Anderson, C. H., M. McCally, and G. L. Farrell 1959 THE EFFECT OF ATRIAL STRETCH ON ALDOSTERONE SECRETION. Endocrinology 64:201.

ABSTRACT: A study was carried out to determine whether the secretion rates of aldosterone and of hydrocortisone are subject to regulation by receptors located in the atria of the heart. In dogs, the right or left atrium was stretched with sutures which extended from the atrium to the thoracic wall. Adrenal venous blood was collected and analyzed for aldosterone and hydrocortisone. Following right atrial stretch the aldosterone secretion rate was significantly reduced. However, stretching the left atrium was without effect on the secretory rate of aldosterone. These findings strongly suggest that the secretion of aldosterone may be regulated in part by stretch receptors located in the right atrium.

79

Anderson, G. V., B. Fruchter, H. T. Manuel, & P. Worchel n.d. SURVEY OF RESEARCH ON SPATIAL FACTORS. AFPTRC-TR-54-84

80

Anderson, H. G. 1919 MEDICAL AND SURGICAL ASPECTS OF AVIATION. (London: Oxford Univ. Press, 1919)

81

Anderson, J.B., Jr. & H. Liebewitz 1958 FIRST INTERNATIONAL CONGRESS ON AERONAUTICAL SCIENCES, MADRID
(Office of Naval Research, London, England) Technical Report ONRL-97-58

ABSTRACT: Technical papers were presented which dealt with problems involved in high-speed flight in the fields of aerodynamics, structures, navigation and guidance, power plants, human engineering, and space flight. This report presents a list of the papers and abstracts the material.

82

Anderson, R. G. 1947
THE MOTIVATIONS OF THE FLYER AND HIS REACTIONS TO THE STRESSES OF FLIGHT J. Aviation Med., 18:18-30

ABSTRACT: Each individual who flies is subjected to the same specific and cumulative stresses in varying degree and intensity. Stress produces anxiety and the end result of anxiety is largely determined by the personality and previous experiences of the individual concerned. The amount of resistance to anxiety which a given individual has is dependent

upon the type and intensity of his motivation. Motivation of sufficient strength may overcome the most serious predisposition. On the other hand, a weak, unhealthy motivation may yield to anxiety when there is little or no predisposition. This suggests that instead of concentrating on eliminating the allegedly predisposed, as has been done in the past without valid statistical support, those interested in the selection of flying personnel should attempt to estimate and evaluate resistance.

83

Anderson, R.S., F. W. Stemler, R.F. McHugh, Jr., & E.B. Rogers 1959
AIR BLAST STUDIES WITH ANIMALS(Biophysics Division, U.S. Army Chemical Warfare Laboratories, Army Chemical Center, Maryland)
CWLR 2288, AFSWP-1110, Subproject 4-08-02-023-03, July
ASTIA AD-225 403

ABSTRACT: Goats, rabbits, and mice have been exposed to air blasts in a shock tube. Translation seemed to be the major cause of injury except for damage in the ears. Correlation have been made between the air pressure, velocity, and distance traversed by the animals.

84

Anderson, R.S., F.W. Stemler, & E.B. Rogers 1961
AIR BLAST STUDIES WITH ANIMALS II
(Biophysics Division, U.S.Army Chemical Research and Development Laboratories, Army Chemical Center, Maryland)
CRDLR 3049, DASA-1193, April
Project 4C99-02-002. ASTIA AD 255 305.

ABSTRACT: Goats (under Nembutal) and mice were exposed in a shock tube modified to give longer-duration overpressures and equipped with ports for photography. Except for ear damage, displacement still seemed to be the major cause of injury in goats in the 4-foot section of the tube. However, it was found that mice were killed, apparently by pure blast, in a particular position in a particular type of side chamber attached to the higher-pressure, smaller-diameter, section of the tube. The relation between maximum velocity of displacement and the distance animals were thrown was fairly regular. The probability of injury over different terrains is discussed.

85

Anderton, D.A. 1952 WILL PRONE FLIGHT LICK HIGH-G LOADS?
Aviation Week, 57(26):21-22,24-25

ABSTRACT: Advantages of prone flight are discussed: G-tolerance would be increased (up to 12 G for half a minute); cockpit configuration would reduce aerodynamic drag; pilot would feel more secure in the face of enemy fire; canopy problems (eg., sealing) are reduced; instrument visibility is improved by elimination of conventional control column.

Disadvantages are pointed out: G-suits and stall characteristics of modern aircraft reduce the argument of increased G-tolerance; lack of canopy necessitates some other means of providing visibility---mirror, television, or radar, all adding weight and new complications; lack of canopy might aggravate claustrophobia. Attempts to use prone-position are reviewed: Horton brothers in Germany; Northrop Aircraft, Inc. (in the MX-324, and the Xp-79); Stanley Aviation Corp. (in a modified F-80E); and Beecraft Associates (in the Wee Bee and a delta-wing trainer). AMC Aero Medical Laboratory's experiments are briefly reviewed; developments of nylon bed, and control system, studies in weightlessness and high-G loadings in airplane and on centrifuge. (CARI)

86

Andes, G. M. and J. E. McNutt 1962 CAPILLARY PHENOMENA IN FREE FALL
J. Aerospace Sci. 29:103-104, January 1962.

The authors of this article question the recently published results on the behavior of freely falling liquids by Benedikt and Reynolds. The authors report their own experimental result that sessile drops, even of nonwetting liquids, remain attached to their substrates when allowed to enter free fall.

87

Andina, F. 1937 ÜBER "SCHWARZSEHEN" ALS AUSDRUCK VON BLUTDRUCKSCHWANKUNGEN BEI STURZFLUGEN (Visual Disturbances "Seeing Black" As Sign of Variations of Cerebral Blood Pressure in Aviators Following Abrupt Changes of Speed During Flight)
Schweiz. med. Wschr. (Basel) 67: 753-756, Aug. 1937.

ABSTRACT: The author, with a military flier as pilot, observed and recorded his own experience with reference to seeing black while the plane made the loop, half-loop, and sudden long drop. According to intensity, the visual disturbances may be divided into three phases. The first may be termed "seeing darkly," with the reading matter looking dark but still legible. At first there is no scotoma. In the second phase a black curtain appears in front of the eyes, beginning at the nasal side, with the portion of the field of vision completely eliminated. In the third phase there is completely blackness, total amurosis. The three phases can hardly be said to follow strictly one after the other because they merge so quickly. Even during the last phase there are no signs of impaired consciousness. The eye seems to be more sensitive after the subject has been flying on his back with head down. In this experimental flight the pilot's reactions were the same as those of the author.

88

Andina, F. 1937 LA VISION NOIRE, EXPRESSION DES VARIATIONS DE LA PRESSION SANGUINE DANS LES ACROBATICS AERIENNES (DARK VISION, EXPRESSION OF BLOOD PRESSURE VARIATIONS IN AERIAL ACROBATICS)
Schweiz. Med. Woch. 67: 753-756

89

Andrews, A. H. 1945 ACCELERATION TOLERANCES OF THE HUMAN BODY.
(Combined Intelligence Objectives Sub-Committee)
Item No. 24, File No. XXXII-83. ASTIA ATI 59 705.

ABSTRACT: Acceleration tolerances of the human body were investigated in order to obtain information on aircraft crashes and design as related to protection of personnel, design of ejection seats, and design and tactical use of aircraft for mid-air ramming. Tests are described and the various positions of the pilot used in this study are shown diagrammatically. It is stated that an accelerative force of 10 g of 0.01-second duration against the head causes symptoms of cerebral concussion. However, an acceleration of 34.3 g with the body properly supported is the maximum tolerance without causing symptoms of cerebral concussion; therefore, cockpit, seat, seat belt, and harness should be designed to withstand during crashes at least 34 g. (ASTIA)

90

Andrews, W.H. & E.C. Holleman 1960 EXPERIENCE WITH A THREE-AXIS SIDE-LOCATED CONTROLLER DURING A STATIC AND CENTRIFUGE SIMULATION OF THE PILOTED LAUNCH OF A MANNED MULTISTAGE VEHICLE.
(National Aeronautics and Space Administration, Washington, D.C.)
NASA TN-D-546, Nov. 1960. ASTIA AD 246 060

ABSTRACT: An investigation was conducted to determine a human pilot's ability to control a multistage vehicle through the launch trajectory. The simulation was performed statically and dynamically by utilizing a human centrifuge. An interesting byproduct of the program was the three-axis side-located controller incorporated for pilot control inputs. This method of control proved to be acceptable for the successful completion of the tracking task during the simulation. There was no apparent effect of acceleration on the mechanical operation of the controller, but the pilot's control feel deteriorated as his dexterity decreased at high levels of acceleration. The application of control in a specific control mode was not difficult. However, coordination of more than one mode was difficult, and in many instances, resulted in inadvertent control inputs. The acceptable control harmony at an acceleration level of 1 g became unacceptable at higher acceleration levels. Proper control-force harmony for a particular control task appears to be more critical for a three-axis controller than for conventional controllers. During simulations in which the pilot wore a pressure suit, the nature of the suit gloves further aggravated this condition.

91

Andrus, E. C., E. Day, E. Nichols, & S. Scherlis 1941 STUDIES ON THE EFFECTS OF ABDOMINAL PRESSURE UPON THE FLOW AND DISTRIBUTION OF BLOOD. CAM No. 21; 18 Aug. 1941

ABSTRACT: Effect of Spencer type belt inflated at pressures up to 100 mm Hg was studied on 30 male subjects, 16 to 29 years of age. With subject at rest, supine inflation of belt is accompanied by 5 to 6 mm Hg rise in diastolic blood pressure in arms and legs. Venous pressure in arms is not significantly affected, but in legs it usually rises when the belt is inflated, especially if it is adjusted low on the body. Arm volume is unchanged but leg volume increases. Circulation time is not significantly affected. Cardiac output (ballistocardiograph) undergoes transient increase during inflation of belt. Blood flow in arm and calf may increase but usually decreases, particularly with higher belt pressures. This is probably due to peripheral vasoconstriction reflexly provoked by application of pressure to abdomen.

Observations on tilt table. Inflation of belt has no consistent effect on immediate fall of arterial pressure in arms and rise in legs produced by a change from the supine to the erect posture. In over half of subjects, inflation of the belt prevents or lessens progressive fall in brachial arterial pressure during tilting. Increased leg volume on tilting is to some degree prevented by previous inflation of belt. The hypotension produced by sodium nitrite may be very favorably influenced by inflating the belt before or even while tilting. It is concluded that abdominal pressure belts might be valuable in circumstances where pooling of blood in the abdomen occurs.

Effects of inflated belt on respiration. The level of respiration is displaced upward into the complemental air. Tidal air, respiratory rate, and minute volume are little affected. In 13 subjects, vital capacity increased in one, decreased 100 cc in 6,200 to 500 cc in 5, and 1100 cc in one.

Effects of inflated belt on heart. Upward displacement of the diaphragm raises the heart to a more transverse position. Consequently, the ECG shows shift of electrical axis to the left and a concomitant change in the amplitude of T waves. No significant change in size is apparent on fluoroscopy.

92

Andrus, E. C. & S. Scherlis 1943
STUDIES ON THE INFLUENCE OF PNEUMATIC LEGGINGS UPON THE FLOW AND DISTRIBUTION OF BLOOD
CAM Rept. no. 115, February

93

Andrus, E.C., et al. 1948 ADVANCES IN MILITARY MEDICINE.
Vol. 1 (Boston: Little, Brown, & Co., 1948)

CONTENTS:

Part III - Aviation Medicine

The effects of acceleration and their amelioration, E.M. Landis
Visual problems, W.R. Miles & D.W. Bronk
Motion sickness, P. Bard

94

Annenskii, F. D. 1961 SPACE PSYCHOLOGY (Kosmicheskaya Psikhologiya) Trans. of Nauka i Zhizn' (USSR) 28(2):33-39, 1961. (Joint Publications Research Service, New York, N. Y.) Aug. 19, 1961 JPRS: 9916

95

Annenskiy, F.D. 1961 [SPACE PSYCHOLOGY] Nauka i zhizn' (2): 33-39

ABSTRACT: The article investigates the various psychological problems and stresses which future astronauts will probably have to face. Experiments with animals in the second and third Soviet space ships indicate that the body can withstand the physical stresses of space flight and weightlessness. Man may find it more difficult to orientate himself in space and time during space flight because of the lack of succession of day and night and because of the absence of an "up" or a "down" in a state of weightlessness. At first the astronaut will have difficulty in judging the duration of an occurrence. The experience of the space dogs, however, indicated that they preserved some sense of time and rapidly adjust themselves to the situation. An aiding factor here would be the "time metronome" in the brain, i.e., the regular rhythm of 12 oscillations a second in the bioelectric activity of the brain. The astronaut will not be conscious of motion, noise or (except during the active phase of the flight) vibration. Prolonged isolation of this sort can cause various psychic disturbances and halucinations. The author feels, however, that an astronaut will be assisted by the routine instrument readings and observations he will have to make. Drugs may also be used to combat tiredness or insomnia. The general conclusion is that man is sufficiently adaptable to overcome any foreseeable psychological difficulties of space flight.

96

Anthony, A. and P.A. Danner 1955 CYTOLOGICAL AND CYTOCHEMICAL CHANGES IN THE SKIN OF HAIRLESS MICE EXPOSED TO HIGH INTENSITY SOUND. J. Invest. Dermat. 24:435-446. April 1955

ABSTRACT: The results of an investigation of abdominal skin changes in hairless mice following exposures to subthermal (no rise in skin temperature) and thermal (increase in skin temperature) levels of high intensity air-borne sound can be summarized as follows:

1. Subthermal sonic vibrations have no observable effects on the histological structure or functional activity of the skin. Failure to produce tissue injury or cytochemical changes in skins irradiated daily for 3 months is evidence that mechanical effects of sound, at the intensity levels employed, are negligible.

2. Tissue damage produced by very high energy thermogenic sound is primarily the result of local overheating produced by absorption of sound in the skin. Little heat transfer occurred in the skin laterally from the site of exposure as evidenced by the absence of heat damage in glandular and fibrous elements of adjacent regions.

3. Sound-induced skin erythema is followed by a depletion of skin lipids and a diminution in size of cystic elements in the integument.

4. In skin burns produced with intense sound, there is an obliteration of sebaceous and corneal cysts associated with a marked hypertrophy of dermal collagen.

5. The sequence of histological and cytochemical changes following thermogenic sonic irradiation was found to be in complete accord with the response known to occur following ordinary skin burns.

97

Apaix, A., Stringlioni 1959 VERTIGO OF SINUSOID ORIGIN, APROPROS OF A CASE. Rev Otoneuroophtal 31:438-9

98

Apenchenko, Ol'ga 1961 A HARD ROAD TO THE SKY: A REPORTER'S ACCOUNT OF COSMONAUT TRAINING.
Trans. of mono. Truden Put' Do Tebya, Nevo, Moscow, 1961.
(Office of Technical Services, Washington, D.C.)
March 16, 1962 62-24952

99

Archangielskiy, A. 1939 PILOTS AND ACCELERATION. Vo-sanit Dvele

100

Arima, C.L. 1958 BIBLIOGRAPHY OF HUMAN RESOURCES REPORTS 1947 to 1957, PART "A" (Defence Research Board of Canada, Directorate of Scientific Information Service) ASTIA AD-204 501

101

Armament Research Dept. 1946 PILOT EJECTION, RESULTS OF PHYSIOLOGICAL TESTS AT A.R.D. BALLISTICS (L.P.D.) (Armament Research Dept., White Lea) Note No. 130, Sept. 1946.

102

Armed Services Technical Information Agency 1960 BIO-ASTRONAUTICS: AN ASTIA REPORT BIBLIOGRAPHY (Armed Services Technical Information Agency, Arlington, Va.) Feb. 1960 ASTIA AD 233 000 (Suppl. to ASTIA AD 211 775).

ABSTRACT: Previous bibliographies have covered the literature on bio-astronautics through 1958. This supplemental bibliography brings the subject matter up to date through 1959 insofar as report literature represented by ASTIA holdings, is concerned.

103

Arment, D.E. & Ralph C. Lenz 1946 KINETIC MEASUREMENTS ON A PILOT DUMMY EJECTED FROM A P-61 AIRPLANE IN FLIGHT, DETAILED ANALYSIS OF DATA Air Materiel Command, Wright Field, Dayton, Ohio Serial No. TSEAC12A/4303-45-1, Add. 1 October 17, 1946 ASTIA ATI 186 676

ABSTRACT: This report presents the data and the analysis thereof, relative to the forces acting on the pilot-dummy during the ejection-seat tests conducted with the P-61B-5 airplane during the period from 27 February 1946 to 1 April 1946. Detailed studies of the kinetic measurement data resulted in the following conclusions: (a) The ejection velocity (57.6 f.p.s.) obtained in the tests closely approximates the velocity (57 f.p.s.) for which the catapult was designed. (b) At airplane velocities greater than 235 mph indicated airspeed, the horizontal acceleration caused by the airstream exceeds 3 g. The horizontal acceleration becomes physiologically negative if the ejected pilot should rotate to a head-forward position. (c) The increased horizontal acceleration at the higher airspeeds makes reduction of the ejection velocity inadvisable because the pilot's trajectory might approach too close to the tail of the airplane. (d) The vertical acceleration, as recorded for the peak values (27 to 31 g for 0.015 second), exceeds the present-known physiological tolerance of a human subject. (e) The peak "vertical" accelerations were caused by the compressibility of the parachute packs between the seat and the dummy, and probably can be eliminated or reduced by corrective modification of the cushioning components.

104

Armour Research Foundation March 1955 STUDY OF THE EFFECT OF ORIENTATION ON DYNAMIC LOADING AND RESPONSE OF STRUCTURES. Armour Research Foundation Rept. No. 3, Contract No. AF 33(616)-166, 1 March, 1955

105

Armour Research Foundation July 1957 COMPENDIUM OF AIR BLAST EFFECTS, VOL. II, LOADS. (Armour Research Foundation) Contract AF 33(600)-25734

106

Armour Research Foundation 1959
INVESTIGATION OF EMERGENCY ESCAPE UNDER CONDITIONS OF EXTREMELY HIGH ALTITUDE AND VELOCITIES.
(Armour Research Foundation) March

107

Armstrong, H.G. Oct 1935 SUBJECTIVE MENTAL AND PHYSICAL REACTIONS TO FREE FALL IN SPACE
(The Journal of the American Medical Association, 105: 1107-1110)

ABSTRACT: From a study of the subjective reactions to a free fall of approximately 1,200 feet in space, made by means of a delayed parachute jump, it may be concluded that:
1. In a free fall in space the mental reactions are normal, except as influenced by fear, excitement or other factors not attributable to the fall per se.
2. In a free fall in space there is produced only one abnormal physical sensation and this consists of a very gentle, evenly distributed generalized, superificial pressure on the downward surface of the body.
3. There is an apparent dimunution of hearing acuity from an undetermined cause.
4. Position in space and motion through space are recognized solely by means of vision.
5. Depth perception acuity is such that a speed of approximately 100 feet per second at a distance of 1,900 feet from an object is required to recognize motion toward that object.
6. Delayed parachute jumps are entirely practical means of avoiding certain highly hazardous aerial situations.

108

Armstrong, H.G. and J.W. Heim 1937 THE EFFECT OF ACCELERATION ON THE LIVING ORGANISM. (Engineering Division, Air Materiel Command, Wright-Patterson AFB, Ohio) Report No. 2362, Dec. 1, 1937.
ASTIA ATI 25622

ABSTRACT: An investigation was conducted concerning the effect of linear and centrifugal accelerations on the living organism with special reference to military aviation. A series of experimental determinations were made during which accelerations of 1 to 7 times the force of gravity were experienced in flight as well as accelerations of 1 to 16 g produced by

laboratory methods. Synchronous blood pressure-accelerations of 1 to 16 g produced by laboratory methods. Synchronous blood pressure-acceleration recordings were obtained on large animals during accelerations in the 3 coordinate axes of the body and for the positive and negative direction in each of these axes. The tolerance of the average individual is determined, the physiological changes occurring with each acceleration explained, and the possible means of minimizing deleterious effects are described. Recommendations are made for limiting accelerations in flight to a safe limit.

109

Armstrong, H.G., & J.W. Heim 1938 THE EFFECT OF ACCELERATION ON THE LIVING ORGANISM. J. Aviation Med. 9(4):199-215.
See also (Army Air Corps., Wright Field, Dayton, Ohio) TR 4362, 1 Dec. 1937. ASTIA ATI 25 622

ABSTRACT: Positive accelerations, directed thru the long axis of the body and acting in the direction seat to head, result in a shifting of the blood away from the head region to the lower portions of the body. This shifting of the blood away from the head produces a cerebral anemia in the average normal young male adult. 5 seconds are required from the time any given acceleration is reached until the full physiologic effect is obtained. As a consequence the shorter the duration of any acceleration (under 5 secs.) the less the physiologic effect. There is a wide variation in individual susceptibility to positive accelerations which is probably due to the variations in vascular tone and vasomotor control in different individuals. Tolerance is decreased by rapidly repeated exposures but increased by repeated daily exposures. Acceleration of +12.2 G's in flight and +16 G's in the laboratory have been tolerated without evidence of permanent injury. Negative accelerations, directed thru the long axis of the body from head to seat, cause a shifting of the blood away from the lower portion of the body to the head region results in a high intracranial blood pressure. There is little time-lag in negative accelerations. Transverse accelerations, directed thru the body perpendicular to its long axis and in any direction, are relatively well tolerated up to 12 times the force of gravity.(CARI)

110

Armstrong, H. G. 1939 PRINCIPLES AND PRACTICE OF AVIATION MEDICINE. (Baltimore: Williams and Wilkins, 1939)

111

Armstrong, H. G. 1940 MEDICAL PROBLEMS OF HIGH ALTITUDE FLYING. J. Lab. Clin. Med. 26:263-271.

ABSTRACT: The current medical problmes of high altitude flying depend principally on the altitude attained. As a consequence, the problems of commercial air transport operations are fewer and less serious than those in military aviation, since the former is limited to 18,000 feet. In either instance all the deleterious effects of altitude flying are brought about by the decrease in atmospheric temperature and pressure with ascent.

In spite of winter-flying clothing, personnel begin to suffer at about -10° C. The solution to the problem of cold in high altitude flight is to close and heat the cabin. This has been satisfactorily accomplished in civil aircraft and to a certain extent in military aviation.

During ascent another problem appears when the composition of the atmospheric air remains constant but its total pressure and partial pressure of its component gases decrease. This decrease in turn brings about a decrease in the alveolar oxygen tension and in the oxygen saturation of the arterial blood. This results in a tissue anoxia to which, in aviation, the term "altitude sickness" has been given.
Still another problem in high-altitude flying is the decrease of atmospheric pressure with ascent which may produce five different pathologic states in the body. Three of these are brought about by expansion of the gases contained in the body cavities.

112

Armstrong, H.G. 1943 PRINCIPLES AND PRACTICE OF AVIATION MEDICINE. (Baltimore: Williams and Wilkins Co., 1943) 2nd. Ed.

113

Armstrong, H.G. 1943 SPEED AND ACCELERATION. In Principles and Practice of Aviation Medicine. 2nd ed. (Baltimore: Williams & Wilkins, 1943). Pp. 406-435

114

Armstrong, H.G., H. Haber, & H. Strughold 1949 THE AEROMEDICAL PROBLEMS OF SPACE TRAVEL. In USAF School of Aviation Medicine, Rancolph AFB, Texas, Epitome of Space Medicine, Item No. 11, Pp. 383-401
See also J. Aviation Med. 20(6):383-402, 402-417-Discussion. Dec. 1949.

ABSTRACT: Each of the articles discusses specific problems involved in space travel. Dr. Haber discusses the physical and astronomic problems while Dr. Strughold is concerned with the physiological problems. (CARI)

115

Armstrong, H. G. 1951 SPACE MEDICINE IN THE UNITED STATES AIR FORCE. In Marbarger, J. P., ed., Space Medicine; The Human Factor in Flights Beyond The Earth (Urbana, Ill.: University of Illinois Press, 1951). Pp. 11-13.

116

Armstrong, H.G. 1952 PRINCIPLES AND PRACTICE OF AVIATION MEDICINE. (Baltimore: Williams and Wilkins Co., 1952) 3rd Ed.

117

Armstrong, H.G. 1952 SPEED AND ACCELERATION. Ch. XXI of Principles and Practice of Aviation Medicine, 3rd ed. (Baltimore: The Williams and Wilkins Co., 1952) Pp. 353-380.

118

Armstrong, H.G., ed. 1961 PRINCIPLES AND PRACTICE OF AEROSPACE MEDICINE. (Baltimore, Md.: The Williams and Wilkins Co., 1961)

ABSTRACT: The successor to an earlier book entitled "The Principles and Practice of Aviation Medicine," It is the only complete treatise in existence at present on the subject of aerospace medicine. A great array of diverse subject matter is arranged in an orderly, logical sequence of 32 chapters written with the highly specialized knowledge and experience of 21 contributing authors. The information contained has been culled from some 1100 scientific journals, periodicals, and technical reports, many of which are published in foreign languages. This volume has been written primarily for the use of the student and the practioner of aerospace medicine.

119

Armstrong, N. A and E. C. Holleman 1962 A REVIEW OF IN-FLIGHT SIMULATION PERTINENT TO PILOTED SPACE VEHICLES (Advisory Group for Aeronautical Research and Development, Paris, France.) AGARD-403 July 1962

ABSTRACT: This report shows how the environment of actual flight may be used to simulate many phases of manned space exploration. A number of simulations using conventional, modified, and specially built aircraft are discussed in relation to the portion on spaceflight to which they are generally applicable, that is, the launch, orbital, entry, or the landing-approach phase. Inasmuch as this is a survey, only the scope of the investigations is indicated; no detailed descriptions of, or conclusions from, the research programs are given. Quantitative results may be extracted from the papers mentioned in the references. (Author)

120

Armstrong, R.C. 1959 THE EFFECTS OF POSITIVE PRESSURE BREATHING ON TRANSVERSE ACCELERATION TOLERANCE.
(Convair Aviation, Space and Radiation Medicine Group, San Diego, Calif.)
Rept. No. ZM-AM-001, 14 Jan. 1959.

ABSTRACT: The intent of this paper is to define the basic physics of acceleration in terms of Biological effects, to apply these definitions to techniques for attenuating acceleration stress, and to provide experimental data to support the theoretical conclusions.

121

Armstrong, R.C. and W.L.S. Wu. 1960 EFFECTS OF ZERO "G" ON LIFE SUPPORT SYSTEM DESIGN (Convair Astronautics Div., San Diego, Calif.)
ZM-AM-003, 27 April 1960.

ABSTRACT: It is important to consider the probably consequences of both short and protracred exposures to near or absolute weightlessness in order to establish design guide lines for life support systems and personal equipment to attenuate any adverse responses that are anticipated.

122

Armstrong, R.C. 1961 MARS-SPACE TRAVEL SIMULATOR
Interavia (Geneva), 16 (12): 1983. Dec. 1961.

ABSTRACT: The Manned Astronautical Research Station (MARS) mockup vehicle is capable of taking three astronauts 200 miles into space for three weeks of scientific study. MARS, which is 24 ft in diameter and contains three rooms, can simulate all of the biological environments of orbit except those of hart radiation, zero g, the internal stress of apprehension, the hyper-gravity encountered during launch and re-entry, or the vehicle's dynamic sound pressure levels. It does simulate the normal background noise of orbital flight. As an experimental platform for life science research it will be useful in: determining the physical reactions and operational capabilities of man during flight; conducting physiological and sociological experiments in a confined environment; conducting biological experiments varying the atmospheric pressure, temperature, and humidity; providing for the design and test of apparatus and equipment for advanced space vehicles; and determining the types of testing and training program necessary for space crews.

123

Arno, R. 1960 DIGITAL COMPUTER PROGRAM FOR ACCELERATION PERFORMANCE, TRACKED VEHICLES (Detroit Arsenal, Center Line, Mich.) Rept. no. RR-8, Contract DA 20-089-ORD-39246, Proj. 5510.11.270 and 5W72-01-001; 25 Jan 1960. ASTIA AD-239 330

ABSTRACT: A general computer program was written for the Electrodata 204 "Datatron Digital Computer to calculate acceleration performance and related characteristics of tracked vehicles. Vehicle performance is determined at prescribed time interval during acceleration from standstill to maximum velocity. Other additional data supplied by the program are vehicle speed, distance traveled, time of travel, sprocket torque, tractive effort, rolling resistance, drawer pull, and acceleration (Author)

124

Arnold, A. 1955 LONG RANGE UPWARD EJECTION SEAT TRAJECTORY ANALYSIS. (Stanley Aviation Corporation, Denver, Colo.) Report #326 Feb. 16, 1955. ASTIA AD 140 727

ABSTRACT: A brief analysis is presented in memorandum form to define the methods used in trajectory analyses for the long range ejection seat. First the equations of motion are established and then a correlation is shown between them and the tabular calculation with the introduction of an error control which determines the allowed length of time interval for the step-by-step integration procedure. Only pitching motion is considered, thus motion is confined to the plane of symmetry.

125

Arnold, J. S., T. D. Witherly and C. T. Vincent 1959 THE STUDY OF ROCKET SLED SLIPPER WEAR PROBLEMS.
(US Air Force Missile Development Center, Holloman AFB, New Mexico)
AFMDC-TR-59-38 ASTIA AD 228 444

Abstract: The use of track coatings and wear-resistant slipper materials to reduce the wear of the slipper of rocket propelled track vehicles is discussed. Four metal coatings (aluminum, lead, zinc, and tin babbitt) were tested with stainless steel and molybdenum sliders. Zinc coating was the most effective. Molybdenum disulfide and calcium hydroxide (non-metallic) coatings were tested. Calcium hydroxide proved useful in wear reduction. Molybdenum disulfide cannot be evaluated until adherence to the track can be solved. An effort to produce a ductile molybdenum alloy was unsuccessful. On the basis of a few runs, vanadium may be a useful slipper material. Inertial forces and accelerations of considerable magnitude and short duration play an important role in the overall slipper wear problem.

126

Arnoult, M.D. 1949 POST ROTATIONAL AUDITORY LOCALIZATION (U.S. Naval School of Aviation Medicine and Research, Naval Air Station, Pensacola, Fla. and Tulane University of Louisiana) Joint Project Report No. 2. Report No. 1. 13 May 1949. ASTIA ATI 69 635.

ABSTRACT: In this investigation an attempt was made to determine the effect of rotation upon the auditory localization of sound. Four Ss were rotated ten revolutions at the rate of 30 rpm and allowed to make judgments of the position of an auditory stimulus following the cessation of rotation. In the total number of trials 80 percent reported displacement in the direction of rotation; 8% showed displacement in a counterrotatory direction, and 12 % reported no displacement. The amount of angular displacement one second after the cessation of rotation was of the order of from 10° to 20°. The duration of the displacement ranged from two to 27 seconds with a mean value of 14 seconds.

127

Aronow, M.L. 1959 STEADY-STATE ACCELERATION TEST EQUIPMENT. In 1959 Proceedings of the Institute of Environmental Sciences, Annual Technical Meeting, April 22-24, 1959, La Salle Hotel, Chicago, Illinois Mt. Prospect, Ill. Institute of Environmental Sciences, 1959. Pp. 206-208

ABSTRACT: Among the many physical simulators currently in use for environmental testing and dynamic instrument calibration, the rotary accelerator is the only one capable of subjecting a test object to a constant and indefinitely sustained acceleration. This device is becoming increasingly important in the dynamics laboratory for the calibration of seismic instruments and for certain environmental tests particularly important on missile and aircraft components. The basic rotary accelerator is a centrifuge generally equipped with a variable speed drive, operator controls, a rotating arm arranged for mounting test objects and slip rings for connecting power and instruments to the test objects It exists in a number of specialized forms. Several of these forms will be described and their use briefly considered. (Author)

128

Arsen'eva, M.A., V.V. Antipov et al 1961 ISMENENIIA V KROVETVORNYKH ORGANAKH MYSHEI POD VLIIANIEM POLETA NA KORABLE-SPUTNIKE (CHANGES IN THE HEMATOPOIETIC ORGANS OF MICE UNDER THE INFLUENCE OF FLIGHT IN A SPACESHIP) Iskusstvennye sputniki zemli (Moskva) 10: 82-92, 1961

ABSTRACT: The effect of space flight conditions wa studied on the hematopoietic organs of 40 black S-57 strain mice and white mice sent up in the 2nd sputnik. An attempt was made to differentiate between the action of vibration, acceleration, and radiation. All animals were returned to earth in good condition. Chromosome disintegration during mitosis in the bone marrow cells was significant-

ly increased in the experimental animals as compared to controls. The findings differed from the results of x-ray studies in that the frequency of chromosome destruction did not decrease prior to the end of the experiment and mosaicism in chromosomal changes was almost completely absent. Thirty days after the return to earth myelopoiesis increased sharply, manifested in an increased number of nyeloblasts, promyelocytes, and myelocytes. Three days after the return the number of megacaryocytes in the spleen decreased. Certain other changes noted in the hematopoietic organs are presumed to be caused by vibration and other adverse factors in flight. (J. Aerospace Medicine 33(11): 1395-1396, Nov. 1962)

129

Arskiy, Kh. T. 1940 ZUSTAND DER CORTICALEN FUNKTIONEN IM ZUSAMMENHANG MIT DEM ABSPRUNG VOM FALLSCHIRMTURM (Condition Of The Cortical Function In Connection With Jumping From The Parachute Tower)
Vo.-sanit. Dyelo (7):90-96. 1940

130

Arslan, M. 1961 THE CORIOLIS ACCELERATIONS IN VESTIBULAR STIMULATION. (ELECTRONYSTAGMOGRAPHIC INVESTIGATIONS)
In Confin.Neurol. 21:403-411, 1961 (France)

131

Arulpragasam, A.C. 1960 THE EFFECT OF DIVISION OF THE CHORDA TYMPANI NERVE IN A CASE OF PERSISTENT POSITIONAL VERTIGO AND SOME OBSERVATIONS AND COMMENTS. J. Laryng. 74:119-20, February 1960

SUMMARY: 1. Division of the appropriate chorda tympani nerve had a curative effect on a case of positional otolith vertigo, which was persistent.

2. The disordered reaction of the oto lith organ in positional vertigo, appears to be mediated through the chorda tympani nerve.

3. Division of the chorda tympani nerve in this case, resulted in an immediate disturbance of the vestibular system.

4. It is suggested that the temporary vertigo sometimes observed, after Rosen's operation for stapes mobilization, may in some instances be due, to division or damage to the chorda tympani nerve.

5. Facial palsy can be a complication of division of the chorda tympani nerve.

132

Aschan, G. 1952 CUPULOMETRIEN SOM FLYGMEDICINSK UNDERSÖKNINGSMETOD. (Cupulometry as an Aeromedical Testing Method) Meddelanden fran flygoch navalmedicinska namnden (Stockholm) (1):4-6, 1952.

ABSTRACT: The cupulometric method constitutes an improvement over the old rotating-chair methods (such as the Barny test) in which the stimuli surpass qualitatively and quantitatively those encountered under normal circumstances. Cupulometry is carried out in such a way that the speed of rotation does not exceed 50 degrees - 60 degrees per seconds. Instead of the subject being rotated on a chair within a room, he is placed in a rotating chamber. The acceleration is controlled so as not to exceed the stimulus threshold of the cupular organs (about 0.5 degrees per sec.^{2}). Only when the rotation chamber is brought to a sudden stop will the subject perceive a sensation of rotation and show post-rotative nysagmus opposite to the direction of rotation. The first applications of this method gave surprising results. A test carried out on a number of normal, healthy flying cadets revealsed that none of them had a "normal" cupulogram. Stimulus thresholds were substantially raised, and subjective as well as objective time values were lowered markedly. All these data point at a reduced vestibular sensitivity. An asymmetric right and left response was frequently observed, a phenomenon which jibed with reports from the pilots that all their planes had a tendency to roll more easily to one side.

133

Aschan, G., C. O. Nylen, J. Stahle, & R. Wersall 1952 THE ROTATION TEST: CUPULOMETRIC DATA FROM 320 NORMALS. Acta Oto-Laryngologica 42(6):451-459, Dec. 1952

SUMMARY: With a method largely the same as that van Egmond et al. have developed from findings by Buys, Fischer, etc., 320 adults of both sexes with negative otoneurological histories and normal audiograms were examined for post-rotatory nystagmus and "after-sensation". The acceleration was constantly 0.5 degrees per sec.^{2}, the speed of rotation never exceeded 52 degrees per sec. and the deceleration was always 20--30 degrees per sec.^{2}. The following results were obtained. 1) Statistical analysis confirmed van Egmond et al.'s finding that, under given conditions, postrotatory phenomena and speed are correlated, a fact illustrated graphically by so-called cupulograms. 2) There is consicerable individual variation, manifested simply as displacement up or down of the cupulogram and by the range of threshold speeds and their means: Nystagmus-inducing speed threshold: range, 1.5-12 degrees per sec.; mean, 4.5 degrees per sec. 3) Paired observations for left and right stimuli highly facilitate the detection of cupulographic "Nystagmusbereitschaft", i.e. directional preponderance. 4) When rotation to the right precedes rotation to the left at all the various speeds, the nystagmus cupulogram will display a systematic directional preponderance to the left.

Conversely, when the initial rotation is to the left, the resulting preponderance will be in the opposite direction. This is not applicable to sensation. 5) A single pair of observations for nystagmus duration following contradirectional stimulation which differ by more than 12-13 seconds might indicate abnormality. A consistent unidirectional difference over 6 secs. at 4-6 speeds must be considered pathological. 6) The statistical results and experiences to date of "clinical cupulometry" strongly suggest that clinical usefulness of the method will spring from the nystagmus cupulogram, particularly as it provides a means of detecting directional preponderance. The sensation cupulogram does not seem equally valuable. 7) The test produced no symptoms of nausea in any of the test subjects. (AUTHOR)

134

Aschan, G. 1954 RESPONSE TO ROTATORY STIMULI IN FIGHTER PILOTS
Acta oto-Laryngologica 115:24-31
NOTE: Reel 7, Flash 6, Item 18

ABSTRACT: One hundred fighter pilots were examined oto-neurologically in order to determine whether their profession influenced their oto-neurological status. A tangible relation to their actual flying duties is demonstrable. Fully trained fighter pilots in good trim, with practically daily ascents, show a sensation cupulogram with a higher threshold value and slighter inclination (lower $\not\sim/\Delta$) of the curve of the sensation cupulogram than do pilots with a smaller training. Pilots flying to a very limited extent did not differ in any way from the control material consisting of non-aviators.
The nystagmus cupulograms show the same. In these, there is often directional preponderance, and in 26 out of 33 cases this corresponds to case histories saying that the pilots concerned more easily rotate their aircraft--carry out rolls --in agreement with this directional preponderance.
Absence from flying for a long period (months) leads to a normalization of the status.
Significant oto-neurological changes in the calorigrams could not be demonstrated except in a few cases. These have been accounted for separately, with unmistakable oto-neurological diagnoses.
In discussing the results, it is maintained that the genesis of this vestibular fatigue, adaption or habituation demonstrated in "normal" fighter pilots must probably be sought, not peripherally in the cupula itself, but in the nervous part of the vestibular apparatus. (AUTHOR)

135

Aschan, G. 1955 THE MECHANISM OF THE CUPULA AMPULLARIS IN MAN. Acta Societates Medicorum Upsaliensis 60:77-88.

SUMMARY: Rotary stimulation of the semicircular canals with well-defined stimuli (1-4°/sec²) during varying periods were carried out using "normal" test subjects. The results of vestibular stimulation were gauged by recording nystagmus with as little ocular interference as possible. The speed of the slow component of nystagmus was used as an indicator of the cupular movement in accordance with Steinhausen's hypothesis.

The tests showed that, when angular acceleration ceased, there was an immediate reduction of speed in the slow component of nystagmus. An explanation of this change of speed is offered by the postulation of a double movement of the cupula ampullaris when the subject experiences angular acceleration. Dohlman and Vilstrup, in their experiments on animals, have shown that at angular accelerations the cupula as a whole is distorted but also slides over the surface of the crista ampullaris. The tests described here should provide grounds for the assumption that the mechanism of the cupula ampullaris in man is of a similar nature.

136

Aschan, G., M. Bergstedt, & J. Stahle 1955 NYSTAGMOGRAPHICAL OBSERVATIONS ILLUSTRATING THE CUPULAR MECHANISM IN RABBITS AND PIGEONS Acta Societatis Medicorum Upsaliensis 60:89-122

SUMMARY: When nystagmus in the rabbit and the head-nystagmus of the pigeon are recorded, both animals being subjected to angular accelerations, an immediate reduction of the speed in the slow component of nystagmus is noted. This reduction occurs at the transition from acceleration to a constant speed of rotation and at deceleration when rotation ceases.
A plausible explanation of this phenomenon would be a double movement of the cupula ampullaris with angular acceleration, as demonstrated by Dohlman and Vilstrup. The two facets of this movement are a torsion of the actual cupula and a sliding of the cupula as a whole along the surface of the crista.
When weak angular accelerations are experienced, we obtain the first type of cupular movement, but with stronger accelerations, the resultant post-acceleratory nystagmus indicates that the second facet of cupular movement has taken place.
The tests on pigeons, where the structure of crista ampullaris in the vertical and horizontal semicircular canals is different, appear to offer evidence for the assumption that the mechanism of all ampullae is identical. (Author)

137

Aschan, G., & M. Bergstedt 1955 THE GENESIS OF SECONDARY NYSTAGMUS INDUCED BY VESTIBULAR STIMULI. Acta Societatis Medicorum Upsaliensis 60(3 & 4):113-122

SUMMARY: The caloric tests were carried out by irrigating either one or both ears. The double irrigations were of three types; hot/hot, cold/cold, hot/cold. The results of these tests demonstrated a central nervous process able to add and subtract the impulses released by peripheral vestibular stimulation. Judging by the speed of the slow component of nystagmus, ampullo-petal or ampullo-fugal cupular deflection in corresponding ampullae in both labyrinths cancel each other out. Ampullo-fugal stimulation of one and ampullo-petal of the other are added, giving rise to a much higher speed of the slow component than when only one ear is stimulated.

The secondary phase of nystagmus induced by calorization was only observed after hot/cold double irrigation. Rotary tests were carried out using small angular accelerations. The periods during which these accelerations were administered were chosen so that the theoretical cupular deviation in each test was approximately of the same magnitude (1.8 degrees---1.9degrees). A secondary phase of nystagmus was not dependent on the theoretical cupular deviation but on the total duration of the primary rotary nystagmus. Even rather weak stimuli such as 1 degree/sec.^{2} during a sufficiently long period can give rise to a secondary phase of nystagmus.

After nystagmus and turning sensation following opto-kinetic stimulation have been demonstrated, the former by objective recording. In these tests every kind of influence is excluded from the cupula ampullaris.

The secondary phases of nystagmus and turning sensation due to vestibular stimulation appear to have a central nervous genesis. Further evidence of this is the occurrence of secondary phenomena due to opto-kinetic stimuli where all vestibular stimuli were excluded. (AUTHOR)

138

Aschan, G. and J. Strahle 1956 CUPULOMETRIC STUDIES ON THE PIGEON. Acta Oto-laryngol. 46(2):91-98

SUMMARY: An account is given of a cupulometric study on pigeons done to ascertain whether any physiological difference exists between the ampullae of the horizontal and the vertical semicircular canals. The duration of the post-rotatory nystagmus and the number of beats were noted after rotation in the horizontal, right-lateral, and left-lateral positions, deceleration throughout being 12° sec^{-2}. Photo-electric-cell nystagmography was carried out in addition.

The duration of nystagmus and the number of beats were significantly greater from the horizontal canals than from the vertical.

On rotation the pigeon spontaneously places one pair of semicircular canals in the plane of rotation. The subsequent post-rotatory nystagmus oscillates in this plane in accordance with the Flourens-Ewald law.

The possible reasons for the difference between the reactions of the vertical and horizontal canals are discussed. Phylogenetic and anatomical considerations are thought to be responsible.

139

Aschan, G., M. Bergstedt, B. Drettner, C. O. Nylen, & J. Stahle 1957 THE EFFECT OF HEAD MOVEMENT ON POSTIONAL NYSTAGMUS - ELECTRO-NYSTAGMOGRAPHY WITH AN ELECTRIC DRIVEN POSTURE TABLE. Laryngoscope 67:884-893

SUMMARY: The use of a posture table should facilitate the differentiation of the significance of head-movement and head-position in the release of positional nystagmus. An electrically driven posture table is described. With this it is possible to rotate the patient at a constant rate following initial subliminal acceleration.

Experiments in an electric posture table, on patients with persistent and transitory positional forms of nystagmus, are described. Nystagmus was recorded instrumentally with the patient's eyes closed. This precaution eliminates the source of error due to visual stimuli. In addition, nystagmus can be assessed both qualitatively and quantitatively, and comparisons can be made between records obtained under different test conditions.

The investigation indicates that in persistent forms of positional nystagmus the position of the head is the determining factor. In transitory and transitional forms, on the other hand, movements of the head also play a significant part in the releasing mechanism.

To avoid overlooking cases with transitory forms of positional nystagmus, the most suitable way to perform the standard posture-test, therefore, is to let the patient perform a fairly rapid turning from one position of the head to another. It corresponds on the whole to the old fashion of testing on a couch.

140

Ascroft, P. B. 1943 BLAST INJURY OF THE LUNGS WITH A CURIOUS LESION OF THE CEREBRUM.
The Lancet 1:234-235, Feb. 20, 1943.

SUMMARY: In a fatal case of multiple injuries due to the explosion of a hand grenade at very short range, the external injuries were not in themselves fatal. There was extensive haemorrhagic infiltration of the lungs, typical of the kind due to blast. An unexpected finding at autopsy was a peculiar discoloration of large areas of the cerebral hemispheres, due to great numbers of minute haemorrhages confined to the grey matter of the cortex.

141

Askren, W.B. 1959 MAN FUNCTIONS IN SPACE FLIGHT.
(Wright Air Development Division, Wright-Patterson AFB, Ohio)
WADC TR ASTIA AD-238 480

ABSTRACT: The hypothetical activities of a three-man crew of an earth-to-moon flight were analyzed with respect to some of the following subsystems: navigation, flight control, energy management, environment contorl, secondary

power management, communications, escape reconnaissance, offense and defense. The following selection criteria were suggested: (1) sensory abilities, such as vision, hearing; (2) mental abilities such as general intelligence, computational skills, problem solving ability; (3) motor skills, such as tracking skill, response times; (4) tolerance to physiological stress, such as high g, heat, cold; and (5) adaption to new experiences (psychological stress) such as confinement, new food forms, and crew interaction.

142

Asmussen, E., E. H. Christensen & M. Nielsen 1940 THE REGULATION OF CIRCULATION IN DIFFERENT POSTURES.
Surgery 8:604-616.

ABSTRACT: Our experiments indicate that the circulation rate in quiet standing is on the lower limit of what is really desirable and that, even if the fast pulse rate in the standing position in itself is no sign of insufficiency, it indicates on the other hand that some extra stress is put onto the pressure-regulating mechanism.

A diminished cardiac output during quiet standing has to be looked upon as a sign of insufficiency, even if the O_2 consumption and the arterial blood pressure remain normal. The vessels of the lower extremities are distended by hydrostatic forces; a large amount of blood remains there and consequently the filling and pressure or the central veins get too low to secure an adequate filling of the heart and a normal cardiac output. Through an increased heart rate and through compensatory contractions of the vessels in certain organs (e.g., in the intestines) a normal arterial blood pressure might be obtained. However, it must be remembered that a diminished circulation rate to these organs with partly contracted vessels locally may have an unfavorable effect. It may be of great importance that circulatory insufficiency due to a peripheral dilation of the vessels or to a loss of blood can be counteracted by an elevation of the lower extremities. The autotransfusion of blood that can be made in this way may be of great significance. In cases where a circulatory insufficiency due to a disproportion between the total blood volume and the capacity of the vessels is obvious, any posture where hydrostatic forces can induce an increased filling of the vessels of the lower extremities should be avoided. Even a small decrease in cardiac output may mean a rather severe insufficiency of the circulation of certain organs. The beneficial effect of the reclining position to a great extent may be due to the abundant blood supply to the different organs obtainable in that position. (Author)

143

Asratyan, E. A. 1961 ACADEMICIAN ASRATYAN STATEMENT
FBIS Far East, Nr. 72, April

ABSTRACT: This article is an extract of an interview with Alternate Member of USSR Academy of Sciences, E. A. Asratyan. In the interview, Asratyan discussed the value of the Sputnik flights in preparing for Gagarin's space flight. One of the greatest problems studied during the Sputnik flights was great acceleration.. Scientists found how highly sensitive the blood circulation system is to change in flight conditions. From this the scientists were able to conclude that it is essential to create conditions for maximum diminution of the effect of overload on the cosmonaut. Account was also taken of the fact that this influence can affect not only the vegetative functions of the human organism, but also the higher levels of the centrl nervous system. (CARI)

144

Astashenkov, P. and B. Zhukov 1958 COMBAT HELPMATES OF THE FLIERS.
(Trans. of mono. Boyevye Pomoshchniki Letchikov, Moscow, 1956)
(SLA Translation Center, Chicago, Ill.) 59-14099.

145

Astbury, A.K. 1952 PROGRESS IN MILITARY MEDICINE IN BRITAIN Military Surgeon 110(2): 132-133.

ABSTRACT: Recent advances in aviation medicine are briefly summarized. Among the specific items mentioned are the development of anti-g equipment, control of body temperature by proper clothing, prevention of motion sickness, and evacuation by helicopter.

146

Atria, N. F. 1951 IL MEDICO D'AERONAUTICA ED ALCUNI PROBLEMI DI MEDICINA AERONAUTICA RELATIVI AL VOLO A REAZIONE (The Flight Surgeon And Problems of Aviation Medicine Relative to Jet-propelled Flight)
Rivista di Medicina Aeronautica, Rome, 14:183-189, April-June 1951.

147

Atria, N. F. 1952 AEROMEDICAL PROBLEMS OF JET FLYING. U. S. Air Force Medical Service Digest 3(2):30-32.

ABSTRACT: The medical problems encountered in jet plane flight are different from those of propeller-driven flight. The main problems concern bailout, high altitude, and noise. As to bailout from jet planes, the USAF uses an ejection seat which is catapulted by an explosive charge along two guide rails. The effects of high altitude may be prevented in one of three ways: wearing a pressure suit (this has been discontinued as it makes the operation of the plane difficult); the use of pressurized cabins (without pressurization, the average flyer may be able to fly at 46,000 feet for about 25 minutes, beyond this time the blood would pool or filter into the tissues); and pressure breathing (this requires a revision of the pilot's breathing habits and may induce chest pains because of the stretching or rupture of alveoli). These methods may also be combined, e.g. pressure breathing in a partially pressurized cabin. High-intensity noise may induce a temporary hearing loss, e.g. a loss of 20 decibels in a sound field of 120 decibels within 30 minutes.

148

Austin, F. H. 1959 PHYSIOLOGICAL INSTRUMENTATION OF PILOTS FOR TEST AND OPERATIONAL FLIGHTS IN NAVY HIGH PERFORMANCE JET AIRCRAFT. PHASE I. PRELIMINARY INVESTIGATIONS. (Paper, Fourteenth Meeting of the Flight Test Techniques and Instrumentation Panel, May 11-15, 1959, Athens, Greece) (Advisory Group for Aeronautical Research and Development, Paris, France) AGARD Rept. No. 240. ASTIA AD-248 343.

ABSTRACT: Information is presented on the electrocardiogram and respiratory rate during spin tests of a supersonic carrier fighter airplane. Also presented are the accelerations encountered by a pilot, measured concurrently on the airplane seat frame and on his helmet during catapult launch, rapid accelerations and decelerations and rolls and under actual instrument flight conditions. Analysis of accelerations during actual instrument approaches may lead to better understanding and solution of the vertigo accident problem. An oximeter pick-up based on a new concept of operation and packaged with a miniaturized tape recorder for in-flight data link, now under development for flight test, is described. (AUTHOR)

149

Australian Flying Personnel Research Committee 1942 BLACKING-OUT RESEARCH AT SYDNEY UNIVERSITY DURING 1941 FPRC No. 358-h; 8 Jan. 1942

ABSTRACT: Dr. Cotton has been able to withstand 9.5 "g" for 30 seconds in his suit on two occasions.

Cotton suit may be pressurized by (1) hydrostatic system which is too cumbersome for plane use, (2) a column of pistons, (3) Meyer's differential pistons (like U. S. Berger Bros. design), (4) Stevens' ball valve which has not yet been tested.

Detailed description of electric drive centrifuge at Sydney. Subject's seat is shot out from center of centrifuge to periphery which is revolving at desired speed to obtain very quick acceleration. Radius is 18 feet, maximum speed 60 rpm, maximum force 10 "g".

150

Australian Flying Personnel Research Committee 1942 REPORT NO. 2 ON "BLACKOUT" WORK AT SYDNEY UNIVERSITY. FPRC No. 358-j

ABSTRACT: It is reported that Robinson's ball valve device for regulating pressure admitted to pneumatic suits under "g" is unsatisfactory because "hunting" of balls causes fluctuation in pressure and gross wastage of air.

Meyer's differential pistons are satisfactory, providing 3 to 4 "g" protection to trained subjects on the centrifuge. However, the tight fit of the pistons means that the air used must be filtered free of dust.

Pneumatic suits offer good protection but provision must be made for (1) ventilation, (2) reduction in weight.

151

Australian Flying Personnel Research Committee 1942 NOTE ON PROGRESS OF THE PNEUMODYNAMIC SUIT (EXTRACT FROM THE AUSTRALIAN FLYING PERSONNEL RESEARCH COMMITTEE) Rept. No. FR27 dated Dec. 1942; FPRC No. 407a

ABSTRACT: Six subjects tested the Cotton suit in the Kittyhawk plane in October 1942. Five were protected up to 7.5 to 8.5 "g" and one was protected to 10 "g" but buckled his plane during the test. Fatigue was diminshed and pilots were able to read their instruments with ease during high "g" maneuvers although dragging effects on the face and heaviness of the limbs were not affected.

152

Automotive Crash Injury Research 1957 ANNUAL REPORT, AUTOMOTIVE CRASH INJURY RESEARCH FOR THE PERIOD 1 APRIL 1956 TO 31 MARCH 1957. (Automotive Crash Injury Research, Cornell University Medical College, New York)

153

Automotive Crash Injury Research 1960 ANNUAL REPORTS 1954-1960. (Automotive Crash Injury Research of Cornell University, New York)

154

Autonetics 1961 GRAVITY ANOMALIES: A SELECTIVE BIBLIOGRAPHY (Autonetics, Downey, Calif.) 4 April 1961, ASTIA-255 309.

155

AVCO Research Laboratory 1958 AVCO PROPOSES MANNED RE-ENTRY SYSTEM Missiles and Rockets, 3(2):156. Feb. 1958.

ABSTRACT: AVCO Research Laboratory is said to have solved the design problems of the re-entry parachute and of the environmental capsule to carry a man many times around the earth and then protect him as he returns through the atmosphere The parachute is not the usual cloth umbrella, but a metal device more like a drag brake.

156

Avery, J. P. 1962 STRENGTH ANALYSIS OF CARRIAGE ATTACHMENT FITTING ON CREW SEATS, HU-1 AIRCRAFT, AND RECOMMENDATIONS FOR IMPROVEMENT. (Aviation Crash Injury Research, Phoenix, Arizona) AvCIR 62-11, Oct. 1962. ASTIA AD 290 467

SUMMARY: The crew seat of the HU-1A aircraft has failed frequently in survivable type accidents, with the primary failure occurring in the carriage attachment fitting (Part Number 204-070-742-1). The most recent accident occurred at Fort Carson, Colorado, 7 May 1962 (reference TCREC Tech. Rept. 62-87). Analysis discloses that occupant inertia load of the order of 11 G could have caused these failures.

A simple field modification is presented which would reduce stresses in the fitting by a factor of approximately two. No new parts need to be manufactured; two AN bolts and one NAS spacer are the only new parts required.

157

Aviation Crash Injury Research 1956 FINAL PROGRESS REPORT, OFFICE OF NAVAL RESEARCH CONTRACT #N6ONR 264-12, COVERING PERIOD FROM 7/1/48 THROUGH 9/30/55 (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc. Phoenix, Arizona) Report AvCIR-47-0-71; Sept. 1956

158

Aviation Crash Injury Research 1956 HELICOPTER ACCIDENT AND INJURY REPORT FORM AC (PRELIMINARY). (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc., Phoenix, Arizona) Report AvCIR-5-F-64, May 1956.

159

Aviation Crash Injury Research 1957 AvCIR HELICOPTER CRASH INJURY REPORT FORM (Aviation Crash Injury Research, A Division of Flight Safety Foundation Inc., Phoenix, Arizona) Report AvCIR-7-F-86, Nov. 1957

160

Aviation Crash Injury Research 1957 DESIGNING FOR SURVIVAL IN VTOL AIRCRAFT. (Aviation Crash Injury Research, Cornell University) Av-CIR-51-0-83.

161

Aviation Crash Injury Research 1958 AvCIR FIXED-WING CRASH-INJURY REPORT FORM (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc. Phoenix, Arizona) Report AvCIR-8-F-92, Aug. 1958

162

Aviation Crash Injury Research 1958 PRELIMINARY REPORT - BAR CHARTS OF MC BEE-IBM DATA. (Aviation Crash Injury Research, A Division of Flight Safety Foundation Inc., Phoenix, Arizona) Nov. 1958

163

Aviation Crash Injury Research 1959 AVIATION CRASH INJURY RESEARCH, OCTOBER 1, 1955 THROUGH SEPTEMBER 15, 1959; FINAL REPORT (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc., Phoenix, Arizona) Office of Naval Research Contracts Nos. Nonr-401(21 and Nonr-2883(00). ASTIA AD-234 030

164

Aviation Crash Injury Research 1960 ARMY AVIATION SAFETY. (Aviation Crash Injury Research, Phoenix, Arizona) TREC Tech. Rept. 60-77, December 1960.

165

Aviation Crash Injury Research 1960 EXPERIMENTAL RESEARCH - U.S. ARMY H-25 HELICOPTER DROP TEST 22 OCTOBER 1960. (Aviation Crash Injury Research, Phoenix, Arizone) AcCIR 1-TR-124, TREC Tech. Rept. no. 60-75, December 30, 1960

SUMMARY: This report presents the results of an analytical study to establish methods of conducting the first exploratory tests, followed by a presentation of the methods used in the first experimental crash test. A Piasecki Model H-25 helicopter has been employed in recreating a typical accident approximating an unsuccessful attempt to attain autorotation from a low altitude power failure.

The instrumentation and research techniques used in (1) the measurement of the impact forces and accelerations, (2) the determination of the feasibility of the utilization of on-board recorders, and (3) the evaluation of certain problems inherent in the dynamic crash testing of full-scale VTOL aircraft are presented. Tentative results and the technical problems encountered are discussed and recommendations for subsequent testing are made. (Author)

166

Aviation Crash Injury Research 1961 UNITED STATES ARMY AVIATION CRASH INJURY RESEARCH FINAL REPORT, 16 DECEMBER 1960 TO 15 SEPTEMBER 1961. (Aviation Crash Injury Research, Phoenix, Arizona) AvCIR 61-20, TREC Tech. Rept. 62-13, September 1961. ASTIA AD 275 184L.

ABSTRACT: A final report is prepared by Aviation Crash Injury Research, a division of the Flight Safety Foundation, Inc. (FSF) under the terms of Contract DA-44-177-TC-707. All work was accomplished between 16 Dec. 1960 and 15 Sept. 1961 and is reported under individual work items listed as follows:

1. Crash injury investigations of selected accidents;
2. Collection and coding of accident data;
3. Review of specifications and crash safety evaluation of aircraft;
4. Feasibility studies of dynamic testing devices;
5. Study of crash safety equipment and procedures;
6. Statistical and clinical analyses of mass accident data;
7. Liaison with groups and agencies on crash safety;
8. Training programs in crash injury investigation;
9. Feasibility study for remote control of an H-21 helicopter;
10. Dynamic crash tests of four helicopters; and
11. Post crash fire studies.

167

Aviation Research & Development Service, Federal Aviation Agency 1961 REPORT OF THE PROCEEDINGS OF THE FIRST ANNUAL INTERNATIONAL AVIATION RESEARCH AND DEVELOPMENT SYMPOSIUM April 10-14, 1961 (Aviation Research & Development Service, Federal Aviation Agency) ASTIA AD 275 888

ABSTRACT: The first annual aviation research and development symposium was convened to bring together representatives of all those groups, Government and non-Government, national and international, interested in advancing or improving the scientific aspects of air transportation. Twenty-two foreign countries, three international organizations, all U.S. military services, and many private industry companies responded. A total of 690 persons attended one or more of the 4 days devoted to the presentation of technical papers and panel discussions. All the papers are reprinted here, as well as a summary of each of the panel discussions pertaining to recent research and development accomplishments in the fields of air traffic control, communications, navigation aids, data processing and display, airport lighting and marking, and related technical subjects.

168

Awaji, E. 1943 PHYSIOLOGICAL EFFECTS OF HIGH-SPEED (Air Documents Division, AMC, Wright Field, Dayton, Ohio) Microfilm No. RC-1075 F272; ATI-27294

ABSTRACT: The effect of high-speed flight upon pilots is described, as well as the safety measures to be taken during high speed. The velocity limit of airplanes, the problem and effect of acceleration, and straight-line centrifugal and rotary accelerations are discussed. Precautionary measures are outlined for the protection of the pilot, and reasons for avoiding a sudden change in speed are covered. The degree of stimulation, vibration sense, the effect of vibration on the body, injuries which may result from vibration, and research methods and test apparatus used while carrying on experiments on vibration effects are included (ASTIA)

169

Ax, P. 1960 PACAF BASIC BIBLIOGRAPHIES: EXPLORATION OF SPACE (Misawa Air Force Base, Japan) 1 Feb. 1960

ABSTRACT: This is a bibliography on the exploration of space, with annotations from various sources, which supersedes the bibliography dated 1 February 1959. Included are 85 references, published between 1953 and 1959, and classified as follows: Rocket History and Research; Space Flight; Satellites; International Geophysical Year Space Programs; Space Medicine; and the Moon and Interplanetary Travel.

ACCELERATION

B

170

Baba, A.J. 1959 PERFORMANCE TESTS ON FOUR POTENTIOMETER TYPE ACCELEROMETERS. National Bureau of Standards Report No. 6300.

ABSTRACT: The instruments tested were Genisco, Inc., Model GMO 309, Serial Nos. 7593 and 7594; and Model GMO 972, Serial Nos. 41954 and 41955. They comprise a rectangular leaf spring, a potentiometer coil, a double-contact brush attached to the seismic mass, and damping plates. The damping plates are fixed to the frame of the gauge at only one end, and are "backed up" by a plate of bimetal. The damping fluid is a silicone oil. The instruments have a nominal range of $\pm$ 15g, with stops provided.

171

Baba, A.J. 1960 PERFORMANCE TESTS ON DASHPOT-DAMPED POTENTIOMETER-TYPE ACCELEROMETERS. National Bureau of Standards Report No. 6633

ABSTRACT: The instruments tested are potentiometer-type accelerometers, manufactured by Humphrey, Inc. Model LA03-0304-1, Serials 1 and 2. They consist of a seismic mass potentiometer pickoff, double-ended air-dashpot and four leaf springs. The instruments are calibrated over a range of $\pm$ 5 G on a rotary accelerometer powered by a d.c. compound-wound motor. Dynamic calibrations made at around 155 deg. F. differed by only about 0.1g from those made at room temperature.

172

Babushkin V.I., V.V. Malkin & V.V. Usachev 1956 A FEW DATA ON THE ADAPTABILITY OF THE HUMAN ORGANISM TO THE EFFECTS OF RADIAL ACCELERATION
Voyenno-meditsinskiy Zhurnal 4: 1019, 1956
See also: AF Technical Intelligence Trans., AFOIN Rept. AF 1083820, 20 March 1957

173

Babushkin, V. I., V. V. Malkin, & V. V. Usachev 1957 NEKOTORYYE DANNYYE O PRISPOSOBLENII ORGANIZAMA CHELOVEKA K DEYSTVIYU RADIAL'NYKH USKORENILY. (A FEW DATA ON THE ADAPTABILITY OF THE HUMAN ORGANISM TO THE EFFECT OF RADIAL ACCELERATIONS). Voyenno-meditsinskiy Zhurnal (Military Medical Journal) 4:10-19, 1956 (Translation in USAF Air Intelligence Information Report "Acceleration and the Human Organism". IR-1282-57, 20 March 1957).

174

Babushkin, V. I., P. K. Isakov, V. B. Malkin & V. V. Usachev 1958 RESPIRATION AND RESPIRATORY EXCHANGE IN MAN SUBJECTED TO RADIAL ACCELERATION. Fiziol. Zh. SSSR Sechenove 44:308-314.

ABSTRACT: (1) During exposure to the action of radial acceleration, increases in pulmonary ventilation, oxygen consumption and CO_2 elimination were observed regularly, and a considerable increase in energy experditure was noted. These changes were associated with the development of compensatory reactions—mainly with the reflex increase of skeletal muscle tonus.

(2) The smaller expenditure of energy during acceleration when anti-gravity clothing was worn is evidence of its relatively high efficiency, the wearing of such clothing being responsible for a lessening of "tension" in compensatory mechanisms and thus promoting increase in the potential reserves of the body.

(3) Energy expenditure determinations during the action of acceleration constitute one of the general indices characterizing "tension" in the compensatory reactions, directed to the adaptation of the body to the altered conditions attaching to the action of mechanical energy (gravitational force).

175

Babushkin, V.I., P.K. Isakov, V.B. Malkin, and V.V. Usachev 1958 IZUCHENIE BIOELEKTRICHNESKOI AKTIRNOSTI SKELETNOI MUSKULATURY U CHELOVEKA PRI DEISTRII RADIAL NYKH USKORENII. (BIOELECTRIC ACTIVITY IN THE SKELETAL MUSCLES IN MAN EXPOSED TO RADIAL ACCELERATION. Fiziol. Zh. SSSR Sechenov 44(1):10-13

ABSTRACT: Noting that much research in regard to the effects of head-to-foot acceleration had been concerned with the activity of the heart and blood vessels, the authors wished to "throw light on the activity of the skeletal muscles during acceleration. Ten healthy male subjects between 20 and 30 years of age were used. The subject was placed in a laboratory centrifuge in which head-to-foot acceleration of various intensity could be produced. Electromyogram recordings of reactions of various muscles of the abdomen, hips, and chest were made before, during and after the centrifuge was halted. Respiration, pulse, and arterial blood pressure were also recorded simultaneously in some experiments. Intensification of bioelectric activity of skeletal muscles was observed in all the subjects. The greatest increase in amplitude of muscle currents was observed when acceleration was increased from 2 g to between 4 and 5 g. Further increase in amplitude either ceased or deceased at higher levels. Duration of exposure was found to be important, and use of pressure suits resulted in a sharp drop in the amplitude of current in the muscles of the hips and abdomen. The authors conclude that increase in the bioelectric activity of skeletal muscles, observed during acceleration, depends upon an increase of muscular tonus. They suggest that the natural changes in the tonus of the skeletal muscles may be used as a unique index for evaluating the effectiveness of various anti-g devices. (CARI)

176

Babushkin, V. I. 1959 [THE INFLUENCE ON MAN OF RADIAL ACCELERATION OF GREAT DURATION]
Voenno-meditsinskii Zhurnal 8:50-54 (Russian)

177

Babushkin, V. I., P. K. Isakov, V. B. Malkin, & V. V. Usachev 1961 SOME CHANGES IN HIGHER NERVOUS ACTIVITY UNDER ACCELERATION. Voyenno-meditsinskiy Zhurnal 1961(6):54-58

ABSTRACT: Because of the effects of acceleration in flight on the brain the author's studied the functional state of the higher sections of the central nervous system under radial acceleration. Radial acceleration was effected in a centrifuge with a seat equipped for recording motor reflexes and studying the structure of certain special volitional movements. The first series of tests studied the state of conditioned motor reflexes to light and sound stimuli under varying degrees of acceleration. The results showed that under relatively low acceleration of 3-4 g a slight increase in the latent period of the motor conditioned response was noted. As the experiment was repeated, the difference in the latent period became less marked. At greater accelerations of 5-6 g the picture was different. To check the pilot's work capacity under acceleration a second series of tests studied the effects of acceleration on motor actions simulating working movements that a pilot has normally to make. (CARI)

178

Bachman, K.L. 1961 REPORT ON EVALUATION OF KEARFOTT INTEGRATING ACCELEROMETER. (Aeronautical Instruments Laboratory, U.S. Naval Air Development Center, Johnsville, Penn.) Report No. NADC-AI-6127. 14 Dec. 1961. ASTIA AD-280 186IL

ABSTRACT: Performance tests have been made on the Kearfott Integrating Accelerometer #430348-1A-402-X. A wide variation in scale factor and null repeatability was noted in all tests in the range from 0 to 0.01 g. The non-linearity of the instrument from $+1.745 \times 10^{-2}$ g to $\pm$ 1g is no better than 2.2×10^{-3}g and is apparently not affected by extremes of temperature. A threshold sensitivity of 1.45×10^{-4} was observed. The random drift characteristics degraded from 3.9×10^{-4} in a zero g field to 5.9×10^{-3}g in a 1 g field.

179

Bachman, K. L. 1962 EVALUATION OF THE BELL AEROSYSTEMS COMPANY MODEL III-B LINEAR ACCELEROMETER (U) (Naval Air Development Ctr., Johnsville, Pa.) NADC-AI-6253; Proj. RAV35J003/2021/F002-13-003. ASTIA AD-331 407L.

180

Backenstoe, G.S. 1959 PROCHLORPERAZINE IN AIRSICKNESS
Pennsylvania M. J., 62 (9): 1341-1343, Sept. 1959

ABSTRACT: Prochlorperazine (a phenothiazine derivative) was administered to 396 persons known to be susceptible to airsickness, and of whom, 261 had been previously treated with little success with other drugs. Good or excellent results were obtained in 307 of the total number of cases; prochlorperazine produced more satisfactory results in 165 of the 261 persons previously treated with other agents. The preferred dosage was one 5-mg. tablet one hour before flight. The author states that the drug appears to be a highly effective anti-emetic, anti-nauseant, and psychotherapeutic agent, and as such, is especially useful for the treatment of airsickness, where psychic factors often play a major causative role.

181

Backman, M.E. 1959 IMPACT: THERE'S MORE TO IT THAN MEETS THE EYE (Naval Ordnance Test Station, China Lake, Calif.) Rept. no. NOTS TP 2367, Nov 1959, ASTIA AD231-041

ABSTRACT: The scientist can determine the penetration, vibration, and wave motions that occur during the event called "impact" even when highspeed photographic equipment is not available or is inadequate. By applying certain equations, it is possible for him to make calculations that are more precise than a photographic record of the event. (Author)

182

Backman, Marvin E. 1960 IMPACT: THERE'S MORE TO IT THAN MEETS THE EYE
U.S. Naval Ordnance Test Station, China Lake, Calif. NOTS TP 2367
ASTIA AD 231 041

ABSTRACT: In this generalized treatment of the importance of vibration and wave motion, the concepts presented have been merely outlined, and all variations in the examples have not been covered. The extent of the application of these concepts is obvious without such detail. Certain ranges of cone angle and projectile length should follow the formulas given here, and more complicated shapes may be treated by straightforward applications of the same techniques. In all these cases the rejection of rigid-body concepts introduces symmetry in the interaction of target and projectile. Both target and projectile are influenced in the same way: both deform, both are stressed, both change motion. There are only differences in degree because of differences in the properties of these bodies. The fact that the target may undergo primarily a change of shape while the projectile undergoes primarily a change in motion is the result of asymmetry in the properties of these bodies and not due to fundamentally different modes of action. The idea that changes of motion and stress travel from place to place at a finite rate makes a definite contribution to the study of projectile impact. Most important, it provides the most precise description of non-rigid body acceleration. For changes brought about by impact, this idea may provide the only descriptive terms that are appropriate.

183

Baessler, U. 1962 ON THE INFLUENCE OF GRAVITATION AND LIGHT ON THE RESTING STATE OF CARAUSIUS MOROSUS.
In Z. Naturforsch (B) 17B:477-480, July 1962 (German)

184

Baevskii, k. 1961 BIOTELEMETRY AND SPACE FLIGHT
Trans. from Ekonomicheskaya Gazeta (USSR) no. 167(1020) p. 3, 1961.
(Joint Publications Research Service, New York, N. Y.)
Sept. 1, 1961 JPRS: 10,000.

ABSTRACT: Radiotelemetry is the basic means of investigation in space medicine. (Author)

185

Baker, C.A. 1960 MAN'S VISUAL CAPABILITIES IN SPACE (Presented at the Seventh Annual East Coast Conference on Aeronautical and Navigational Electronics, Wright-Patterson AFB, Ohio, October 1960.)

186

Baker, H.C. 1960 READING OF GEOREF FROM UNUSUAL POSITIONS.
(RAF, Inst. Av. Med., Farnborough). FPRC Memo 130. January 1960.

187

Baker, N.L. 1957 MISSILE AGE. MANNED RE-ENTRY: A TECHNICAL BARRIER OF THE PAST?
Missiles and Rockets 2:59, Dec. 1957

ABSTRACT: Spotlights advances made by industry and government research centers in the field of missile and satellite recovery.

188

Bakh, I., O. Gorlov, V. Yakovlev, & Ye. Yogov 1959 MAN IN SPACE: MEDICAL BIOLOGICAL PROBLEMS IN SPACE FLIGHTS. Vses. Obshc. Raspr. Polit. i Nauch. Znanii (USSR) Ser. 8, 1(20): , 1958
(Air Technical Intelligence Ctr., Wright-Patterson AFB, Ohio, Rept. No. ATIC-1256169, Oct. 7, 1959)

ABSTRACT: The pamphlet describes in a popular vein problems such as acceleration, weightlessness, radiation, meteoric danger, lowered barometric pressure, hypoxia, sealed cabins, space suits, temperature, water and food, re-entry and demands on future astronauts. Ample data are included on Sputnik 2 and the dog Layka.

189

Bakulev, A. 1959 THE COSMIC ERA
Meditsinskiy Rabotnik 81(1829):2 , Oct. 9, 1959

ABSTRACT: The author of this article states that the Soviet Union has successfully launched into space three artificial earth satellites and three cosmic rockets. He considers this an immense contribution to world science and a genuine revolution in such fields of science as astronomy, geophysics, and biology The radiotelemetric apparatus placed in the hermetic cabin with Layka transmitted to earth the dog's pulse frequency, respiration, arterial pressure, and electrocardiogram. On the basis of data received, it was concluded that the experimental animal tolerated accelerations and subsequent weightlessness well. Experiments in the space medicine field showed that systematic training, the use of an anti-G suit, and the position of an astronaut in the rocket make it possible for a human to tolerate for several minutes accelerations which are 12-15 times greater than the force of gravity of the earth. The results of numerous experiments showed that the human organism can easily tolerate weightlessness for 30-45 seconds. A human being repeatedly exposed to conditions of weightlessness usually becomes acclimated to weightlessness in space and can carry on coordinated muscular movements. (CARI)

190

Bakulev, A. 1960 DESTINATION --- SPACE
Meditsinsky Rabotnik, (Medical Worker) 1(40):34-36, Jan. 1960

ABSTRACT: Experimental research has shown that man can tolerate acceleration 12 to 15 times greater than the force of the earth's gravity for seven minutes without ill effects if he is conditioned by systematic training, equipped with a special anti-gravity suit to prevent disturbances in cerebral blood circulation and seated in the rocket so that the mechanical forces act perpendicularly to the longitudinal axis of his body. Other experiments have shown that the human organism can easily endure a state of weightlessness

lasting 30 to 45 seconds. It has been ascertained that with recurrence of weightlessness man adjusts himself to this state, retains orientation in space and may coordinate his movements accurately. The author also discusses the sealed cabin, oxygen supply, and radiation encountered during a space flight. (CARI)

191

Balakhovskii, I.S., & V.B. Malkin 1956 BIOLOGICHESKIE PROBLEMY METZHPLANETNYKH POLETOV. (Biological Problems of Interplanetary Flight.) Priroda 1956(8):15-21

ABSTRACT: Numerous experimental investigations, carried out in the USSR and abroad, have established that the influence on the human organism of the mechanical forces resulting from accelerations depend,on one hand, on their magnitude, time of action, rate of increase, and direction relative to the longitudinal axis of the body, and on the other hand, on the functional condition of the organism, i.e., on the state of health. It has been established that the disturbance of a circulation of the blood during acceleration is caused by the displacement of a great mass of blood into the lower half of the body; also, because of the vertical position of the body, the blood pressure is so great that the heart cannot send it into the upper organs, particularly the brain. Furthermore, because of the significant increase in the "weight" of the internal organs, their connective apparatus is subjected to great strain, and the irritation of the receptors of the internal organs caused by this can become a source of pathological reflexes. In order to avoid this, an "anti-overload" costume consisting of a system of rubber chambers connected by some solid material, has been designed. With the appearance of over-loading compressed air is supplied automatically to the chambers of the costume. This costume prevents the accumulation of blood and thus maintains the circulation of the blood to the brain. The stability of the organism can be raised also by systematic training. Investigation carried out with people on centrifugal machines have shown that, in the vertical position, a man can withstand the action of 4 to 5 times the force of gravity, but only for a few minutes. Overloads are withstood best when they are directed perpendicular to the longitudinal axis of the body. In such a position a man can withstand, for a few minutes, forces that exceed his "earth" weight 10 to 12 times. Most investigators consider that life is possible under conditions of "nongravity" and that the human organism will be able to adapt itself to new conditions of existence. (CARI)

192

Balakhovskii, I. S., & V. B. Malkin 1957 BIOLOGICAL PROBLEMS OF INTERPLANETARY FLIGHTS. In Krieger, F. J., A Casebook on Soviet Astronautics. Part II (Rand Corp., Santa Monica, Calif.) pp. 81-96
(USAF Project Rand) Research Memo RM-1922, 21 June 1957
Priroda 45(8):15-21, Aug. 1956
German Translation: Naturwissenschaft. Rundschau 10:173-177, 1957

ABSTRACT: Among medical problems discussed in regard to space flight is a general consideration of current knowledge of the effects of weightlessness and acceleration on the human body. The author notes that "the influence on the human organism of the mechanical forces resulting from accelerations depend on one hand, on their magnitude, time of action, rate of increase, and direction relative to the longitudinal axis of the body, and on the other hand, on the functional condition of the organism". The problems of circulation, blood pressure, weight of the internal organs, strain of connective tissues, and "irritation of the receptors of the internal organs" are discussed. The author states "that centrifuge investigations indicate "that, in the vertical position a man can withstand the action of 4 to 5 times the force of gravity, but only for a few minutes. Overloads are best withstood when they are directed perpendicular to the longitudinal axis of the body. In such a position, an man can withstand, for a few minutes, forces that exceed his "earth" weight 10 to 12 times." (CARI)

193

Baldes, E.J. & A.N. Porter 1945 HUMAN CENTRIFUGE FOR USE IN STUDIES OF MAN'S REACTION TO ACCELERATION. Fed. Proc. 4(1):4

ABSTRACT: Occupants of high speed aircraft are often subject to forces which produce pronounced physiologic effects. These forces may arise from linear acceleration as in catapult or rocket assisted take-offs and in the decelerative forces of crash landings. The more common type of accelerative force which causes blackout and unconsciousness in aviators is that arising from motion in a curved path, i.e. sharp turns and dive pull-outs. In order to study the latter problem under accurately controlled conditions it has been necessary to develop the human centrifuge. To simulate centripetal acceleration as it is experienced in aircraft the dimensions of the centrifuge must be as large as practically possible. Likewise, the onset of force must be rapid to be comparable with the onset of acceleration as it may occur in aircraft.

A small animal (pilot model) centrifuge have been in operation since 1942. The operation of both centrifuges is based on the use of flywheels, the r.p.m. of which is preset so that the requisite energy of rotation is at any given time immediately available to accelerate the superstructure. The rate at which the superstructure is accelerated is limited only by the rate at which the rotational energy of the flywheels can be transferred to the superstructure. This type of construction is relatively simple and low in cost since a low rate energy source is sufficient to accelerate and preset the flywheels to any required r.p.m.

194

Baldes, E. J. et al. 1945 PROTECTION AGAINST THE EFFECTS OF ACCELERATION AFFORDED THE HUMAN BY ASSUMPTION OF THE PRONE POSITION. (National Research Council, Committee on Aviation Medicine, Washington, D.C.) CAM Rept. 158.

195

Baldes, E. J. 1945 MINUTES OF CONFERENCE ON ORGANIZATION OF JOINT NRC-NAVY-AAF PROGRAM TO INVESTIGATE EFFECTS OF CRASH FORCES ON MAN AND MATERIEL.(DECELERATOR HISTORY). (Aero Medical Laboratory, Wright Field) 5 May 1945.

196

Baldes, E. J. et al 1945 SUGGESTIONS ON CRASH PROJECT. (Copies of Correspondence) 28 Feb. 1945.

197

MOTION PICTURE

Baldes, E.J., & A.N. Porter 1946 HUMAN CENTRIFUGE OPERATION. (Acceleration Lab., Mayo Aero Medical Unit, Rochester, Minn.)

ABSTRACT: The motion picture illustrates the principles and the mechanism involved in the operation of the human centrifuge at the Acceleration Laboratory, Mayo Aero Medical Unit. The centrifuge has two essential parts: a superstructure or carriage and a pair of rotating flywheels. The superstructure and the flywheels rotate in the horizontal plane about a common axis. The flywheels are driven by a Chrysler automobile motor powered by natural gas. The rotating flywheels, which weigh approximately 20 tons apiece, provide the energy for the rapid development of accelerative forces in the superstructure. The superstructure is set in motion by clutching to the flywheels and is brought to a standstill by declutching from the flywheels and braking on a rigid foundation. The speed of rotation of the superstructure is controlled by the clutch and the speed of the rotating flywheels. With this control the exact acceleration desired may be delivered rapidly or slowly for any required period in the superstructure. At one end of the superstructure is a gondola or cockpit so suspended that it swings outward when the centrifuge is in motion and in which the subject or pilot may sit, stand or lie The other end of the superstructure is closed by a solid partition, sufficient space being provided for a variety of experiments under various accelerations. (Fed. Proc. 5(1):3. 1946)

198

Baldes, E.J., C.F. Code, E.H. Lambert & E.H. Wood 1946 HUMAN CENTRIFUGE AND STUDIES OF BLACK-OUT
The Journal of Physiol., April 15, 1946, 104: 39-40

ABSTRACT: Human centrifuges have been built in an attempt to reproduce under controlled conditions in a laboratory the accelerations to which aviators may be exposed during sharp turns, pull-outs, spins or other manoeuvres in aircraft. Two such devices have been built in Rochester: a small pilot model suitable for animals in 1941, and a larger one for human work in 1942. Both operate in a similar manner. They consist essentially of a carriage or superstructure below which one or more heavy flywheels rotate. The heavy flywheels, weighing in the case of the human centrifuge a total of 40 tons, provide the energy for the rapid development of accelerative forces in the super-structure. The super-structure may be quickly or slowly set in motion by clutching to the rotating flywheels, and may be stopped rapidly or slowly by declutching and applying a brake.

199

Baldes, E. J. 1952 CRASH-WORTHINESS OF AIRCRAFT AND CRASH INJURY PREVENTION
J. of Aviation Medicine 23(5):433-438, October 1952

ABSTRACT: In the case of aircraft accidents involving excessive speed, as in the case of jet transports, the forces and stopping distances will exceed present maximal tolerable limits. The problem then is not only to summarize safety measures that might be considered for airplanes of today but also to suggest possible modifications for the planes of the future if we are to anticipate accidents within the limits of human tolerance. First of all, it is important to be able to reconstruct the events leading up to aircraft destruction. Hence, it is necessary to stress the importance of adequate instrumentation to record the flight path of the aircraft at all times. Secondly, certain design factors must be included in airplanes to increase the chance of survival. These include design changes in the fuselage, passenger seats, and landing gear.

200

Baldwin, J. A. and A. Wainwright 1962 RADIOLOGICAL WARFARE AND NUCLEAR EXPLOSIONS. AN ASTIA REPORT BIBLIOGRAPHY
(Armed Services Technical Information Agency, Arlington, Va.)
1 July 1962. ASTIA AD 277 900

ABSTRACT: This bibliography was prepared by ASTIA in response to frequent inquiries on the hazards and safety aspects of radiological warfare and nuclear explosions. Citations are included for reports cataloged by ASTIA from 1953 through June 1962, and are restricted to unclassified, unlimited references. References are arranged alphabetically by subject areas pertaining to blast effects, civil defense, fall-out patterns and prediction, nuclear warfare, protection, radiation effects, radiation meters, radiobiological effects, sampling, thermal radiation and fire, and weapons. These subject areas are further subdivided into more specific topics. The classified section of this bibliography appears as a secret document, identified as AD 330 030. (ASTIA)

201

Balke, B. 1952 CORRELATION OF STATE AND SHYSICAL ENDURANCE
(Air Force School of Aviation Medicine, Randolph AFB, Tex.)
Rept. no. 1, April 1952.

202

Balke, B. 1962 HUMAN TOLERANCES
(Federal Aviation Agency, Aeronautical Center, Civil Aeromedical Research Institute, Oklahoma City, Oklahoma) Report 62-6, April 1962

ABSTRACT: The ultimate limitations in flight performance and in future civil air carrier equipment are the limitations imposed by what may be termed "human tolerances." This is particularly applicable to the matter of the supersonic transport. The discussion of man's maximum adaptive capacities for the majority of stresses potentially encountered in atmospheric and transatmospheric flights points to the weakest links in the man-machine complex of air and space transportation. An attempt is made to point out the means by which the human tolerances can be maximally adapted to the advanced technology. (AUTHOR)

203

Ballhaus, W. F. (Chm.) 1960 . VISTAS IN ASTRONAUTICS--1960. VOLUME III. PROCEEDINGS OF THIRD AFOSR ASTRONAUTICS SYMPOSIUM, LOS ANGELES, CALIF., OCTOBER 12-14, 1960.
(Society of Automotive Engineers, Inc., New York, N. Y.)

ABSTRACT: These proceedings include the papers and discussions presented at a symposium on astronautics research. There are six functional areas represented: 1) astronautic vehicle utilization, 2) astronautic propulsion, 3) bioastronautics, 4) planetary and space environment, 5) astronautic communications, and 6) astronautic guidance. A subject matter index is included. (Tufts)

204

Ballinger, E.R. 1952 HUMAN EXPERIMENTS IN SUBGRAVITY AND PROLONGED ACCELERATION. (Paper presented at Aero Medical Association, Washington, D.C., March 1952) Technical Data Digest 17(5):10-12
See also J. Aviation Med. 23:319-321, 373

ABSTRACT: In the summer of 1951 a series of jet flights were carried out which exposed the human occupants to varying periods of zero-gravity. These runs, averaging 15 sec each, gave no indication of motion sickness, vertigo, or incoordination.

A second series of experiments exposed human volunteers to varying degrees of acceleration. Conclusions drawn from these experiments were: 1) Vertigo appears to be the result of head movement rather than any particular position of the head during exposure to acceleration. 2) Giddiness following exposure to acceleration was related more to the duration of the run rather than its intensity. 3) Accelerations up to 10 g can be tolerated in the semisupine position. However, accelerations below 8 g are probably more acceptable physiologically. (DACO)

205

Ballinger, E.R., and C.A. Dempsey 1952 THE EFFECTS OF PROLONGED ACCELERATION ON THE HUMAN BODY IN THE PRONE AND SUPINE POSITIONS. (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TR 52-250. July 1952. ASTIA AD-5352.

SUMMARY: Physical tolerance to various periods of acceleration while in supine, semisupine, and semiprone positions was determined by use of a human centrifuge. The run durations ranged from 15 min at 3 g to 2 min at 10 g. With a well-constructed bed and a head-supporting helmet, 23 subjects, in all positions, were able to tolerate 10 g for 2 min with only a small degree of discomfort. Proper modifications of the positions would eliminate physical discomfort and leave marked hypoxia as the limiting factor above 12 g. (ASTIA)

206

Bambenek, R. A. and J. D. Zeff 1961 BIOENGINEERING OF ADVANCED LIFE-SUPPORT SYSTEMS
J. of Aerospace Medicine 32(3):219, March 1961.

ABSTRACT: Circumlunar vehicles and space stations of the near future will contain new types of life-support systems in order to minimize take-off mass. Because of their relative complexity, these systems will require extensive development efforts to obtain the optimum man-machine system. This paper describes the system considered best for mission durations of one or more months, and the status of our development efforts. Experimental models of (1) a compressions distillation water recovery system, (2) reduction-electrolysis oxygen regeneration system, (3) cabin gas conditioning system, (4) waste collection and storage system and (5) vacuum distillation water recovery system have been constructed and preliminary tests performed. Primary emphasis in these developments has been placed on determining the control and maintenance problems. The systems as described are automated to the fullest extent possible, and contain displays for trouble shooting and manual operation. Future development efforts will require the use of an environmental system simulator so that tests of the man-machine complex can be performed for prolonged durations. This paper describes such a simulator capable of sustaining three men for duration of one or more months, which is now under development in our laboratories.

207

Bamford, H. E., L. F. Hanes, M. L. Ritchie, & S. E. Wilson 1958 THE OPERATION OF MANNED SPACECRAFT. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 58 225, June 1958

ABSTRACT: In an effort to expose the essential interconnectedness of the contributions of many technological specialties to the control of manned spacecraft, a survey is made of problems involved. Three categories of problems are distinguished. (1) The elements of space travel - vehicle, propulsion system, and energy source - are examined in relation to requirements for escape, deep-space operations, and descent. (2) The environmental needs of protection from hazards of space and ecological interactions required for survival are discussed. (3) Allocating the control function between crew and residual system is held to be the central design problem.

208

Bancroft, J.E., O. de Lalla & J.W. Gofman 1958 LIPOPROTEINS IN FRACTURES. (Letterman Army Hospital, San Francisco, Calif.) Project No. 6-60-01-002, "Clinical Investigation" (AF 18(600)-1250(7756-76), June 1957-June 1958. ASTIA AD 219 543.

ABSTRACT: An investigation was made of the effect of traumatic injury in the form of major fracture upon serum lipoprotein and cholesterol levels in humans both for short and long-term post injury periods significant effects upon low-density lipoproteins were observed, but only for the period up to 6 months post-injury. No significant lont-term effects upon low density lipoproteins or serum cholesterol were found. The results indicate that human atherosclerosis is not expected to be appreciably influenced by trauma in the form of fracture.

209

Bancroft, J. E., O. de Lalla, & J. W. Gofman 1958 RELATIONSHIP OF TRAUMATIC INJURY TO SERUM LIPROPROTEINS AND TOTAL SERUM CHOLESTEROL (Letterman Army Hospital, San Francisco, Calif.) Repts. Control Symbol CSCRD-16; Subtask No. LAH R-54. ASTIA AD-219 543.

ABSTRACT: An investigation was made of the effect of traumatic injury in the form of major fracture upon serum lipoprotein and cholesterol levels in humans both for short and long-term post injury periods. Significant effects upon low-density lipoproteins were observed, but only for the period up to 6 months post-injury. No significant long-term effects upon low density lipoproteins or serum cholesterol were found. The results indicate that human atherosclerosis is not expected to be appreciably influenced by trauma in the form of fracture. (AUTHOR)

210

Banghart, F.W. 1958 BIOLOGICAL PAYLOADS IN SPACE FLIGHT (Univ. of Virginia, Division of Educational Research) ARDC-TR-58-58, ASTIA AD 204 761

ABSTRACT: Reports of the joint efforts of a working group assembled at the Univ. of Virginia, Sept. 2-5, 1958, to discuss useful biological payloads and desirable bioscience experiments to be carried on in vehicles capable of space flight. The major objective of the working group centered around biological experiments which would provide data from which the feasibility of a manned space flight could be determined. This document summarizes the accomplishment of that objective, and is presented under four major categories: (1) behavioral factors, (2) instrumentation factors, (3) ecological factors, (4) physiological effects.

211

Banghart, Frank W. 1958 BIOLOGICAL PAYLOADS IN SPACE FLIGHT 2 - 5 SEPTEMBER, 1958
Air Research and Development Command, Hdqs. ARDC-TR-58-58 ASTIA AD 228 785

ABSTRACT: The main document of the working group is presented under four major categories: (1) behavioral factors, (2) instrumentation factors, (3) ecological factors, (4) physiological effects.

This format presents the results of the working group in terms of (a) the specific set of experiments to be performed (behavioral factors), (b) the proposed instrumentation for handling the information processes (instrumentation factors), (c) factors involving atmospheric provisions, food and water supplies, and atmospheric regeneration must be taken into consideration and solved in order that a manned flight be feasible (ecological factors), and (d) certain effects of gravity and radiation must be met (physiological factors).

212

Barach, A.L. 1942 PRINCIPLES OF AVIATION MEDICINE.
J. Ass. American Medical Colleges, 17:283-299.
NOTE: Reel 7, Flash 7, Item 61.

ABSTRACT: The fact that engineers have built planes that climb above 55,000 feet and travel faster than 7 miles a minute has confronted the physiologist and physician with four major problems; (1) oxygen want: (2) air bends (aeroembolism); (3) pressure disturbances in the ear, nasal accessory sinuses and abdomen; (4) the effects of centrifugal force.

The effects of centrifugal force were mentioned briefly. A disturbance in consciousness and impairment of vision are apt to be the 2 most frequent symptoms. The limit of human endurance is a centrifugal force which has been described as 5 G's lasting for 3 seconds. Failure of the heart to fill with blood is one of the most important results of the forces produced by positive acceleration. Wearing a special belt which causes increased pressure on the abdomen for a limited period of time appears to be of considerable help.

213

Barach, A. L., and G. Besson 1943 EXPERIMENTS WITH HUMAN SUBJECTS ON SIMULATED FREE-FALL WITH PARTICULAR REGARD TO ACTUAL PARACHUTE DESCENTS FROM HIGH ALTITUDES AND OBSERVATIONS ON THE INCIDENCE OF AEROEMBOLISM. (Report, Com. Aviat. M., U. S. Nat. Res. Council)

214

Barach, A.L. 1955 MOTION SICKNESS.
In Cecil and Loeb, ed., A Textbook of Medicine.
(Philadelphia: W.B. Saunders, pp. 510-516, 1955) 9th Edition

215

Barber, A.B. 1962 HUMAN PROBLEMS OF SUPERSONIC AND HYPERSONIC FLIGHT.
(Proceedings of the Fifth European Congress of Aviation Medicine)
(New York: Pergamon Press, 1962)

216

Barber, E.L. 1954 ENGINEERING PROPOSAL FOR HUMAN RESCUE EQUIPMENT (CAPSULE TYPE) (Radioplane Div., Northrop Corp., Van Nuys, Calif.)
Radioplane Report No. 990, Dec. 1954.

217

Bard, P. 1945 PHYSIOLOGICAL INVESTIGATIONS OF CAUSE AND NATURE OF MOTION SICKNESS. (National Research Council, Canada)
Com. Med. Res., Report No. C485, September 1945

218

Barer, A.S. 1958 VLIIANIE TSENTROSTREMITELNYKH USKORENII NA SODERZHANIE V KROVI ZHIROTNYKH ATSETILKHOLINA, ADRENALINA, ADRENALINOPODOBNYKH VESHCHESTV, KALIIA I NATRIIA (EFFECT OF CENTRIFUGAL ACCELERATION ON BLOOD CONTENT OF ACETYLCHOLINE, ADRENALIN, ADRENALIN-LIKE SUBSTANCES, POTASSIUM AND SODIUM. Biull. Eksp. Biol. Med. (Moscow) 46(7):56-59. July 1958.
(Eng. Trans.: Bulletin of Experimental Biology and Medicine)

219

Barer, A.S. and E.V. Iakovleva 1960 THE EFFECT OF CENTRIFUGAL ACCELERATIONS UPON SODIUM AND POTASSIUM ION LEVELS IN URINE AND SALIVA (VLIIANIE TSENTROSTREMI -TEL 'NYKH USKORENII NA SODERZHANIE IONOV NATRIIA I KALIIA V MOCHE I SLIUNE) Vop. Med. Khim. (Moscow) 6(6):615-618. Nov. - Dec. 1960

ABSTRACT: Sodium and potassium ion levels in urine and saliva before and after repeated exposure to positive acceleration (head to seat) were studied by flame photometry. The sodium ion concentration tended to decrease and the potassium ion concentration to increase under acceleration. These changes were greater in individuals with low acceleration tolerance.

220

Barer, A.S. 1962 VLIIANIE ODNOKRATNO I MNOGOKRATNO DEISTVUIUSHCHIKH TSENTROSTREMITEL'NYKH USKORENII NA VYSSHUIU NERVNUIU DEIATEL'NOST' ZHIVOTNYKH V POSLEDEISTVII (THE AFTER-EFFECT OF SINGLE OR REPEATED CENTRIPETAL ACCELERATIONS ON THE HIGHER NERVOUS ACTIVITY OF ANIMALS
(Zhurnal vysshei nervnoi deiatel'nosti (Moskva), 12 (2): 332-337. March-April, 1962. in Russian, with English summary pp. 337)
English Translation: U.S. Joint Pub. Research Serv. (Washington), no. 14, 796 (OTS: 62-11732), p. 16-30. Aug. 10, 1962

ABSTRACT: Ninety-one rats were subjected to accelerations on a centrifuge at 4 g for 15 seconds, 7 g for 1 minute, and 10 g for 1 minute. Some animals were subjected to repeated accelerations. Their higher nervous activity was studied by means of complex food-conditioned motor reflexes. Disruption of the conditioned reflex activity was related to the magnitude and direction of acceleration. The greatest changes were caused by accelerations in a head-pelvis direction, the least changes by accelerations acting in a transverse direction. This is in accord with the hypothesis that the effect of accelerative forces on the organism is determined by the change in the hemodynamics affecting the blood supply to vital organs. Central nervous system adaptation to repeated accelerations was noted.

221

Barker, C. L., Jr. 1961 SPACE FLIGHT ACCELERATION SIMULATOR.
Planetary and Space Science 7:335-344. July 1961

ABSTRACT: Discusses a ground-based training and research facility which would simulate the acceleration-time history of rocket flight or the gravitational fields of the moon and planets. Proposes a horizontal circular track 1,000 feet in diameter leading to a veetical track almost a mile in height. The vehicle would be a multi-place capsule or an equipment capsule which is programmed to duplicate conditions of boost, zero-g, or re-entry, or any combination of the three.

222

Barmack, J. E. 1948 A METHOD OF INCREASING THE MANEUVERABILITY OF HIGH SPEED AIRCRAFT WITHIN THE LIMITS OF HUMAN TOLERANCE TO G FORCES (Office of Naval Research, Special Devices Center, Washington, D. C.) Proj. 20-M-1B, Report no. 151-1-11, 28 Feb. 1948. ASTIA AD-41 255.

ABSTRACT: Several flight paths are explained, including the method of entrance, by which it is expected to reduce the "g" moment exerted upon a pilot. The "g" moments which act upon a pilot of an aircraft utilizing the normal seating arrangement are: (+g) radial forces acting from head to seat; (-g) radial forces acting from seat to head; (Tg) forces acting from front to back, and vice versa. A pilot may withstand anywhere from 4 to 5 times as many g's when the force is exerted in the Tg plane. It was considered, that by rapid deceleration before entry into a turn or before the first 25% is completed, the +g would be greatly reduced. By placing the pilot in a prone position, a turn of small radius could be executed in which 12-15 g's may develop and be withstood, aircraft permitting.

223

Barnes, A. C., Jr., J. J. Carroll & L. W. Gregg 1962 HANDBOOK FOR AIRCRAFT ACCIDENT INVESTIGATORS. (Aviation Crash Injury Research, Phoenix, Arizona) April 1962

ABSTRACT: Emphasizes the importance of adequate visual records of aircraft accidents, with careful descriptions of each photo. "No significant improvement in the crash safety design of an aircraft can be achieved unless engineers and manufacturers know what structures and objects within the occupiable area cause injuries in accidents."

224

Barnes, R.W. 1946 PILOT EJECTION SEAT ACCESSORIES. (Army Air Forces Air Technical Service Command) Memorandum Report No. TSEAP-7-9-482, 25 September 1946. ASTIA ATI- 179496

ABSTRACT: Tests were conducted on pilot ejection seat accessories for the following purposes:

1. To determine a method to prevent tumbling of the ejection seat.
2. To determine a method for insuring positive separation of occupant and ejection seat at a certain point on the seat trajectory.
3. To determine a method for decreasing the minimum safe bailout altitude in aircraft equipped with an ejection seat.
4. To determine a method for the inerim use of standard parachutes with an ejection seat, at all altitudes, and at speeds up to 600 miles per hour.

As a result of the tests, it was found that the design used was capable of preventing tumbling of the ejection seat and insuring positive separation between occupant and seat upon release of safety belt and shoulder straps. That particular design could also decrease the minimum safe bailout altitude at 600 miles per hour in less than 170 feet true altitude. It will make possible the safe interim use of standard parachutes with the ejection seat to speeds of at least 600 miles per hour.

225

Barr, E.O. 1943 FLYING MEN AND MEDICINE: THE EFFECTS OF FLYING UPON THE HUMAN BODY. (New York; London: Funk & Wagnalls Co.)

226

Barr, G. M. 1956 "QUICK LOOK" DATA REVIEW FOR SLED TEST RUN NO. A103LA-16, 17, AND 18, DATED 21, 27, AND 30 NOV. 1956. (Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.) Report no. GM 43.9-66; WDD Document no. 7-2248; ASTIA AD-217 306.

ABSTRACT: The purpose of this document is to present a quick-look data review of the immediate data gathered from a dynamic sled run at NOTS. This report contains pertinent sections of the multi-channeled oscillograms made at NOTS and comments fro Aerojet and NOTS at a quick-look data review meeting. This information will be used to evaluate vibration and instrumentation data. In addition studies will be made to determine instrumentation performance, separate effects due to vibration and acceleration, allow laboratory simulation of sled vibration environment, and compare the sled vibration environments with expected missile environments and specifications. (Author)

227

Barr, J. S., R. H. Draeger, and W. W. Sager 1946 SOLID BLAST PERSONNEL INJURY: A Clinical Study. Milit. Surg. 98:1-13.

ABSTRACT: Fifty cases of solid blast injury have been carefully studied and the data obtained have been analyzed from the clinical standpoint.

Solid blast injury is a definite clinical entity, caused by the shock wave from an explosion transmitted through solid material, usually steel, to personnel in contact with that material. The typical case has fractures of the lower extremities with marked soft tissue damage. Amputation because of gangrene is necessary in some of the cases but prompt first aid, proper early surgical management and late reconstructive procedures will restore the majority of the limbs to useful function.

228

Barr, N. L. and R. B. Voas 1959 TELEMETERING PHYSIOLOGICAL RESPONSES DURING EXPERIMENTAL FLIGHTS. In: L. E. Lambe, Ed., The First International Symposium on Cardiology in Aviation. (School of Aviation Medicine, Brooks AFB, Texas) November 1959. ASTIA AD-244 389.

ABSTRACT: Modern technology has provided means for transmitting to remote locations nearly all physiological responses which involve external electrical, mechanical, or thermal changes. These developments have made it possible to make precise physiological measurements under operational conditions of the type that only a short time ago were limited to the laboratory. Since transmission of these responses is possible, the pilot's physiological reactions may

be monitored from the ground in order to protect him from environmental hazards to which he is insensitive. A major problem which arises in connection with this procedure is that emotional responses obscure physiological reactions, resulting in reactions beyond what are normally considered safe and producing large individual differences in reactions. To overcome these problems, careful studies of each individual to be monitored must be made prior to the actual experiment flight. Telemetering also permits experimental study of stratosphere and space flights. Here again control data are essential since in many cases it will not be possible to return experimental animals to the earth and therefore information on their status in space must be gathered by comparing telemetered physiological recordings with control data collected on the ground.

229

Barr, P. O., H. Bjurstedt, & J. C. G. Coleridge 1958 REFLEX CONTROL OF RESPIRATION IN THE ANESTHETIZED DOG DURING PROLONGED EXPOSURE TO POSITIVE RADIAL ACCELERATION. (Reports from the Lab of Avn. and Naval Med., Karolinska Institute, Stockholm, Dec. 1958)

ABSTRACT: The ventilatory response of anaesthetized dogs to prolonged exposures to accelerative forces in the head-to-tail direction was investigated using a large centrifuge. An initial apnoea was observed, which could be prevented by abdominal counterpressure or bilateral vagotomy. Hyperventilation sometimes followed the apnoea and predominated when the vagi had been cut prior to the exposure. Evidence was obtained for a pulmonary stretch reflex origin of the apnoea, and for a predominantly chemoreflex drive resulting from reduced flow through the carotid bodies, etc.

230

Barr, P. O., H. Bjurstedt and J. C. G. Coleridge 1958 REPORT FROM THE LABORATORY OF AVIATION AND NAVAL MEDICINE. (Karolinska Instit., Stockholm). Dec. 1958

231

Barr, P. O., H. Bjurstedt, & J. C. G. Coleridge 1958 RESPIRATORY CHANGES IN THE ANESTHETIZED DOG DURING PROLONGED POSITIVE ACCELERATION. J. Physiol. (London) 142:60P

ABSTRACT: In the course of an investigation of the pulmonary gas exchange during prolonged gravitational stress, experiments were carried out to determine the effects of positive acceleration on the ventilation of the anaesthetized dog. The dogs were placed in a centrifuge (radius 24 ft.) in the supine position with the long axis of the body parallel to the radius of rotation and the head towards the centre of rotation.

With the animal breathing air an initial apnoea was always observed followed by either subnormal ventilation, recovery or hyperventilation. The initial apnoea was considerably prolonged by oxygen breathing. Since the apnoea was reduced or even abolished by inflation of a cuff placed around the abdomen, and never occurred after bilateral vagotomy, it was attributed to activation of the Hering-Breuer reflex mechanism, brought about by the stretching of the pulmonary receptors when the diaphragm was displaced caudally.

The post-apnoeic respiratory changes seemed to depend mainly on the extent to which the arterial blood pressure fell at the carotid sinus level. After vagotomy, exposure to positive acceleration at 2 or 3 g produced very marked hyperventilation, and the pH of the arterial blood was shifted to the alkaline side by up to 0.4 unit within 2 min. Bilateral denervation of the carotid sinus regions prevented the occurrence of this hyperventilation; hence it may be due to a reduction of flow through the carotid bodies. After bilateral vagotomy and denervation of the sinus regions, respiratory failure commonly occurred during positive acceleration.

232

Barr, P. O., H. Bjurstedt, and J. C. G. Coleridge 1959 BLOOD GAS CHANGES IN THE ANESTHETIZED DOG DURING PROLONGED EXPOSURE TO POSITIVE RADIAL ACCELERATION.
Acta. physiol. scand. 47:16-27.

ABSTRACT: Anesthetized dogs were exposed to increased gravitational stress in the head-to-tail direction and arterial O_2 saturation and acid-base balance changes studied. Simultaneous, direct and continuous recordings were made of arterial O_2 saturation and pH as well as respiratory minute volume in centrifuge runs. Application of moderate g forces over several minutes produced severe hypoxemia although 100% O_2 was breathed and hyperventilation was present, indicating a great alveolar-arterial O_2 difference, and accordingly, a large intrapulmonary shunt.

233

Barr, P. O., H. Bjurstedt, & J. C. G. Coleridge 1959 REFLEX CONTROL OF RESPIRATION IN THE ANESTHETIZED DOG DURING PROLONGED EXPOSURE TO POSITIVE RADIAL ACCELERATION. Acta physiol. scand. 47:1-15

ABSTRACT: The ventilatory response of anesthetized dogs to accelerative forces in the head-to-tail direction was investigated using a large centrifuge. An initial apnea was observed, which could be prevented by abdominal counter-pressure or bilateral vagotomy. Hyperventilation sometimes followed the apnea and predominated when the vagi had been cut prior to the exposure. Evidence was obtained for a pulmonary stretch reflex origin of the apnea, and for a predominantly chemoreflex drive, resulting from reduced flow through the carotid bodies, when hyperventilation occurred. Thus, reflexogenic control of respiration was prepotent during gravitational stress, whether manifested by inhibition or stimulation of respiration.

234

Barr, P. O. 1961 HYPOXEMIA IN MAN INDUCED BY PROLONGED ACCELERATION. (Laboratory of Aviation and Naval Medicine, Dept of Physiology, Karolinska Institutet, Stockholm, Sweden.) August 1961

235

Barr, P. O. 1962 HYPOXEMIA IN MAN INDUCED BY PROLONGED ACCELERATION. In Acta.Physiol Scand. 54:128-137, Feb. 1962.

236

Barr, P. O. 1963 HYPOXEMIA IN MAN INDUCED BY PROLONGED +G_z ACCELERATION (Biomedical Lab., 6570th Aerospace Medical Research Lab., Aerospace Medical Division, Air Force Systems Command, Wright-Patterson AFB, Ohio) Technical Documentary Report No. AMRL-TDR-62-137, April 1963.

ABSTRACT: Changes in the arterial oxygen saturation were recorded in healthy subjects on the human centrifuge by continuous cuvette oximetry before, during and after prolonged exposures to positive acceleration. With the subjects breathing air and wearing an automatically inflated anti-G suit, an immediate fall in the arterial O_2 saturation was observed upon exposure to +4.5-5.0 G_z.

After one minute of the first exposure the O_2 saturation ranged between 95 and 81 per cent, the arterial pH remaining essentially unchanged. At the time the respiratory minute volume had increased, indicating gross deterioration in the efficiency of pulmonary function. Repeated exposures caused the arterial O_2 saturation to fall at a faster rate and to a lower level with each consecutive run. The rate of resaturation on returning to normal gravity was usually slow, and markedly so after several exposures. The last-mentioned observations are interpreted as being mainly the result of residual atelectasis in dependent regions of the lungs. The potential dangers of acceleration-induced bypoxemia in high performance flight missions are discussed.

237

Barr, Per-Olof 1963 PULMONARY GAS EXCHANGE IN MAN AS AFFECTED BY PROLONGED GRAVITATIONAL STRESS
Acta Physiologica Scandinavica (Stockholm) Vol. 58, Supplement 207

ABSTRACT: The present investigation is an experim ntal study of certain effects of prolonged gravitational stress on the principal function of the pulmonary circulation, i.e. the exchange of O_2 and CO_2 between the alveolar spaces and the blood. The present experiments were performed exclusively on human subjects. While exposed to strong gravitational fields for periods up to 2 minutes, with the G force acting in the head-to-foot direction, the subjects displayed drastic alterations in the pulmonary gas exchange as revealed by continuous and simultaneous recordings of ventilatory and blood chemical variables. It became evident that the pulmonary circulation is highly susceptible to inertial forces; there is probably no influence, environmental or of other origin, that is capable

of exerting a reversible effect on pulmonary function which is so profound. The extent to which such forces were found to affect the pulmonary gas exchange in standardized exposures was investigated on the basis of relatively recent concepts pertaining to the ventilation-perfusion relationships of the lung.

In this text, a short review of earlier findings pertaining to the effects of inertial forcer on the pulmonary circulation and gas exchange is given. In view of the specia, and sometimes adverse, experimental conditions involved in the methodological approach to the problems, a relatively comprehensive account of the techniques and experimental procedure is given, before the results are described and their physiological significance discussed. A commentary is included on certain applications of the results to problems involved in operator performance and flight safety.

238

Barr & Stroud Ltd. 1955 TWO-COORDINATE ACCELEROMETERS
Instruments in Industry 2:67, May 1955

ABSTRACT: Incorporates two accelerometer elements accurately positioned with axes at 90 degrees. The accelerometer is designed for use at vibration frequencies up to 15 c/s. It provides a convenient means of resolving the acceleration to which it is subjected, into two coordinate components in a plane, and could be used in vibration or impact testing or as a servo element.

239

Barron, C. I. 1957 NAVAL AVIATION SAFETY OFFICER COURSE - OUTLINE OF AVIATION PHYSIOLOGY. (Aviation Safety Division, Univ. of Southern Calif.)

240

Barrow, D. W. & H. T. Rhoads 1944 BLAST CONCUSSION INJURY.
J.A.M.A. 125:900-902, 29 July 1944.

SUMMARY: 1. Detailed observations and complete follow-up studies were made on a group of 200 men exposed to "blast" due to the detonation of high explosives.

2. Those nearest the explosion were, in general, most seriously injured, but capricious choice of victim was noticeable.

3. Death was almost instantaneous when it occurred and was due to multiple injuries in most instances.

4. Those patients who survived sixt minutes recovered.

5. Damage to the ears by blast and to the eyes from foreign bodies occurred in a high percentage of those who recovered. Periods of unconsciousness, convulsions, chest pain, pulmonary complications and abdominal distress were minimal in this group. Intestinal perforation did not occur. Shock, bradycardia, hypotension, decreased psychomotor activity and slow respiration were the outstanding clinical signs and symptoms of this group.

Barrow, D. W. 194[illegible] BLAST INJURY.
Air Surgeons Bul[illegible]in 2:206-207, July 1945.

ABSTRACT: From exact determ[illegible]ation of the position of those injured and the probable blast pressures at [illegible]ese points, it was calculated that blast pressures of 100 to 200 pounds per square inch are required to produce death.

Exposure to blast produced a characteristic clinical picture, one of the serious implications of which is easily missed by the superficial or uninitiated observer. Decreased psychomotor activity was constant. The pulse was characteristically slow and full; the respiratory rate was decreased. Patients were in definite shock, with hypotension, increased sudomotor activity and subnormal temperature, and demanded the supportive measures that have been found helpful in the treatment of patients in shock from other causes. Activity must be restricted to the minimum in patients suffering from blast injury. Bleeding is aggravated by activity, and fatalities, which might otherwise be avoided, may occur where rest has not been enforced.

242

Barshev, P. and V. Peskov 1961 FIVE HOURS WITH YURII GAGARIN (REPORT FROM OUR SPECIAL CORRESPONDENTS ABOARD THE AIRPLANE "IL-18"757 17)
Trans. from Komsomol'skaya Pravda (USSR) no. 90(11030) p. 4, 1961.
July 27, 1961 ASTIA AD 261 825

243

Bartlett, F. C. 1949 THE EFFECTS OF FLYING UPON HUMAN PERFORMANCE.
L'Année Psychologique 50:629-638.

ABSTRACT: During World War II, it became necessary for workers of the Cambridge Psychological Laboratory to turn their attention to a study of the changes in the performance of a variety of skills when that performance must continue without interruption for long periods, often under stress. The types of activity most involved rarely required excessive physical or muscular effort at any stage. But they did require accuracy and usually considerable speed in manipulation. The essential problems conformed in general to the familiar fatigue problem. But it very soon appeared from observation that the results did not agree very well with any familiar fatigue picture. Skill "fatigue" has characteristics of its own. Its experimental study demands special methods and the measures needed are special measures. One of the particualr cases selected for special study was the case of changes of human activity accompanying prolonged air flights, Very broadly speaking there are two sets of problems: fatigue in aircrew, and fatigue in the passenger. This paper is limited to remarks about fatigue in aircrew. The author lists the characteristics and conditions of fatigue in aircrew including the threshold of indifference, awareness of discomfort, anticipation span, and speed, load, and anxiety. The author then lists the principles of diagnostic examination for fatigue.

244

Bartlett, F.C. 1950 HUMAN TOLERANCE LIMITS.
Acta Psychol. 7:133-141

ABSTRACT: There may be an essential difference between incentives that are tacked on to a task, all systems of reward and punishment, for example, and incentives that operate within the prosecution of the task itself. The former can raise the amount and efficiency of performance for short periods but can do nothing at all to push up the ceiling of tolerance, when this is imposed by objective environmental conditons. The latter can raise the level of efficiency in the learning stage and can maintain this level when mastery is reached. In one respect at least it can push up the ceiling of tolerance, for it can prolong the effective working spell without imposing any increase of strain.

245

Bartlett, F.C. 1951 THE EFFECTS OF FLYING UPON HUMAN PERFORMANCE
(CONTRIBUTION TO L'ANNEE PSYCHOLOGIQUE 50IEME VOL. JUBILAIRE, PRESSES UNIVERSITAIRES DE FRANCE. IN HONOUR OF HENRI PIERON)
(Flying Personnel Research Committee, Air Ministry) F.P.R.C. Rept. 765
August 1951

246

Bartlett, F. 1956 EFFECTS ON HUMAN PERFORMANCE OF VARIOUS STRESS CONDITIONS. (RAF Inst. Av. Med., Farnborough) FPRC Rept. 961.
ASTIA AD 96 383

ABSTRACT: The following three reports summarize very briefly the main important conclusions that can be drawn from a large amount of work upon the effects on human performance of exposure to: (a) Noise (b) Heat and humidity, and (c) Sleeplessness.

It will be seen that all three forms of stress may, unless special precautions are taken, seriously affect human behavior when great accuracy and speed are required. It will also be seen that in all three cases, the main need now is for further experimental work especially directed to two main points: (1) The further effects that may be produced when work has to be continued under these forms of stress for a relatively long period and under environmental conditions which are apt to change suddenly and unexpectedly. (2) The further effects which are almost certainly associated with sudden changes of stress conditions, such as a very rapid increase or decrease of noise, temperature, and humidity.

It was hoped to add something about these rapid changes, especially as regards to temperature and humidity, but nothing is known about their effects upon human performance with sufficient certainty to make it possible to put forward conclusions with confidence at present. It was also hoped to be able to deal similarly with the effects upon human performance of vibration, but here again existing knowledge is too uncertain to warrant anything definite being said. (Author)

247

Bartual Pastor, J. 1962 NEUROPHYSIOLOGICAL ANALYSIS OF THE CENTRAL INTEGRATING SYSTEM OF SPACE ORIENTATION IN MAN BY RECORDING OF THE OCULAR REACTIONS AFTER PERIODIC OPTOKINETIC AND VESTIBULAR STIMULATION.
Rev. Esp. Otoneurooftal. 21:373-386 Jul-Aug. 1962 (Sp)

248

Barwood, A.J. 1962 THE MAINTENANCE OF CORRECT EJECTION POSTURE
Paper: 33rd Annual Meeting of the Aerospace Medical Association, Chalfonte-Haddon Hall, Atlantic City, N.J., April 9-12, 1962

ABSTRACT: The high incidence of mild back injury during otherwise successful ejections, and the increasing incidence of such back injury with the improvement of ejection capability, prompted investigation into the probable cause of such injury. The geometry of harness systems was studied and the techniques for adjusting such harnesses were investigated. The typical back injury in the region of T-10--L-2 indicated that posture appeared to have a direct relation to such injury. Means of maintaining an acceptable posutre were therefore investigated and ultimately modifications for all types of harnesses were proposed. Initially these were tried experimentally and have produced marked improvement in whole body restraint, and have, at the same time, made the harness system more comfortable. The moulding of the seat top and back to the mean anatomical profile of aircrew has also been attempted, resulting in the maintenance of an improved ejection posutre and very considerable improvement in comfort and acceptability -- a factor which might well be applied to conventional seat design.

249

Basler, V. E. and L. E. Morehouse 1948 THE EFFECTS OF G ON MAXIMUM GRIP STRENGTH
(Office of Naval Research, Washington, D. C.)
May 1948 Contract N6ori77

SUMMARY: A comparison of the grip strength at 1 G with 2, 3, 4 and 5 positive G shows that the strength of man seated in aircraft is not weadened in direction proportion with increasing forces of positive G. A decrease in grip stength is observed at 3 G, but the loss in strength is recovered at 4 and 5 G.

250

Bates, G. 1961 A BIBLIOGRAPHIC INDEX FOR CATALOGING THE ACCELERATION LITERATURE (National Academy of Sciences, National Research Council, Washington, D.C.) Publication No. 913, Pp. 1-6. ASTIA AD 266 076

ABSTRACT: As a considerable volume of literature on acceleration research is now available, with more literature being generated at an increasing rate, the Panel on Acceleration Stress believes that it is highly desirable for such information to be indexed and catalogued in a uniform manner so that pertinent information can be readily located by users. Various abstracts of acceleration literature are now available; however, most of these use an open ended, non-systematic indexing system, so that the user must scan all of the reports in order to find desired references. This index is offered as a solution to that problem.

251

Bates, H. J. 1963 DESIGN STUDY FOR AN ACCELERATION RESEARCH DEVICE (FINAL REPORT).
(Rucker Co., Oakland, Calif.)
Contract AF 33(616)-7536 AMRL-TDR-62-113 May 1963 N63-19160

ABSTRACT: This report introduces an advanced centrifuge design which may be built, utilizing present-day engineering and manufacturing techniques. The report (1) presents a tentative configuration and performance of a centrifuge and facility that best fits present and anticipated weapons system; (2) evaluates and adjusts the centrifuge design with respect to the research value of a specific performance requirement and its associated cost; (3) presents a design which can be built with present-day knowledge and with assurance of meeting performance requirements; (4) presents a design complete enough in detail to show its feasibility and to establish an estimated cost; and (5) recommends staging of construction and the staff personnel necessary to maintain and operate the facility. (Author)

252

Bauder, D. W., & D. L. Krenz 1961 WATER ENTRY TESTING USING ROCKET SLEDS In 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D. C. (Mt. Prospect, Ill.: Institute of Environmental Sciences, 1961). Pp. 75-80.

253

Bauer, L.H. 1930 SYMPOSIUM ON BLIND FLYING.
J. Aviation Med. 1:127-132

ABSTRACT: By blind flying is meant flying without a horizon for guidance. The exact physiological phenomenon has been a source of great dispute among otologists but is generally agreed now that the cause is a change of tension in the fluid in the otolith canals. During vertigo, the pilot must disregard his sensations and fly by instruments. Ocker and Crave have devised an instrument known as a flight integrator which combines the necessary instruments in one instrument. (CARI)

254

Bauer, L.H. 1933 AIR SICKNESS.
J. Aviation Med. 4:41-44

SUMMARY:

Air sickness belongs to a group of motion-sicknesses: swing, train, seasickness, etc.

Its causes are physiological or psychological reactions to unaccustomed motion.

The vestibular mechanism is the chief physical factor responsible for air-sickness.

Its frequency is perhaps about 5 per cent.

Its prevention lies in properly ventilated cabins; in taking the passenger's mind off of himself; in eliminating any causes of fear; and prompt treatment. If the individual is susceptible to motion sickness he should fly only in good weather and in smooth air.

255

Bauer, L. H. 1933 AVIATION MEDICINE
Oxford Medicine 1:545-585.

ABSTRACT: Out of a mass of experience, research and statistics a subject known now as aviation medicine has developed as a distinct specialty. This specialty is really a branch of preventive medicine, as its sole basis is the prevention of aircraft accidents from the human standpoint. It has drawn to itself portions of other specialties, namely, physiology, internal medicine, ophthalmology, otology, neuropsychiatry and psychology. It is a correlation of certain parts of these specialties as they relate to flying. The specialist in aviation medicine is known as the flight surgeon.

256

Bauer, L.H. 1942 MEDICINE AND AVIATION.
Trans. Amer. Acad. Ophthal. Oto-laryng. Jan-Feb : 43-46

ABSTRACT: The specific standards for flying cannot be gone into in detail in a brief article, but in general they are as follows: military pilots must have visual acuity, normal visual fields, and normal color fields. A pilot must have sufficient accommodative power to read a map or instrument pane. The ability to judge distance or depth perception is very important. Obstructive lesions of the nose and throat are disqualifying for a prospective pilot. Hearing, sufficient to detect radio signals, is essential. The layrinth is not the most important factor in maintaining equilibrium in the flyer, vision is the most important factor. Pilots suffering from fatigue after long hours of flight are suseptible to a condition known as aeroneurosis. Pilots are also subjected to intense cold, low barometric pressure, lack of oxygen, and high speed resulting in violent g forces. All of these conditions induce fatigue, low resistance, and may cause casualties.

257

Bauer, Louis Hopewell 1943 AVIATION MEDICINE.
(New York: London: Oxford University Press, 1943)

258

Bauer, L. H. 1952 SPACE MEDICINE
West Vir. Med. J., 48(11):326-327. Nov. 1952

ABSTRACT: A review of space medicine and the problems that man faces in space flight.

259

Bauer, R.C. 1958 TRANSONIC WIND TUNNEL DYNAMIC STABILITY TEST OF A SMALL - SCALE SATELLITE AEROMEDICAL RESEARCH VEHICLE.
(Arnold Engineering Development Center, Air Research and Development Command) AEDC-TN 58-78, Dec. 1958. ASTIA AD 223 468-L

ABSTRACT: A one degree of freedom dynamic test of the GE-SARV nose cone was conducted in the 1-FT Transonic Tunnel of the Propulsion Wind Tunnel Facility at the Arnold Engineering Development Center.

The pitch damping coefficient, $(C_{m_q} + C_{m_\alpha})$, and the static stability parameter, C_{m_α}, were obtained from free-oscillation tests at Mach numbers from 0.7 to 1.5 about a pivot location 0.499 diameters from the nose. The Reynolds numbers based on the maximum model diameter varied from 0.63 to 0.76 x 10, and the reduced frequency parameter, $\frac{wd}{2V}$, ranged from 0.016 to 0.027.

The model was dynamically stable throughout the Mach number range 0.7 to 1.5 about a pivot location 0.499 diameters from the nose.

260

Baumker, A. 1944 A HISTORY OF GERMAN AERONAUTICAL RESEARCH (German Air Ministry, Munich, 1944). Translation by R.A.E., Farnborough. R.A.E. Translation No. 87.

261

Beach, Smiley Powell & N.C. Russell 1962 SUCCESSFUL PREDICTION OF AIR SICKNESS IN AIRCREW TRAINEES
Paper: 33rd Annual Meeting of the Aerospace Medical Association, Chalfonte-Haddon Hall, Atlantic City, N.J., April 9-12, 1962

ABSTRACT: Work done in 1953 by one of the authors suggested that successful prediction of air sickness could be made by taking a careful history and subjecting the individual to square wave head movements while seated in a rotating chair. Starting in 1960 one hundred and fifty pilot trainees were assessed by this method and also given a psychiatric assessment before undergoing primary flight training. The failure rate in this primary training due to air sickness was seven per cent. The combined history assessment and rotation test predicted half of this number with no false predictions. The assessing psychiatrist predicted failure of half of the remainder because of poor motivation or anxiety. This threefold attack can be usefully employed to remove the incurably airsick individual before he attempts expensive flying training.

262

Beals, L. S., Jr. 1951 SOME CONSIDERATIONS OF AEROMEDICAL RESEARCH
Ann. New York Academy of Sciences 51: 1159-1165, Jan. 1951

ABSTRACT: War, for all its amlignancy and degradation, chaos and waste, makes one contribution to the progress of mankind--its effectiveness in pushing forward the frontiers of knowledge at a faster rate than during peace. Research with military applications has developed a system of operation through government-sponsored study in universities and foundations. Planning and co-ordination thus have become channelized under headings not blatantly military, but pointed toward national security. Medical research has been less affected by any of the co-ordinating research plans than nay other branches of science. During the war there was some joint effort by individual laboratories and foundations. Two significant committees, the Vision Committee and the Committee on Aviation Medicine, still function. In aviation medicine team co-operation became vital in research. Work was not oriented around the physiology or endocrinology of a piece of a man, but about the total function of the whole human organism. Supersonic flight imposes not only aeromedical problems of the first order but also those that can only be completely embraced by a human-engineering approach. The major problems of the aviator in the supersonic cockpit are (1) the acceleration environment (2) visual performance (3) thermal surround (4) ultrasonic environment (frequencies above 20 kc.) and (5) pilot escape. These problems cannot be solved by aviation medicine alone. The role of the flight surgeons, in assuring the continued survival of this nation, would clearly appear to be the reorientation of the research program around the broadest interpretations of human engineering principles.

263

Beard, M.G. 1961 FIRE LESSONS FROM LA GUARDIA AIRPORT ELECTRA CRASH
(Paper, 65th Annual Convention, American Airlines, Inc., Detroit, Michigan, May 15, 1961)

ABSTRACT: For many years, there has been controversy regarding the relative safety between kerosene as a possible safety fuel and aviation gasoline. Since the start of jet transport operation, the controversy seems to have switched to a comparison between kerosene and JP-4. The Electra accident of Sept. 14, 1960, at LaGuardia Field where seventy-two passengers plus four crew members escaped from an inverted fuselage, has received an unusual amount of comment crediting the use of kerosene for this rather remarkable accomplishment.

After a thorough investigation of the accident, it does not appear that there would have been a holocaust when the airplane came to rest if it had been fueled withJP-4 or Avgas. All of the fuel in the ruptured wing tanks close to the fuselage was spilled on the runway and glass along the skid wake of the airplane and this fuel was not available to burn at the location where the airplane came to rest. Because of the unique conditions surrounding this accident, it is not a good one to prove whatever difference there is between kerosene, JP-4 and Avgas with respect to crash fire survivability. It does prove that there are few injuries if decelerations are low and impact "g's" are mild.

264

Beard, P. J. & W. F. Gantvoort 1938 STUDIES ON THE BIOLOGICAL EFFECTS OF SUPERSONIC VIBRATION.
J. Bact. 35:5.

ABSTRACT: Apparatus for the generation of supersonic vibrations is described. It consists of an oscillator with two 500-watt tubes which can be used singly or in parallel. It follows in principle the apparatus described by Wood and Loomis, but with certain modifications. The wave length can be varied between 300 and 1000 kilocycles and the power can be adjusted by means of a variable resistance in the primary circuit. The energy is transmitted to a piezo-active quartz crystal submersed in a dielectric. The latter flows through a cooling system at a rate of 5 gallons per minute and the temperature can be held at any desired level.

On applying energy to the crystal the dielectric becimes so violently agitated that it builds up a fountain about 5 cm. in height. Objects suspended in this fountain are subjected to the effects of the vibrations.

Double-distilled water containing triple-distilled mercury developed, with 600 kilocycles, a turbidity lasting over several hours. Exposure for 4 minutes was lethal for mice. Exposure for 15 minutes reduced a culture of Escherichia coli from 70,000,000 to 20,000 cells per cubic centimeter.

265

Beaton, J. L. and R. N. Field 1959 DYNAMIC FULL SCALE TESTS OF MEDIAN BARRIERS. (Div. of Highways, Materials and Res. Dept., Sacramento, Calif.) May 1959.

266

Beauchamp, G.T. 1961 ADVERSE EFFECTS DUE TO SPACE VEHICLE ROTATION. Astronautical Sci. Rev., 3(4):9-11. Oct- Dec. 1961.

ABSTRACT: In a satellite rotated to create an artificial gravitational field, the effects of Coriolis forces are considerable upon occupant movements, his performance at the controls, and on the operation of machinery. Careful consideration of the vehicle size, magnitude of the simulated gravity, and deliberate slowing of movements will lessen the adverse effects of Coriolis forces. The following recommendations are made: (1) The optimum vehicle radius at floor level should be from 45 to 50 feet, since smaller radii are conducive to intolerable Coriolis forces and gravity gradients. (2) At low simulated gravity levels the rotational radius of the vehicle for satisfactory human performance should be extended to several hundred feet to balance the Coriolis forces. (Acrospace Medicine 33(5):645, May, 1962)

267

Beauchamp, G.T. 1961 DISTURBING FORCES PRESENT IN A ROTATING SPACE STATION. J. Environmental Sci., 4(5):12-13,21.

ABSTRACT: The effects of Coriolis forces may be reduced by carefully considering vehicle size and strength of simulated gravity field, and by allowing for slower movement. Some suggestions for design are given: (1) optimum vehicle radius at floor level is 45 to 50 feet; smaller radii increase intolerable Coriolis effects and gravity gradients; and (2) gravity levels of 0.10 g require large spin radii (such as that proposed for nuclear vehicles) to overcome coriolis forces. The location of functional machinery, controls, and consoles is considered, since the effects of Coriolis forces may affect their operation.

268

Beck, A.I. & B. Cooper 1959 PROBLEMS INVOLVED IN PROVIDING PROTECTION FOR AIRCREWMEN DURING ESCAPE. (Paper, 30th Annual Meeting, Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: The problem areas concerned in providing adequate protection for aircrewmen prior to and during escape sequences from high performance aircraft are complicated by the physiologic considerations and the physical nature of the escape itself. The human limitations to imposed forces, both initial and sustained, and the method used to eliminate and/or reduce them will be presented.

Pertinent data resulting from sled test runs and crew escape studies will be discussed using actual filmed sequences of research effort. The presentation will consider the present state-of-the-art of crew escape systems and will present the problems yet to be solved to produce reliable escape potential for proposed new weapons systems. Factors such as positioning, restraints, time sequences, personal equipment, altitude and speed and related problems will be reviewed and possible solutions offered to meet the demands arising from the ever expanding flight envelopes of the most modern weapons systems.

269

Becker, K.R., R.W. Watson and F.C. Gibson 1962 HYPERVELOCITY IMPACT PHENOMENA. (U.S. Army Ordance Ballistics Research Lab., Aberdeen Proving Ground, Maryland). ASTIA AD-280 208.

ABSTRACT: The purpose of this investigation is to study the parameters governing the failure of thin metal plates under the impact of high-speed fragments; special emphasis is placed on the lightweight structural alloys. The geometrical features of the perforations, together with the spatial, mass, and velocity distributions of the ejecta produced in the perforation process, are of immediate interest. Since these variables are strongly dependent on the characteristics of the impacting projectile as well as the physical properties of the target material, a variety of experimental approaches to the problem are clearly evident. In an effort to systematize the approach and at the same time gain information that will be of immediate practical value, a few select target materials are currently being investigated under impact conditions that involve the same projectile geometry but different impact velocities.

270

Beckman, E.L. n.d. SOME PHYSIOLOGICAL AND PSYCHOLOGICAL CHANGES RESULTING FROM WATER IMMERSION THAT MAY BE SIGNIFICANT IN SPACE FLIGHT. (U.S. Navy)

ABSTRACT: In preparing man for space flight aeromedical investigators have simulated the conditions of space and tested the human response under these conditions. The zero G state can only be realized on earth during aircraft flights in Keplerian trajectory which produces a zero G condition on the occupant of the aircraft for 30 to 60 seconds. The hypogravic state resulting from water immersion has been used to simulate certain aspects of the gravity free state. Water immersion creates a physical state which is similar to the zero G state for certain sensory modalities.

Studies on humans immersed in water for 6 to 18 hours revealed some alteration in physiological function and psychomotor performance which may be significant in space flight. These findings will be discussed.

271

Beckman, E.L. 1949 PROTECTION AFFORDED CEREBROVASCULAR SYSTEM BY CEREBROSPINAL FLUID UNDER STRESS OF NEGATIVE G.
(U.S. Naval Air Development Center, Johnsville, Pa.)

ABSTRACT: Eleven goats were subjected to negative G exposures varying from 1.2 to 8.9 G with random selection of the G level on the 17-foot centrifuge at the University of Southern California. Arterial, venous and CSF pressures and, in some cases, intracardiac pressures, were measured through cannulae attached to Statham strain gauges and recorded oscillographically with Heiland Type A galvanometers. Complete post-mortem examinations were performed on all animals. The results of these studies indicate that within the limits of the experimental procedure, normal intracranial vessels are adequately protected against sudden changes in intravascular pressures by simultaneous changes in the cerebrospinal fluid pressure. Two explanations for the mechanism of intracranial hemorrhage reported in the literature are proposed: (1) Torsional stress applied to meningeal vessels by relative motion between the brain and its meninges produced by rapid acceleration of the head under negative G forces with resultant hemorrhage. (2) Rupture of abnormal (aneurysmal) intracranial vessels subjected to increased A-V pressure differences.

272

Beckman, E. L. 1950 THE INFLUENCE OF FOOTWARD ACCELERATION UPON THE FLUID SYSTEM OF THE INTRACRANIAL CAVITY. (U. S. NADC, AMAL, Johnsville, Pa.) Rept. No. NM 001 060.02.0, Dec. 1950.

273

Beckman, E.L. 1951 THE INFLUENCE OF FOOTWARD ACCELERATION UPON THE FLUID SYSTEM OF THE INTRACRANIAL CAVITY.
(U.S. Naval Air Development Center, Johnsville, Pa.)
Rept. No. NM 001 060.02.01. NADC-MA-5101 8 March 1951.

ABSTRACT: A series of experiments was carried out in which the stress of graded magnitudes of accelerative force was applied to goats for controlled time periods. As a result of these experiments, it was demonstrated that the cardiac output of goats under the conditions of stress investigated was moderately decreased when measured by the method of Hamilton. The arterial-venous pressure differential was found to be maintained approximately at control level during exposure to g of the magnitude used in these experiments so long as cardiac arrhythmias or severe bradycardia did not develop. The intracranial vascular system was found to be adequately protected against high intravascular pressures by a counter-balancing pressure increase in the cerebrospinal fluid. It may be inferred that the cerebral blood flow was adequately maintained under the conditions of this experiment.

274

Beckman, E.L. 1951 THE INFLUENCE OF FOOTWARD ACCELERATION UPON THE FLUID SYSTEMS OF THE INTRACRANIAL CAVITY. (U.S. Naval Air Development Center, Aviation Medical Acceleration Lab., Johnsville, Pa.) Report No. NADC-MA 5102, Sept. 1951. ASTIA ATI 119 261

ABSTRACT: The effects of negative G upon the central nervous system were studied upon ten goats by pathological techniques. The animals were exposed for fifteen-second periods to 5 or 8 negative G repeated one to twenty times. Central nervous system tissue was prepared for study by perfusion in situ with 10 per cent neutral formalin in physiological salt solution and subsequent removal of the enveloping cranial vault leaving the dura intact. After formalin fixation, the brain and brain stem specimens were examined grossly for evidence of hemorrhage.

One animal (Goat Number 3) was found to have a subdural hemorrhage covering the left lobe of the cerebellum and the left lateral aspects of base of the brain. Goat Number 1 was found to have ring hemorrhages in both the temporal lobe and mesencephalon. Routine tissue sections from fifteen areas of the brain and brain stem were prepared by cyanin, and hematoxylin and eosin staining techniques. These tissues were studied microscopically for evidence of hemorrhage and pathological changes. Neuropathological findings of increased perivascular spaces and packing of the red blood cells in the cortical vessels were observed which were suggestive of increased capillary filtration.

275

Beckman, E.L. 1952 EFFECTS OF ACCELERATION UPON THE CEREBRAL METABOLISM AND CEREBRAL BLOOD FLOW- PHASE IV -SOME OBSERVATIONS ON NEGATIVE G DEVELOPED IN AEROBATICS. (U.S. Naval Air Development Center, Aviation Medical Acceleration Lab., Johnsville, Pa.) Report No. NADC-MA 5203, 23 April 1952. ASTIA ATI 149915.

ABSTRACT: This study demonstrated that standard maneuvers of the type performed by Mr. Jocelyn developed negative G loads of 2 1/2 to 3G for durations of up to 32 seconds. In some maneuvers, peak accelerations of 5 negative G were reached, but in these maneuvers the magnitude of the acceleration was increased gradually to the maximum and then decreased over shorter time intervals of from 8 to 16 seconds.

One pilot was studied who is able to execute negative G maneuvers without undue discomfort, and without subjective or objective evidence of injury.

The use of negative G maneuvers of magnitude and duration measured in these experiments should be evaluated for use in offensive and defensive tactics.

276

Beckman, E. L., L. H. Peterson, & J. Parness 1953 DEVELOPMENT OF BIOLOGICAL RESEARCH APPARATUS FOR USE IN ACCELERATION AND DECELERATION STUDIES. PHASE I. THE EVALUATION OF PRESSURE TRANSDUCER SYSTEMS (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-5206, Jan. 15, 1953. ASTIA AD 1061

ABSTRACT: In Phase I of this investigation, comparison measurements were made of the electrical output of various commercially available pressure transducers. These transducer systems were tested utilizing various coupling systems (catheters and needle combinations) which are currently being used for physiological measurement. Measurements obtained were then compared with the amplitude versus frequency response of these same systems as measured by absolute calibration methods. The facilities of the Navy Underwater Sound Reference Laboratory at Orlands, Florida were used to obtain absolute response measurements. Graphs showing the amplitude versus frequency response of the various systems measured as well as the comparison curves to demonstrate the reliability of the conventional methods of response measurements are included in Appendix B. In Phase II of this investigation, the theory of transducer response for lumped systems (considered in Phase I) was extended to a consideration of a transducer system having more than one degree of freedom (distributed system). For this purpose, the capacitance type transducer with a very long polyvinly catheter was used as the test system. Theoretical consideration was given to the effect of varying physical constants upon the response of the system. These effects are shown in graphs included in the text of this report. A damping segment was designed, based upon the theoretical concepts. This unit was found satisfactory for producing variable damping in a transducer system and thereby improving the amplitude versus frequency response of the system and reducing acceleration artifacts.

277

Beckman, E.L., T.D. Duane, J.E. Ziegler, & H.N. Hunter 1953 HUMAN TOLERANCE TO HIGH POSITIVE G APPLIED AT A RATE OF 5 TO 10 G PER SECOND (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-5302 June 3, 1953 ASTIA AD 20 520

ABSTRACT: Investigations were made to determine more accurately the voluntary human tolerance to high positive G loads applied at the rate of 5–10 G/sec. Measurements were made on 5 adult human males at 15, 12, 10, and 6 G and upon 7 subjects at 8 G. Subjects were safely exposed to accelerative loads of 15 G for durations of 1 - 1.8 seconds if the loads were applied at a maximum rate of 8 - 10 G/sec. When the subjects were exposed to 15 G loads applied at 8 G/sec, unconsciousness was sometimes produced if the maximum load duration was greater than 0.5 sec. The visual symptoms of graying, peripheral vision loss, and blackout were not considered to be premonitory signs of impending unconsciousness when the load was 8 G or more applied at 7 G/sec or more. Unconsciousness produced as a result of loads of 8 - 15 G applied at 7 - 9.6 G/sec did not produce clinically demonstrable sequelae.

278

Beckman, E.L., J.E. Ziegler, T.D. Duane & H.N. Hunter 1953 HUMAN TOLERANCE TO COMBINED ACCELERATIONS. PHASE II. PRELIMINARY STUDIES ON PRIMATES SUBJECTED TO MAXIMUM SIMPLE ACCELERATIVE LOADS. (Naval Air Development Center, Johnsville, Pa.) NADC-MA-5301 22 May 1953. ASTIA AD 15 117

ABSTRACT: A survey was made of the literature regarding human tolerance to simple and combined accelerative stress. The tolerance of chimpanzees to simple positive, negative, and transverse g loads was measured, and applications were made to human tolerance levels. No demonstrable pathophysiological changes occurred when the animal was subjected for 15 sec to 40 transverse g or to 40 positive g. Unconsciousness was produced with approximately the same positive g load as for humans, but this level in chimpanzees was well below the level necessary for the rupture of tissue. Irreversible changes in the central nervous system and general tissue occurred after 15 sec of 40 negative g. Calculations indicated that safe human tolerance levels to positive and transverse g could be maintained with gradually increasing increments of magnitude up to 15 g and gradually increasing durations up to 5 sec maximum. Human tolerance to negative g was not considered safe with greater than 3 g for 1 sec until further investigation is made. (ASTIA)

279

Beckman, E.L., J.E. Ziegler, T.D. Duane, & H.N. Hunter 1953 PRELIMINARY STUDIES IN PRIMATES SUBJECTED TO MAXIMUM SIMPLE ACCELERATIVE LOADS. (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-5301, 22 May 1953. ASTIA AD 15117.

ABSTRACT: An analysis of the problem of determining the human tolerance to simple and combined accelerative stress has been undertaken from a review of the literature on the subject. On the basis of the analysis presented, an experimental program has been undertaken which would provide the data necessary to define the human tolerance to acceleration in the part of the spectrum which has not been adequately studied, i.e., in the period from 1/2 to 5 seconds duration and of accelerative stress loads up to 15G. Preliminary experimentatio has been carried out to study the tolerance of the chimpanzee to loads calculated to give a safety factor of greater than 2.5 for human work. From these studies, it has been possible to extrapolate and to predict that transverse accelerative stress of 15 G for 5 seconds in either the prone or supine position is below the human tolerance and the ultimate rupture points for the various mechanical systems of the body. From a study of the effects of 40 positive G for 15 seconds upon the chimpanzees, it was found that

severe accelerative shock was produced, but that there was no rupture of the skeletal, visco-elastic or vascular systems which was irreversible. From the study of the effects of 40 negative G applied to a chimpanzee for 15 seconds duration, it was found that a comatose state was produced which persisted for approximately three days, and that pathological numbers of leucocytes and red blood cells were demonstrated in the cerebrospinal fluid. Small sub-arachnoid and sub-cortical hemorrhages were found from microscopic examination of the brain tissue. The damage was of such severity that it was not believed to be completely reversible. Pathological changes in the liver, myocardium, and thyroid were also observed. A condition of accelerative shock was produced in the animal and the stress load was such as to produce evidence that the rupture point for the vascular system had been reached with production of irreversibel damage to the brain, heart, and liver. On the basis of these findings, it is recommended that studies be carried out to determine the human tolerance to an accelerative stress of 15 G applied for a duration of up to 5 seconds with the force acting in the transverse and positive G directions. Further animal studies on the effects of negative G are recommended.

280

Beckman, E.L. 1953 OBSERVATIONS OF HUMAN TOLERANCE TO ACCELERATION STRESS: PHASE II. (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-5302. June 1953.

281

Beckman, E. L., J. E. Ziegler, T. D. Duane and H. N. Hunter 1953 SOME OBSERVATIONS ON HUMAN TOLERANCE TO ACCELERATIVE STRESS PHASE II. PRELIMINARY STUDIES ON PRIMATES SUBJECTED TO MAXIMUM SIMPLE ACCELERATIVE LOADS
J. of Aviation Medicine 24(5):377-392 October 1953

ABSTRACT: Preliminary experimentation has been carried out to study the tolerance of a chimpanzee to loads calculated to give a safety factor of greater than 2.5 to 3.0 for human work. From these studies, it has been possible to extrapolate and to predict that the human tolerance to transverse accelerative stress of 15 G for five seconds in either the prone or supine position is below the ultimate rupture points for the various mechanical systems of the body. From a study of the effects of 40 positive G for fifteen seconds upon the chimpanzee, it was found that severe accelerative shock was produced -- which was irreversible. There was no rupture of the skeletal, visco-elastic or vascular systems. It is believed that accelerative stress of 15 negative G applied for a duration of up to five seconds is in excess of the safe human tolerance limit.

282

Beckman, E. L., T. D. Duane, J. E. Ziegler, & H. N. Hunter 1953 SOME OBSERVATIONS ON HUMAN TOLERANCE TO ACCELERATIVE STRESS. IV. HUMAN TOLERANCE TO HIGH POSITIVE G APPLIED AT A RATE OF 5 TO 10 G PER SECOND. (Naval Air Development Ctr., Johnsville, Pa.) NADC MA-5302. ASTIA AD-20 520.
See also J. Aviation Med. 25(1):50-65, Feb. 1954

ABSTRACT: 11 subjects were exposed to high positive accelerations (3-5 g) on the centrifuge, and the durations of the loads required to produce unconsciousness were measured. The time required to produce unconsciousness was longer at low levels and shorter at high levels of acceleration. The mean value for the time above 3 g during the runs which produced unconsciousness was 4.2 secs. After unconsciousness had been produced, the subjects returned to consciousness within 5-10 secs. Unconsciousness was not preceded by loss of peripheral vision and blackout usually experienced when the exposure is to loads of less than 8 positive g. Unconsciousness did not occur until the arterial pressure at the base of the brain had dropped to zero (at a mean level of 5 g). From the data obtained it was assumed that stasis of the cerebral circulation was produced by accelerations of 3, 4, or 5 g. There was no significant difference between the duration of the acceleration required to produce unconsciousness at 8, 10, 12, or 15 g, if the time was measured as the duration of the load above 3, 4, or 5 g.

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Beckman, E. L., J. E. Ziegler, T. D. Duane & H. N. Hunter 1954 SOME OBSERVATIONS ON HUMAN TOLERANCE TO ACCELERATIVE STRESS. PHASE IV. HUMAN TOLERANCE TO HIGH POSITIVE G APPLIED AT A RATE OF 5 TO 10 G PER SECOND. J. Aviation Medicine 25(1):50-66.
See also: (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5302.

ABSTRACT: Eleven volunteer human subjects were exposed to high positive G loads and the durations of the loads required to produce unconsciousness were measured. The data obtained in these experiments were analyzed on the basis of the assumption that stasis of the cerebral circulation was produced by accelerative loads of either 3, 4 or 5 G. On this basis, it was found that: (a) the duration of the stasis of the cerebral circulation which produced unconsciousness was shorter by two to three seconds than the mean time required to produce unconsciousness by 1 G by occlusion of the vertebral and carotid arteries with a cervical cuff, reported by Rossen, and (b) that there was no statistically significant difference between the duration of the acceleration required to produce unconsciousness at 8, 10, 12, and 15 positive G, if the time was measured as the duration of the load above 3, 4, or 5 G. The shorter duration of cerebrovascular stasis required to produce unconsciousness at 8, 10, 12, and 15 positive G was explained on the basis that the high positive G loads cause the capillary bed to be partially drained of blood. The total quantity of blood entrapped within the brain after cerebrovascular stasis has been produced by high accelerative loads would be smaller than the quantity of blood entrapped withing the brain by occlusion of the carotid and vertebral arteries. If the oxygen content of the bloods were approximately the same in both cases, then the time to unconsciousness when circulatory stasis of the brain was produced by high positive G loads would be shorter than when stasis was produced by occlusion of the vessels by a cervical cuff because of the difference in the quantities of the entrapped blood.

284

Beckman, E.L. & H.L. Ratcliffe 1955 A POST-MORTEM STUDY OF RHESUS MONKEYS (MACACA MULATTA) AT INTERVALS AFTER SINGLE OR REPEATED EXPOSURE TO NEGATIVE ACCELERATION. (U.S. Naval Air Development Center, Johnsville, Pa.) Rept. No. NADC-MA-5504, 26 May 1955. ASTIA AD 67 387
See also J. Aviation Med. 27(2):117-130. 1956.

SUMMARY; Twenty-two monkeys, with appropriate controls, were subjected to one or more exposures of negative acceleration (12, 32, or 40 G) and killed 15 minutes to 90 days later. The results of these experiments suggest that current histological techniques offer little promise of explaining the effects of negative acceleration upon the functions of the brain. Scattered capillary hemorrhages and, occasionally, edema were the only lesions that might be related to acceleration. Thrombus formation, especially in the vessels of the lungs, commonly followed negative acceleration, and can account for the development of edema and repeatedly to negative acceleration developed increased tolerance, and in them the adrenal cortex was hypertrophied. (AMAL)

285

Beckman, E.L., and H.L. Ratcliffe, 1956 A POST-MORTEM STUDY OF RHESUS MONKEYS AT INTERVALS AFTER SINGLE OR REPEATED EXPOSURE TO NEGATIVE ACCELERATION. J. Aviation Med. 27(2):117-130.
See also NADC-MA-5504, ASTIA AD 67 387

SUMMARY: Twenty-two monkeys were subjected to one or more exposures of negative acceleration (12, 32 or 40 g) and killed fifteen minutes to ninety days later. Their tissues were compared to those of four normal monkeys and of five monkeys that had received equivalent exposures to positive acceleration. These examinations suggest that current histological techniques offer little promise of explaining the direct effects of negative acceleration upon the functions of the brain.

In terms of survival, however, edema and hemorrhage into the lungs seemed more important than changes in the functions of the brain. Moreover, escape of fluid and blood into the alveolar spaces of the lungs became more conspicuous thirty to ninety-six hours after acceleration, and may be attributed to the effects of thrombi that developed in the vascular tree of the lungs during and immediately following exposure.
Repeated exposure to negative acceleration was followed by the development of increased tolerance, as indicated by lessening edema and hemorrhage into the extra-cranial tissues of the head and face as the series of exposures progressed. The adrenal cortex of these animals was hypertrophied.

286

Beckman, E., D.C. McNutt, & J.S.P. Rawlins 1958 USE OF THE STANDARD EJECTION SEAT SYSTEM AS A MEANS OF ESCAPE FROM SUBMERGED AIRCRAFT. (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. 1049, May 1958. ASTIA AD 201 166.

ABSTRACT: The feasibility of using the standard Martin-Baker ejection seat system was assessed. Results indicated that when the canopy is open or off, escape from submerged aircraft can best be accomplished by climbing out, inflating the Mae West, and making a free ascent. The forces which act upon the aircrew in using either the 60 or 80 fps ejection seat system (type 1, 2a, 3, and 4 guns) for escape from a submerged aircraft are tolerable. The hazards involved in ejection through a Seahawk type canopy when submerged are within the acceptable limits of a survival procedure.

The present standard seat ejection guns will neither fire after the firing head has been submerged in water for more than a few seconds nor will it fire properly after the barrel of the gun has been immersed in water for half a minute. The escape from a sinking aircraft should be carried out before the aircraft sinks to 100 ft. although safe escape is theoretically possible down to depths of 300 feet.

287

Beckman, E.L. 1959 ESCAPE FROM DITCHED AIRCRAFT: Evaluation of the factors which affect survival in a ditching accident in current operational aircraft with recommendations for increasing the rate of survival. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 1094 iv, Mar. 1959. ASTIA AD 243 788

ABSTRACT: The probability of aircrew making a safe escape after a ditching accident by using "manual" escape procedures is assessed; these procedures are shown to be inadequate for escaping from modern jet aircraft; and the use of the ejection seat to assist escape from a sinking aircraft is evaluated and recommended. A research programme is proposed for accumulating data on ditching accidents; this includes the measurement of accelerations to which the aircrew are subjected during ditching and the measurement of the sinking characteristics of aircraft when subjected to realistic ditching conditions. The results obtained should permit an accurate evaluation of the effectiveness of the present methods of escape from ditched aircraft. An engineering development programme is proposed for providing a buoyancy system for the entire airframe in some cases, for the ejection seat in others, and for modifying the ejection seat firing system so as to ensure that it functions under water in addition to providing a slower ejection velocity, when used for escape from a ditched aircraft.

288

Beckman, E. L. 1960 ESCAPE FROM DITCHED AIRCRAFT: TIME REQUIRED BY AIRCREW FOR ESCAPE FROM A DITCHED AIRCRAFT WHILE USING THE AIRCRAFT OXYGEN EQUIPMENT FOR BREATHING. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 1074 Jan. 1960 . ASTIA AD 239 037

Summary: Tests to evaluate problems of pilot escape from ditched aircraft were carried out, using a Meteor Mk 9 fuselage with subjects wearing flying clothing and using Mk 17 D oxygen regulators and both the A13A1 and P type oxygen masks. The times required by aircrew subjects to escape from the cockpit in air were compared with the times required to escape from the cockpit when upright and inverted in 8 feet of water. The subjects required 51% more time to escape from the aircraft when upright in water and 87% more time to escape when the fuselage was inverted in water than when the same escape procedure was carried out in air. The 17D type pressure demand regulator when switched to 100% oxygen, coupled with the oxygen pressure reducer and A13A1 oxygen mask were found to function adequately for underwater breathing in all tests. All subjects were able to carry out normal respiration when the cockpit was in the upright position. When the cockpit was inverted it was necessary for the subjects to augment the supply of oxygen from the regulator by depressing the emergency button. In this manner respiration was adequate for all subjects with the cockpit in the inverted position.

The most significant finding was that all subjects required a short familiarisation and training period on the use of the oxygen equipment underwater before they could satisfactorily utilize the equipment. After the subjects had mastered the breathing technique for using the demand oxygen systems underwater, the escape procedures were efficiently and safely carried out.

Some subjects fouled on the parachute harness, restraint harness or personal survival pack in the process of escape. It was found that when the dinghy pack was attached to the life saving waistcoat by the long lanyard alone, the dinghy pack invariably became fouled on the parachute harness so that the dinghy had to be detached before the escape could be completed.

On the basis of these findings, the problems of escape from a ditched aircraft have been re-evaluated and recommendations are made as to the procedure for escape with regard to various conditions of the aircraft in water. (AUTHOR)

289

Beckman, E.L., T.D. Duane & K.R. Coburn 1961 LIMITATION OF OCULAR MOTILITY AND PUPILLARY DILATATION IN HUMANS DUE TO POSITIVE ACCELERATION. (Naval Air Development Center, Johnsville, Pa.) Rept. No. NADC-MA-6140, 12 December 1961. ASTIA AD 270 281

ABSTRACT: In a search for a reproducible and objective endpoint for measurement of reaction to positive acceleration, it was observed that volitional ocular motility disappeared at approximately the same magnitude of acceleration that produced a loss of peripheral vision. It was disclosed that trained centrifuge subjects could rotate their eyes after losing peripheral vision but in an ataxic manner. The optokinetic reflex seemed to disappear concomitantly with limitation of ocular motility (LOMA). The ability to follow a moving

target was also lost after peripheral vision failed. Progressive pupillary dilatation was observed. The phenomena were also tested while 30-35 mm Hg negative pressure was applied over the eyes by use of a modified underwater swimmer's mask. With this technique, vision after blackout (loss of central and peripheral vision) during acceleration was restored almost to normal. The volitional eye movements likewise returned to normal. The optokinetic reflex was likewise returned to normal. The optokinetic reflex was likewise restored as was the target following reflex. Target following reflex. The pupils, however, remained dilated. It is concluded that there is a cerebral cortical dysfunction which occurs during exposure to positive acceleration at levels which cause blackout. (Author)

290

Beckman, E. L. 1962 BIODYNAMIC PROBLEMS OF HUMAN SPACE FLIGHT
In Barbour, A. B. & H. E. Whittingham, eds., Human Problems of Supersonic and Hypersonic Flight (New York, Oxford, London, Paris: Pergamon Press, 1962), pp. 113-128

291

Beckman, E.L., et al. 1962 LIMITATION OF OCULAR MOTILITY AND PUPILLARY DILATATION IN HUMANS DURING POSITIVE ACCELERATION.
In Armand Mercier, ed. Visual Problems In Aviation Medicine
(New York: Pergamon Press, 1962) pp. 17-25.
See also (U.S. Naval Air Div. Ctr., Johnsville, Pa.) NADC-MA-6140
ASTIA AD 270 281

ABSTRACT: An objective test to determine the functional state of the central nervous system during positive acceleration was evolved, based on the limitation of ocular motility (LOMA0. Normal subjects demonstrated LOMA during positive acceleration on a centrifuge at a g level between the subjective sensations of greyout and blackout. At this point, which varied from 3.5 to 7.0 g in individual subjects, the eyes came to rest in the primary position. Trained centrifuge subjects could overcome LOMA by voluntary effort, indicating that the lower motor neurons to the extraocular muscles remain functional However, these voluntary movements were ataxic, probably because of a loss of sensory feedback from the retina. As positive acceleration increased, the pupils dilated with concomitant loss of peripheral vision, reaching a maximum with loss of central vision. Vertical nystagmus was observed during high rates of change of acceleration, and the optokinetic response did not continue during blackout. When negative pressure was applied to the orbit (using a modified skin-divers mask) during LOMA, vision and optokinetic responses were restored, the voluntary ataxic movements became coordinated, and the pupils remained partially dilated. The usual pupillary dilation during blackout was prevented by local application of pilocarpine, but not by morphine. These results indicate that LOMA is due to cerebral hypoxia which causes a dysfunction of normal oculomotor and pupillary control systems. Therefore, the observations of LOMA and pupillary dilation can be used to objectively evaluate cerebral response to positive acceleration.

292

Becks, Chester C. 1945 ACCELERATION TRANSVERSE. (Natl. Research Council, Div. of Medical Sciences) Rept. No. 418.

293

Becks, C. C. 1958 MAN'S ABILITY TO WITHSTAND TRANSVERSE ACCELERATION IN THE SITTING POSITION
(Mayo Aero Medical Unit, Rochester, N. Y.) ASTIA AD 204991

294

Beeding, Capt. Eli L., Jr. 1957 DAISY TRACK AND SUPPORTING SYSTEMS
(Air Force Missile Development Center, Holloman AFB, New Mex.)
HADC TN 57-8, June 1957. ASTIA AD 113 038

ABSTRACT: The equipment design and function, and the test sequence of the Daisy Track, a 120 ft catapult sled track and braking system, are described. The results of a test run, the details of the construction, and photographs of the Daisy Track are appended.

295

Beeding, E. L., Jr. 1957 DAISY TRACK TESTS, 18 APRIL - 11 JUNE 1957.
(USAF Missile Development Center, Holloman AFB, N. Mex.) Proj. 7850, Test Rept. No. 6, 10 Sept. 1957.

ABSTRACT: The purpose of the program being conducted on the Daisy Track is to determine human tolerances to linear decelerative forces in all planes of body orientation. This is a continuing program due to the many possible combinations of magnitude, rate of application, and duration of force with changes in body orientation. Complete evaluation of these variables using human and animal subjects will provide necessary criteria used in the design of aircraft. The series of tests described in this publication was conducted in order to determine the effect of impact forces of 15 g magnitude applied at the rate of 200 g/sec per second on volunteer human subjects oriented at various degrees with respect to the acceleration-deceleration vector. Subjects were lying on their right side. (CARI)

The Human Disorientation Device will allow medical research in the field of sensory responses to angular acceleration, vertigo, and similiar phenomena required for an analysis of human behavior and human performance limitations in the rapid maneuvering (spin and tumbling, etc.) of high-speed aircraft and spacecraft. (Author)

4

Acker, L.W., D.O. Black & J.C. Moser 1957 ACCELERATIONS IN FIGHTER-AIRPLANE CRASHES. (National Advisory Committee for Aeronautics, Washington, D.C.) NACA RM E57G11, 4 Nov. 1957. ASTIA AD 145 792

ABSTRACT: Full-scale crashes were conducted with FH-1 jet fighter airplanes under circumstances approximating those observed in the military service. These crashes simulated unflared landings at impact angles of 18°, 22°, and 27°, a ground cart wheel, and a ground loop. The magnitude, duration, and direction of the crash accelerations were measured on the airplane structure and on an anthropomorphic dummy installed in the cockpit. The accelerations measured are compared with existing data on human tolerance to the sudden loads that occur in crashes to see whether the human tolerance had been exceeded.

5

Ackerman, M. 1959 AN INTEGRATED SPACE-FLIGHT SIMULATOR. IRE Trans. Military Electronics. MIL-3(3):92-98.

ABSTRACT: The application of a flight simulator in the engineering and development of a space cabin or capsule is discussed. Those elements of the space environment which might physiologically or psychologically affect the pilot or crew are reviewed in terms of the following systems: propulsion, flight, internal environment, communication, and navigation. A proposed flight simulator is described which will integrate the physiologic and psychologic effects of these systems and thereby provide a complete environment for experimentation. Early phasing of the integrated simulator with the space vehicle is suggested as a better foundation for design of the space cabin or capsule than sole dependence on feedback from early flights.

6

Adams, C.C. et al. 1958 SPACE FLIGHT. (New York: McGraw-Hill Book Co.)

ABSTRACT: This book is designed to give a complete, well-rounded account of (1) the history and background of the astronautical sciences, (2) the many subsidiary fields that compose these sciences, (3) detailed information on many of the most important world-wide developments of astronautical significance. It is further intended to offer exceptionally complete coverage of introductory space-flight material, assess the present state of the art, and present a penetrating look into the future potentials of astronautics.

7

Adams, C. R. 1963 LUNAR LANDING VEHICLE HELICOPTER LANDING SIMULATION STUDY. (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 29-May 2, 1963)

ABSTRACT: A simulated hover-to-touchdown landing by helicopter on the lunar surface was the subject of this study. The dual purpose was to determine the hover-to-touchdown time necessary for the Lunar Landing Vehicle under manual control, and also to define qualitatively on the basis of nominal translational velocities a reasonable value of distance from hover point to suitable landing site. The test vehicle, a Sikorsky S-58 helicopter, followed the planned trajectory as closely as possible. Each of the eight test subjects made eight runs from various directions over a rough type of terrain approximating that thought to exist on the lunar surface. To obtain earth-shine values equivalent to lunar surface illumination these tests were conducted at noon with the subjects wearing dark goggles. The landing area was made clearly visible to the subjects five seconds before the initial hover point was reached so that the landing site could be selected. Time and distance were recorded from hover to touchdown. Test program results indicated that the LLV would be able to land within a specified number of seconds if the first landing site proved suitable, whereas marginal landing time must be allowed if an alternate site had to be selected and traversed. Based on these findings a hover time was recommended for the lunar landing maneuver. (Author)

8

Adams, J.C. 1941 AVIATION MEDICINE AND NEW STRESSES IN FLYING. J. Tenn. Med. Ass. 34:423-427

ABSTRACT: Because methods of warfare are progressive, it is necessary that medicine in warfare be equally progressive. A historical contrast between the picture of aviation in the last World War with that of today points out the tremendous role aviation has come to play in the present war. At the present time, problems such as those associated with extreme altitudes, high-speed, night operations and personal problems are among those facing pilots. The Navy school of aviation medicine at Pensacola, Florida, will be a center to train flight surgeons on the importance in correct selection and care of pilots.

9

Adamson, D. 1962 THE GRAVITATIONAL FIELD ENVIRONMENT OF AN EARTH SATELLITE. (National Aeronautics and Space Administration, Washington, D.C.) NASA-TN-D 1270 August 1962.

10

Ades, Harlow W. 1961 ELECTROENCEPHALOGRAPHIC FINDINGS IN RELATION TO EPISODES OF ALTERED CONSCIOUSNESS IN AVIATORS
U.S. Naval School of Aviation Medicine, Pensacola, Florida Project MR005.13-3001, Subtask 1, Report No. 3 ASTIA AD 257 274

ABSTRACT: Observations of aviators who had had unexplained lapses of consciousness while piloting aircraft led to the electroencephalographic exploration of these individuals and of the possible relationship between this clinical phenomenon and unexplained aircraft accidents. Four types of EEG deviation from normal were identified as correlating with incidence of unconscious episodes in pilots with or without accident. The occurrence in various groupings of such pilots was compared to the incidence of occurrence in a group of 1375 aviation candidates The relative significance of the various factors and the future refinement of criteria are discussed in relation to etiology of unconscious episodes and the possible use of electroencephalography as a selection criterion, use of which might reduce the number of aircraft accidents. It is recommended that a baseline EEG be done on each aviation candidate, preferably at the end of the pre-flight phase or during the early phases of flight training. It is further recommended that special procedures for activating abnormal EEG patterns be carried out on aviation candidates whose baseline EEG gives reason for suspicion.

11

Adey, W.R. 1961 ASPECTS OF BRAIN PHYSIOLOGY IN THE SPACE ENVIRONMENT. In Symposium, Brain Functions and Space, I. Cortical Excitability (Brain Research Institute, University of California, Los Angeles, 1961) In press.

12

Adey, W. R. et al 1961 EEG RECORDS FROM CORTICAL AND DEEP BRAIN STRUCTURES DURING CENTRIFUAL AND VIBRATIONAL ACCELERATIONS IN CATS AND MONKEYS.
IRE Trans. Biomed Electronics 8: 182-188, July 1961.

ABSTRACT: Electroencephalographic records have been taken from deep regions of the brains of cats and monkeys with chronically implanted electrodes during centrifugal and shaking accelerations comparable to booster forces. Histological and X-ray controls have indicated that displacement of the electrodes does not occur, and that damage to brain tissue is comparable with nonaccelerated animals. A transistorized EEG amplifier suitable for recording in satellite biopack environments has been developed.

In centrifuge tests, transverse accelerations up to 8 G were associated with rhythmic "arousal" patterns of slow waves in hippocampal regions of the temporal lobe during increasing or decreasing acceleration. Longitudinal accelerations between 5 and 6 G produced blackouts after 30 to 40 seconds, with flattening of EEG records, and frequently with induction of

epileptic seizure activity in temporal-lobe leads. Shaking tests suggested that vibrational acceleration may be associated with the intermittent "driving" of the cerebral rhythms, in a fashion resembling photic driving, at shaking rates from 11 to 15 cps, and from 22 to 30 cps.

13

Adey, W.R. 1962 POTENTIAL FOR TELEMETRY IN THE RECORDING OF BRAIN WAVES FROM ANIMALS AND MEN EXPOSED TO THE STRESSES OF SPACE FLIGHT. In Symposium, The Use of Telemetry in Animal Behavior and Physiology (The American Museum of National History, New York, 1962) In press

14

Advisory Group for Aeronautical Research & Development, Aerospace Medical Panel. 1959 A GLOSSARY OF TERMS COMMONLY USED IN AVIATION MEDICINE: French-English and English-French. ASTIA AD 242976.

15

Advisory Group for Aeronautical Research and Develop. 1959 PROCEEDINGS OF THE NINTH AGARD GENERAL ASSEMBLY (Proces-Verbal de La Neuvime Assemblee Generale De L' Agard)
(Advisory Group for Aeronautical Research and Development, Paris, France)
25 Sept. 1961. ASTIA AD 261 836.

CONTENTS:

Review of Aeronautical Research in Germany
Space Research
Communication with Ballistic Missiles and Satellites
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Aero Space Medical
Avionics
Combustion and Propulsion
Flight Test and Instrumentation
Structures and Materials
Wind Tunnel and Model Testing

296

Beeding, E.L., Jr. 1957 TEST REPORT ON AMFL SHORT TRACK FACILITY. (Holloman Air Development Center, Holloman AFB, N. Mex.) Proj. No. 7850, Task No. 78503, Jan. 1957

ABSTRACT: The purpose of the program being conducted on the Short Track Facility is to determine human reactions to linear decelerative forces 15 to 200 G in magnitude in the range of 200 to 5000 G per second rate of application, for durations of from .010 to .200 seconds for all planes of body orientation.

The series of tests described in this publication was conducted in order to determine the effect of impact forces of the 15 G magnitude applied at the rate of 200 G per second on volunteer human subjects oriented at various degrees with respect to the acceleration-deceleration vector. Subjects were lying on their right side and facing aft. (CARI)

297

Beeding, E.L., J.P. Stapp, and R.R. Hessberg 1957-59 DAISY TRACK TEST. (Complete series of reports, Air Force Dev. Center, Holloman AFB, New Mexico) April 1957 - Dec. 1959

298

Beeding, E. L., Jr. 1958 DAISY TRACK TESTS, 13 JUNE 1957 - 17 DEC. 1957 (USAF Missile Development Center, Holloman AFB, N. Mex.) Project No. 7850, Test Rept. No. 7, March 1958

ABSTRACT: The purpose of the program being conducted on the Daisy Track is to determine human tolerances to linear decelerative forces in all planes of body orientation. This is a continuing program due to the many possible combinations of magnitude, rate of application, and duration of force with changes in body orientation. Complete evaluation of these variables using human and animal subjects will provide necessary criteria used in the design of aircraft. The series described in this publication was conducted in order to determine the effect of impact forces up to 40 g magnitude applied at rates of onset up to 3000 g/sec on volunteer human subjects oriented at various degrees with respect to the acceleration-deceleration vector. (CARI)

299

Beeding, E.L., Jr. & R.R. Hessberg, Jr. 1958 DAISY TRACK TESTS 271-337; RUN: 4 FEB. - 19 MAY 1958. (USAF Missile Development Center, Holloman AFB, N. Mex.) Proj. No. 7850, Test Rept. No. 8, Nov. 1958.

ABSTRACT: The program conducted on the Daisy Track is designed to determine human tolerances to linear-deceleration forces in all planes of body orientation. This is a continuing program because of the many possible combinations of magnitude, rate of application, duration of force, and changes in body orientation. Complete evaluation of these variables, obtained by testing human and animal subjects, will provide necessary criteria for use in designing aircraft and space vehicles. The series of tests reported in this publication was conducted to determine the effects of up to 80 g impact forces being applied to volunteer human and animal subjects at onset rates of up to 4000 g per second, while the subjects were oriented to the acceleration-deceleration vector at various degrees. (CARI)

300

Beeding, E.L., Jr. 1959 DAISY TRACK TESTS -TEST NUMBERS: 338 - 519 22 MAY 1958 - 9 JULY 1959. (USAF Missile Development Center, Holloman AFB, N. Mex.) Project 7850, Task 78503, Dec. 1959.

ABSTRACT: The program conducted on the Daisy Track is designed to determine human tolerances to linear-deceleration forces in all planes of body orientation. This is a continuing program because of the many possible combinations of magnitude, rate of application, duration of force, and changes in body orientation. Complete evaluation of these variables, obtained by testing human and animal subjects, will provide necessary criteria for use in designing aircraft and space vehicles. The series of tests described in this publication was conducted to determine the effects of up to 80 g impact forces being applied to volunteer human and animal subjects at rates of onset up to 10,000 g per second, while the subjects were oriented to the acceleration-deceleration vector at various degrees. (CARI)

301

Beeding, E. L., Jr. 1960 DAISY DECELERATOR TESTS, 13 JULY 1959 - 13 APRIL 1960 (USAF Missile Development Center, Holloman AFB, N. Mex.) MDW Test Rept. 60-4, July 1960

ABSTRACT: The program conducted on the Daisy Decelerator is designed to determine human tolerances to linear-deceleration forces in all planes of body orientation. This is a continuing program because of the many possible combinations of magnitude, rate of application, duration of force, and changes in body orientation.

Complete evaluation of these variables, obtained by testing human and animal subjects, will provide necessary criteria for use in designing aircraft and space vehicles. The series of tests described in this publication was conducted to determine the effects of up to 80 G impact forces being applied to volunteer human and animal subjects at rates of onset up to 10,000 G per second, while the subjects were oriented to the acceleration-deceleration vector at various angles. (CARI)

302

Beeding, E.L., Jr. and J.D. Mosely 1960 HUMAN DECELERATION TESTS. (USAF Missile Development Center, Holloman AFB, N.Mexico) AFMDC-TN-60-2, Jan. 1960. ASTIA AD 234 148

ABSTRACT: A series of deceleration tests were conducted to determine human tolerance to impact forces with the subject seated in the backward-facing position. For healthy males seated in the backward-facing position, restrained with shoulder straps, lap belt and inverted "V" strap, the tolerance limit to G forces of.04 second duration seems to be in the area of 83 G at 3800 G/ second.

303

Beeding, E. L., & J. D. Mosely 1960 HUMAN TOLERANCE TO ULTRA HIGH G FORCES (Paper, 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960)

ABSTRACT: Using the Daisy Track at the Aeromedical Field Laboratory, Holloman Air Force Base, New Mexico, as a test facility, human volunteer subjects were exposed to forces of short duration while seated in the backward facing position. Subjects received from 50 G to 83 G without suffering any apparent permanent damage. Experimental parameters such as peak G, rate of onset of G and duration of G are given for several of these experiments. Subjective reaction to these various force level is discussed accompanied by pertinent comments on the influence on human tolerance of subject position and harness.

304

Beeding, E. L., Jr. 1961 HUMAN FORWARD FACING IMPACT TOLERANCE J. of Aerospace Medicine 32(3):220, March 1961.

ABSTRACT: A total of fifteen human tests were done on the Daisy Decelerator in this series, in which the subjects experienced "eyeball out" decelerations. Force levels ranged from 30-40 G at rates of onset from 500-1100 G per second for total durations on the order of .075 seconds. The series was terminated at the 40 G level when a subject suffered three vertebral compression fractures. This series of experiments is discussed in detail and comments made as to possible causes of this rather low tolerance limit.

305

Beeding, E.L. 1961 HUMAN FORWARD FACING IMPACT TOLERANCES.
(Preprint of paper presented at 32nd Annual Aerospace Medical Association Convention, Chicago, Ill., 24-27 Apr. 1961)

ABSTRACT: A series of tests with the subject seated in the forward facing (eye-balls out) position were conducted on the Daisy Decelerator in an effort to obtain tolerance data for this position. The tests were terminated when a subject suffered three vertebral compression fractures at a peak of 39.8 G.

CONCLUSIONS: 1) That human tolerance to forward facing decelerations lies above the 40 G level. 2) That testing in this position should be done with relatively loose shoulder straps, as suggested by Colonel Stapp's experience, in an effort to find this tolerance limit. 3) That the human can be considered, as engineers do, as a simple mass-spring system, but this consideration does not answer the question of human tolerance with regard to internal organs, as suggested by the heart difficulties (nodal rhythm) of the last subject described. (AUTHOR)

306

Beeding, E.L. 1961 HUMAN IMPACT STUDIES BEING CONDUCTED AT HOLLOMAN AFB, NEW MEXICO
(Panel Discussion -- Symposium on Impact Acceleration Stress, Brooks AFB, Texas, Nov. 27-29, 1961)

ABSTRACT: Present work is primarily designed to answer the vexing question of which factors should be considered in the prediction and establishment of end points. Methods being used in these investigations will be discussed.

As is always the case, adequate test equipment is prerequisite to the obtaining of finalized data. Equipment in use, being procured, and envisioned will be discussed.

An outline of the support being given to the Aeromedical Field Laboratory and other organizations in the form of advice and/or testing will be given.

A listing of key personnel at the Aeromedical Field Laboratory and of appropriate publications will be furnished.

307

Beeding, E.L., Jr. & J.E. Cook 1962 CORRELATION TESTS OF ANIMALS AND HUMANS
In Cragun, M.K., ed., The Fifth Stapp Automotive Crash and Field Demonstration Conference, Sept. 14-16, 1961 (Minneapolis, Minnesota: University of Minnesota, 1962) Pp. 125-129

ABSTRACT: Tests were conducted on swine, dogs, bears, and chimpanzees to determine the correlation between tests of animals and humans. The choice of test animal obviously depends on many factors--subject position, harness, size and weight limitations, test equipment available, need for performance decrement testing,

cost, etc. In general it can be concluded that: (a) Sophisticated test program requiring both performance and proper weight distribution--chimpanzee. He is an excellent composite subject for preceding man into a previously unexplored and potentially hazardous area. (b) Anatomical and physiological results sought--American Black Bear. (c) Small animal size dictated by test equipment--dog. (d) Swine--Isolated studies of various visceral components. As an example, specific studies of trauma to the liver or kidneys can be done.

308

Beeler, D. C. 1942 DATA ON ACCELERATIONS FOR MEDICAL RESEARCH. (Memo Rept. for Aero Med. Lab., Wright Field (NACA, Langley Field, Va.) 23 July 1942

ABSTRACT: Discussion and series of graphs showing the time history curves of several aircraft during various maneuvers. Graphs were compiled from NACA flight tests from 1927 to 1942. A formula is given by which approximate time histories can be constructed for turns of various amounts performed at varying speeds and angles of bank.

309

Beeler, D. E. 1942 DATA ON ACCELERATIONS FOR MEDICAL RESEARCH. (Aero Medical Research Laboratory Army Air Forces, Materiel Command) ASTIA ATI 16 147.

SUMMARY: A series of graphs is given showing the time-history curves of accelerations of several airplanes during various maneuvers, namely, dive pull-outs, push-downs from level flight, pull-ups from level flight and 180° banked turns. The graphs have been compiled from a number of reports of flight tests conducted by the National Advisory Committee for Aeronautics at Langley Field, Virginia, during the period from 1927 to 1942.

The data of the 180° banked turns have been analyzed in some detail and a formula is given by which approximate time histories can be constructed for turns of various amounts performed at varying speeds and angles of banks.

310

Beer, M., R.M. Jayson, V.E. Carter, and F.H. Kresse 1961 SURVEY OF ESCAPE TRAINING IN THE AIR FORCE. (USAF, Wright-Patterson AFB, Ohio) WADC TR No. 60-792. ASTIA AD 255917.

ABSTRACT: The present state of the Air Force ejection training was studied and its contribution to the overall ejection problem was considered. Relevant information was obtained from the literature on ejection training, training films, aircrew personnel, aircrew personnel who have ejected, accident statistics, and escape training instructors. The results showed that ejection

training is inadequate in content and frequency. There is a lack of standardized regular training programs. Furthermore, training media, such as ejection seat trainers and films, leave much to be desired in both quantity and quality. Even more important, training to reduce fear of and anxiety about ejection is needed. In general, aircrew personnel "know" when to eject; but hesitate to take action because of an inadequate knowledge of procedures and an anxiety produced by unfamiliarity with the ejection experience. Ejection training in the Air Force is inadequate and needs to be improved. (Author)

311

Behague, P. and Mothon 1937 TROUBLES DE LA VISION LORS DES ACCELERATIONS DURANT LE VOL: "L'ANOPSIE DES AVIATEURS" (Visual disturbances following accelerations during flight: "Anopsia of aviators.")
Rev. neurol., 67:197-201 , See also: Pr. Med. 45:752, 1937

ABSTRACT: The authors are concerned with "black vision" of aviators, a transient blindness occurring only with rapid variations in speed in either direction. High speed alone is not sufficient to produce the condition; the accelerations, most often negative, must be of the order of 5 to 6 g. at least, as below that nothing happens. The unit of acceleration of a free-falling body being 9.81 meters per second, it is necessary that the speed pass from zero to 49.05 or 58.86 m. per second (or better that it be reduced from this figure per sec.) to cause "black vision."

The authors quoted statements of six or more pilots. racers, or stunt fliers, who have experienced this condition. Close turns also cause it, and the authors stated that centrifugal force also is an element in the problem. They believe this anopsia of aviators is due to circulatory disturbance and cite the experiments conducted by Broca and Garsaux in centrifuging dogs. In order to produce their death it was necessary to have accelerations of 84 to 97 g., and at autopsy the mesenteric vessels were found distorted and dilated to the size of the little finger while the brain was exsanguinated.

The authors stated that as pilots they are going to continue their studies to determine whether the condition is one of cerebralischemia or disturbance of the retinal circulation.

312

Behnke, A.R. 1947 CONCEPTS DERIVED FROM INVESTIGATIONS PERTAINING TO HIGH ALTITUDE FLIGHT.
The Journal of the American Medical Association, Vol. 133, No. 7, Feb. 15, 1947.

ABSTRACT: The paper is an enumeration of some of the concepts and conclusions derived from extended research programs of the National Research Council. The subjects include: selection tests and evaluation of performance, body composition, decompression, anoxia and respiration, acceleration, and protection against injury.

313

Behnke, A. R. 1950 TRAUMA DUE TO STRESS AND PHYSICAL AGENTS. (Mimeographed paper, with references) 16 Sept. 1950.

ABSTRACT: The purpose of this paper is to provide physicians with authoritative references concerning the traumatic state induced by a variety of physical agents and conditions. An outline is made of the following subjects: interrelationships, and common pathologic and functional derangements induced by various agents; tolerance limits and the range of compensation ro adaptation in the face of the operative stress prior to injury; and preventive and therapeutic measures.

Preventive measures, remarkable often in their simplicity, as the protection against flash burns and crash injury, await application to decrease needless disability and death. Against many of the types of injury therapy is eneffectual or lacks specificity. On the other hand widely different stresses and physical agents induce similar gross physiologic and pathologic alterations. The treatment of the "shock state" whatever the cause requires preparation and materials that can be provided for well in advance by judicious planning. Mean while the search must continue to find the specific cellular and tissue changes that underlie definitive therapy.

314

Behr, K., L. Preber, & B. P. Silfverskiold 1955 RECORDING OF THE SKIN RESISTANCE IN THERMAL AND ROTATORY STIMULATION OF THE LABYRINTH. Acta Psychiatry et Neurology (Scand.) 30(5):741-748

ABSTRACT: The present investigations were designed by graphic recording of the variations in skin resistance to throw further light on the nausea associated with sweating, etc., that may attend rotatory and thermal vestibular stimulation. A specially designed apparatus was employed for recording. About fifty patients were investigated.
Vertigo induced by slight rotatory stimulation (cupulometry) was sometimes accompanied by a fall in skin resistance that was difficult to distinguish from nonspecific falls due to emotional factors.
Thermal stimulation often, after a latent period of 2-3 minutes produced a pronounced fall in skin resistance coincidently with nausea. The fall sometimes appeared without demonstrable sweating or other objective signs of nausea.
The causes of this evidently characteristic fall in skin resistance are briefly discussed. The method employed here seems to be serviceable as a simple means of recording vegetative vestibular reactions. (AUTHOR)

315

Beischer, D.E. 1956 EFFECT OF SIMULATED FLIGHT STRESSES ON THE CONCENTRATION OF SERUM CHOLESTEROL, PHOSPHOLIPID AND LIPOPROTEIN
J. Aviat. Med. 27(3): 260-266

ABSTRACT: Summarizing the findings of other authors and the results of the present study, two interesting conclusions can be drawn. (1) No considerable increase of blood cholesterol could be observed under stress conditions likely to occur in routine flying. The main reaction was a slight continuous increase of blood cholesterol under the influence of some stresses. (2) The hypothesis of the general-adaptation-syndrome, introduced by Selye, proved to be only of limited help in the interpretation of the extended experimental material. In most cases the sequence of shock, countershock, and resistance phases could not be recognized in the form of noticeable changes of the blood cholesterol concentration. This experience demonstrates that the merits of a general principle cannot replace a careful experimental study of each single case of stress.

316

Beischer, D.E. 1958 LIVING MATTER UNDER HIGH GRAVITATIONAL STRESS. (Paper, 1958 Meeting, The Biophysical Society, M.I.T., Cambridge, Mass., Feb. 5-7, 1958)

317

Beischer, D. E. 1958 POTENTIALITIES AND RAMIFICATIONS OF LIFE UNDER EXTREME ENVIRONMENTAL CONDITIONS
J. of Aviation Medicine 29(7):500-503, July 1958

ABSTRACT: When man ventures into space, he must take with him certain environmental conditions necessary for life. One factor essential to life is temperature. At low temperature, the rate of life's chemical reactions is too sluggish. At high temperature the protein of the enzyme molecules is irreversibly denatured. Other physical factors which assert an influence on the processes of life should be considered also, and the limitations of life under the influence of these forces collected and determined. Magnetic, electric, and gravitational forces are of great interest in this respect. Time, as a parameter of life, must also be investigated. Not only physical conditions but the chemical environment also exercises a deep influence on the potentialities of life.

318

Beischer, D. E., & A. R. Fregly 1962 ANIMALS AND MAN IN SPACE: A CHRONOLOGY AND ANNOTATED BIBLIOGRAPHY THRU THE YEAR 1960. (Naval School of Aviation Medicine, Pensacola, Fla.) ONR Rept. ACR-64; USNSAM Monograph 5, ASTIA AD-272 581.

ABSTRACT: A bibliography has been compiled of literature in the field of bio-astronautics. This work brings together for the first time a listing of all available reports relating to biological experiments conducted during balloon and rocket flights, with plants, animals, and humans as subjects. This compilation includes a listing of pertinent bibliographies, monographs, technical publications, and periodicals. Detailed tabulations are given of all known balloon and rocket flights, including such information as flight designation, location, type of experiment, experimental subjects, height, duration, success or failure, investigators, and cross-references to literature. A selective subject index is included, listing experimental material and giving cross-references to literature. Most of the citations are annotated. (AUTHOR)

319

Bell, H. S., 1962 SUMMARY AND EVALUATION OF USAF AIRCRAFT ACCIDENTS AND FATALITIES DURING THE PAST FIVE YEARS. (Paper presented at the Aerospace Med. Assoc. Conf., Atlantic City, N. J., 11 April 1962.)

ABSTRACT: A summary and evaluation of all USAF aircraft accidents for five years are reviewed. In addition, aspects of these accidents will be analyzed in terms of the cause factor, fatalities, major injuries, escape and survival. (Aerospace Med. 33(3):327, March 1962)

320

Bell, R.C. 1944 ANALYSIS OF 259 OF RECENT FLYING-BOMB CASUALTIES. British Medical Journal 2:689-692, 25 Nov. 1944.

ABSTRACT: This is an attempt to present a picture of the recent flying air-raids as seen in a small E.M.S. hospital. Those people admitted to the hospital required treatment that rest centers could not give. Air-raid casualties may be divided into two great groups: (1) those who require surgical treatment, and (2) those who do not. Those requiring surgery include the following cases: (1) flying glass; (2) bomb splinters; (3) blast; (4) falling masonry; and (5) burns. Those non-surgical cases included the following ones: (1) cases transferred from other hospitals and requiring food, clothes, and a wash. (2) crippled and infirm; (3) hysteria, fear, and other psychological states; (4) dust; (5) oil.

321

Belleville, R.E., F.H. Rohles, Jr., M.E. Grunzke & F.C. Clark 1960 COMPLEX AVOIDANCE BEHAVIOR IN THE CHIMPANZEE AND ITS APPLICABILITY TO THE STUDY OF SPACE ENVIRONMENTS. (AF Missile Development Center, Air Research and Development Command, Holloman AFB, New Mexico) AFMDC-TR-60-27. September 1960. ASTIA AD 245 444

ABSTRACT: This report describes the concurrent development of two types of avoidance behavior in the chimpanzee in which a discrete avoidance task was superimposed on a schedule requiring continuous avoidance behavior. The rationale for using these tasks for measuring the behavioral effects of space flight is presented.

322

Belleville, R. E., F. H. Rohles, Jr., and M. E. Grunzke 1961 BEHAVIOR OF THE CHIMPANZEE ON A COMPLEX MULTIPLE SCHEDULE (Air Force Missile Development Center, Holloman AFB, N. Mex.) Rept. no. AFMDC-TR- 61-27, Aug. 1961.

ABSTRACT: This report describes chimpanzee behavior on a four component, three lever multiple schedule. The component schedules included the Sidman avoidance procedure with a concurrent discriminated avoidance feature on a second lever; fixed ratio performance for food, differential reinforcement of low rate for water requiring a dual response chain, and a symbol discrimination task for continuous food reinforcement using three levers. The advantages of employing this type of schedule for evaluating the effects of exposure to space flight conditions are discussed.

323

Benchimol, R. 1952 THE HUMAN EYE AT HIGH SPEEDS. Revista medica da aeronautica (Rio de Janeiro) 4(2):113-118

ABSTRACT: High altitude flight involves various problems concerning the human eye. In flight at supersonic speed, a compressed air wave precedes the plane, which disturbs visibility; any visual deficiency of the pilot would become aggravated during high-speed flight. In space flight, the vibration of the engine may have a certain inhibitory effect on visibility. - The delay in visual perception, i.e., the time between stimulation and perception, varies between 35 and 150 milli-seconds, and thus induces a latent scotomic perception period. This phenomenon may be responsible for certain accidents. - Another limiting factor of vision is the environmental temperature. When a plane is flying at 2000 miles per hour, the temperature on the surface of the plane is nearly 600 degrees C.; the human eye can tolerate 110 degrees C. for 23 minutes. - Visual tolerance in bailout has not yet been determined, but, above a speed of 530 miles per hour, the facial tissues are presumably liable to rupture. (ASTIA AD-227 817).

324

Bender, M.B. & F.H. O'Brien 1946 THE INFLUENCE OF BARBITURATE ON VARIOUS FORMS OF NYSTAGMUS.
Amer. J. Ophthal. 29:1541

ABSTRACT: Intravenous injections of barbiturate (sodium amytal 0,5 gm.) produces in the normal individual: (a) coarse nystagmus and inability to maintain gaze on voluntary deviation of the eyes in any one direction, and (b) abolition of opticomotor nystagmus as elicited by rotation of a striped drum upon which the patient fixates. Intravenous injection of barbiturate also alters or decreases the nystagmus due to disease of the brain stem and abolishes such types of nystagmus as: (a) latent (b) positional (c) voluntary, and (d) various forms of so-called congenital nystagmus. Intravenous injection of barbiturate restored eye movements in patients with hysterical ocular palsies and temporarily corrected an ocular squint of unknown origin. It is suggested that barbituarate in mild doses interferes with ability to control eye movements and ocular fixation by its action on the cerebral cortex, brain stem, and intermediate neuronal structures. Eye movements which do not necessarily involve a cortical component might be altered by barbiturate as a result of its action on the brain stem.

325

Bendig, A. W. 1958 SUPPLEMENTAL BIBLIOGRAPHY ON SPACE MEDICINE
(Pittsburg Univ., Dept. of Psychology, Pittsburg, Pa.)

ABSTRACT: This bibliography contains references, particularly in the area of behaviorla sciences, that were omitted from the most recent and complete bibliography of articles on space medicine: C. Roos, Bibliography of Space Medicine.

326

Bending, G.C. 1959 SPATIAL DISORIENTATION IN JET AIRCREWS.
J. Aviation Med. 30(2):107-112.

COMMENT: These cases illustrate the seriousness of these problems and the value of a spatial disorientation indoctrination course in their management. On the threshold of space, it is certain that these and other problems will become more serious and more complex. A fresh, analytical attitude is essential if these and even more disturbing problems are to be recognized and solved.

327

Benes, P. and J. Schindler 1961 AVIATION TODAY AND TOMORROW. (SELECTED PARTS).
(Aerospace Technical Intelligence Center, Wright-Patterson AFB, Ohio)
Trans. no. MCL-938. ASTIA AD 261 788

328

Benjamin, J.D. 1926 AN ANALYSIS OF AVIATION CRASHES,
U.S. Nav. M. Bull., 24:72-75

ABSTRACT: The cause of any crash should come under one of the following four headings: (1) faulty piloting; (2) mechanical; (3) unavoidable (collisions, weather conditions) and (4) unknown.

329

Benneche, R. A. 1948 PILOT EJECTION CAPSULE — INVESTIGATION OF DESCENT CHARACTERISTICS.
(Consolidated Vultee Aircraft Corp., San Diego Div., Calif.)
Rept. No. ZA-115-004, June 1948. ASTIA ATI 54181

ABSTRACT: Investigation has been made to determine the descent characteristics of the pilot ejection capsule of the XF-92 fighter. This report is concerned with the magnitude of the limit release speed and terminal velocity. Release at very high speeds will sjubject the pilot to excessive decelerations. Assuming that six "g" is the maximum safe deceleration, the limit release speed is determined to occur between 400 and 700 mph IAS, depending on the point of attachment and reefing of the stabilizing parachute. Terminal velocity of the capsule has been estimated to be between 175 and 230 mph IAS, depending on the point of attachment of the unreefed chute. These speeds are greater than the 115 mph terminal velocity of the pilot (before opening chute); and the capsule should fall past him after he is out. The variation of pilot deceleration versus time for the escape patterns are plotted.

330

Bennett, C. V. & J. V. Burkhard 1957 A SUMMARY OF CRASH FIRE AND INJURY RATES IN HELICOPTER ACCIDENTS. (CAA Technical Development Center, Indianapolis, Indiana) Technical Development Report No. 313, June 1957.

331

Bennett, J. B. 1951 HAMMOCK-TYPE PLANE SEAT MAY PROVE CRASH SAFETY AID. Technical Data Digest March 1951.

ABSTRACT: The entire seat swings freely between two large teardrop-shaped springs whose function is to absorb some of the shock of turbulence. The hammock is suspended from these springs which form the outer panels of the seat.

Back and bottom of the seat are formed by horizontal tubular members spaced by coil springs. The entire seat is covered by an easily removable cushion, while two coil springs hold the seat erect. Part of the frame forms a foot rest which moves with the seat.

Seat position is controlled by the passenger shifting his weight. But regardless of seat position, the passenger's center of gravity is always below the hammock's pivot point. Any sudden increase in g's which would come about as the result of a crash would cause the chair to flip backward, throwing the entire weight against the chair seat.

This feature puts the passenger in the position where he can stand the maximum impact load.

332

Benson, A. J. 1959 EFFECT OF LABYRINTHINE STIMULATION ON REFLEX AND POSTURAL ACTIVITY IN GASTROCNEMIUS - SOLEUS MUSCLE GROUP IN MAN. J. Physiol. (London) 146:37-38P

ABSTRACT: Changes in reflex acitivity and the integrated electromyogram of the gastrocnemius-soleus muscle group following a simple labyrinthine stimulus were examined in twenty-five normal subjects. The subject sat, knelt or lay on a turn-table which could be rotated in a horizontal plane. The head was upright or tilted forward some 30° and supported in position; opaque goggles were worn.

Deceleration of the turn-table from a constant angular velocity to rest in 0·5-1·0 sec was found to increase the amplitude of the repetitively elicited ankle jerk response. This facilitation was maximal in the first 2 sec after deceleration.

With the subject standing on the turn-table, electromyographic activity was recorded from the gastrocnemius soleus muscle group and integrated over 1 sec periods. After deceleration the pattern of increased activity was found to be similar to that of the myotatic reflex response. A functionally labyrinthectomized subject failed to show a corresponding change in the myotatic reflex response and only a small and comparatively brief increase in electromyographic activity was seen consequent to deceleration.

The monosynaptic response did not change significantly in amplitude with labyrinthine stimulation.

It is therefore concluded that in man the labyrinth exerts its influence on the somatic musculature via the γ efferent system rather than by a pathway acting directly upon the α motoneurones. The compensatory movement consequent to an angular acceleration in the horizontal plane would appear to be brought about by an asymmetrical increase in muscle tone rather than by a reciprocal pattern of activity in which it is increased on the one side and decreased on the other.

333

Benson, A.J. 1959 SOME EFFECTS OF ANGULAR ACCELERATION ON POSTURAL MECHANISM. (Paper, Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: Labyrinthine stimulation giving rise to inappropriate sensations is one mechanism of disorientation in flight; reflex movements of the limbs consequent to such labyrinthine stimulation may contribute to loss or impairment of control. In human subjects changes in stretch reflex excitability and in the integrated electromyogram of the gastronemius-soleus muscle group produced by a simple labyrinthine stimulus, were investigated. Deceleration from an angular velocity of 95° per second to 0° per second in 1 second, caused an increase in the amplitude of the ankle jerk response ranging from 50 to 400 per cent; this facilitation was maximal during the first 3 seconds and underwent a decay which did not follow a simple exponential law but showed subsidiary peaks of facilitation at in from 5 to 10 second intervals. A similar pattern of activity was seen in the integrated electromyogram records. The magnitude of the initial peak was linearly related to the angular velocity of the turntable prior to deceleration, but differed according to the direction of rotation. Labyrinthine stimulation failed to alter the size of the electrically elicited H. reflex response. It is thus inferred that the labyrinth exerts its influence upon the somatic musculature via the γ efferent system acting on the muscle spindles rather than by the more direct pathway to the α motoneurones.
(J. Aviation Med. 30(3):175, March 1959)

334

Benson, A. J., J. L. Gedye and G. M. Jones 1961 GENERALISED MUSCULAR TENSION IN A PILOT SUFFERING DISORIENTATION IN FLIGHT DUE TO A COVERT VESTIBULAR DISORDER.
(R.A.F. Institute of Aviation Medicine, Farnborough)
Memo No. 157:13p August 1961

335

Benson, A. J., & B. F. Tindall 1961 ACCEPTABILITY OF SPIN DURING STABILIZED FALL FOLLOWING EJECTION IN A FULLAND 4-G SEAT. (RAF, Institute of Aviation Medicine, Farnborough.) FPRC Memo No. 169, Nov. 1961

ABSTRACT: A pattern of rotation (simulating that which subjects experience in the Fulland 4-g ejection system from about 38,000 feet) is investigated as it relates to nausea and vomiting. Twenty-eight subjects (11 aircrewmen, 1 experienced parachutist, and 16 laboratory staff members) were subjected to the simulated pattern in the laboratory on a turntable. All subjects kept their heads still during the experiment. None of the subjects vomited, four had symptoms of nausea--only two of these severe. Aircrewmen using this ejection seat system should be instructed to move their heads as little as possible during the angular motion. (J. Aerospace Medicine 33(11):1404, Nov. 1962)

336

Benson, A.J. and T.C.D. Whiteside 1961 THE EFFECT OF LINEAR ACCELERATION ON THE RESPONSE TO ANGULAR ACCELERATION IN MAN. J. Physiol. (London) 156(1):6P-7P, April 1961.

ABSTRACT: Eight subjects each experienced four runs (two near the center and two at the end on a human centrifuge wherein a reproducible rotational stimulus could be combined with different linear accelerations. It was observed that angular velocity of the slow phase of horizontal nystagmus rose during angular acceleration, then decayed exponentially. For this decay, the regression equation was calculated for each angular stimulus. The rate of decay of the nystagmus was significantly increased only in the presence of high linear acceleration (3.1 g). Possible explanations of this reduced response are presented briefly.

337

Benson, A. J., et. al. 1961 GENERALISED MUSCULAR TENSION IN A PILOT SUFFERING DISORIENTATION IN FLIGHT DUE TO A COVERT VESTIBULAR DISORDER. (RAF Instit. of Aviat. Med., Farnborough) FPRC/Memo. 157. Aug. 1961.

338

Benson, O.O. 1941 EFFECTS OF CENTRIFUGAL FORCE ON POSTURE, VISION AND CONSCIOUSNESS. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) Memo Rept. EXP-M-54-653-41B; 6 Sept. 1941. ASTIA ATI 159 411.

ABSTRACT: The purpose of this report is to summarize the available information on centrifugal forces as it affects the posture, vision and consciousness of airplane crew members. During the experiments it was found that the average trained young pilot sitting nearly erect has a "G" threshold of approximately 5 - 5.5 G when the stress is applied for 4 seconds. An extension of the time the force is applied disturbs the all important G-time relationship and lowers the force (G) value at which visual disturbances occur. Greater forces can be tolerated for 1-2 seconds without visual disturbance. The posture of the air crew members at the time the force is applied is very important in determining the blackout threshold. The prone position elevates the threshold whereas the erect position lowers it. The hydrostatic suit appears to raise the blackout thresholds considerably above those now considered within the normal physiological range.

339

Benson, Otis O., Jr. 1941 EFFECT OF CENTRIFUGAL FORCE ON POSTURE, VISION AND CONSCIOUSNESS AND APPENDIX I (Air Materiel Command, Engineering Div., Dayton, Ohio) Memorandum Report No. EXP-M-54-653-41B, 6 Sept. 1941. ASTIA ATI 159 411.

ABSTRACT: The average trained young pilot sitting nearly erect has a "G" threshold of approximately 5 - 5.5 G when the stress is applied for 4 seconds. An extension of the time the force is applied disturbs the all important G-time relarionship and lowers the force (G) value at which visual disturbances occur. Greater forces can be tolerated for 1-2 seconds without visual disturbance.

The posture of the air crew members at the time the force is applied is very important in determining the blackout threshold. The prone position elevates the threshold whereas the erect position lowers it.

The hydrostatic suit appears to raise the blackout thresholds considerably above those now considered within the normal physiological range.

340

Benson, O.O., Jr. 1941 EFFECT OF CENTRIFUGAL FORCE ON POSTURE, VISION, AND CONSCIOUSNESS. (US AAF Exp. Engng. Sect.) Dept. Commerce PB No. 5112, 1946.

ABSTRACT: The posture of the air-crew members at the time the centrifugal force is applied is very important in determining the blackout threshold. The

average trained young pilot sitting nearly erect has a "G" threshold of approximately 5-6 G when the stress is applied for 4 sec. An extension of the time force as applied disturbs the all-important G-time relationship and lowers the force (G) value at which visual disturbances occur. The hydrostatic suit appears to raise the blackout thresholds.

341

Benson, O. O., Jr. 1960 LECTURES IN AEROSPACE MEDICINE: INTRODUCTION. In Lectures in Aerospace Medicine, 11-15 January 1960. (School of Aviation Medicine, USAF Aerospace Medical Center (ATC), Brooks AFB, Texas)

342

Benson, O. O., & H. Strughold, eds. 1960 PHYSICS AND MEDICINE OF THE ATMOSPHERE AND SPACE (New York: John Wiley & Sons, 1960)

CONTENTS:

Strughold, H., & O. L. Ritter, The Gravitational Environment in Space;
Ehricke, K. A., Manned Orbital and Lunar Space Vehicles;
Chapman, D. R., Deceleration During Entry Into Planetary Atmosphere;
Gerathewohl, S. J., & J. E. Ward, Psychophysiologic and Medical Studies of Weightlessness;
Lovelace, W. R., II, and A. S. Crossfield, Biomedical Aspects of Orbital Flight;
Stapp, J. P., Human Tolerance to Accelerations of Space Flight;
Campbell, P. A., Introduction to the Problem of Escape and Rescue During Space Operations;
Stanley, R. M., Escape at Launching and in the Atmosphere From a Space Vehicle;
Mayo, A. M., Survival in Space. The Vehicle-Combined Requirements;
Strughold, H., Interplanetary Space Flight From the Viewpoint of the Physician

343

Benson, V.G., E.L. Beckman, et al. 1961 EFFECTS OF WEIGHTLESSNESS AS SIMULATED BY TOTAL BODY IMMERSION UPON HUMAN RESPONSE TO POSITIVE ACCELERATION. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-6132. ASTIA AD 262 329.
See also Aerospace Medicine 33(2):198-203, Feb. 1962.

ABSTRACT: Twelve members of Underwater Demolition Team No. 21 used underwater breathing equipment while completely immersed in water for 18 hours. Their response to positive acceleration was determined by observing the G level at which the limitation of ocular motility under acceleration (LOMA) occurred.

[illegible] level is approximately the same as when loss of peripheral vision or grey-[illegible]urs when subjects are exposed to positive acceleration. The period of immersion was well-tolerated A small but statistically significant decrease in the G level at which LOMA occurred was found following the period of immersion. (Author)

344

Benson, V. G., E. L. Beckman and K. R. Coburn 1961 EFFECTS OF PROLONGED TOTAL BODY WATER IMMERSION ON HUMAN TOLERANCE TO POSITIVE ACCELERATION J. of Aerospace Medicine 32(3):220, March 1961.

ABSTRACT: Experimental data abailabel suggests that tolerance to the accelerations of space vehicle re-entry is decreased following a period of weightlessness The weightless or zero "G" state encountered in orbital flight can be simulated in a laboratory to a degree by completely immersing the subject in water. A study of this nature was undertaken at the Aviation Medical Acceleration Laboratory, utilizing the assistance of twelve divers from the Underwater Demolition Team Number 21, Amphibious Forces, Atlantic Fleet. The tolerance to positive acceleration of these subjects was measured and mean values were determined prior to water immersion. All subjects were then totally immersed in water for a period of 18 hours. Their tolerance to positive acceleration was measured immediately after the period of water immersion and again after 24 hours recovery. With one exception, there was a decrease in tolerance to positive acceleration immediately following the period of water immersion. However, the magnitude of this decrement was within the range of daily variation in G tolerance of normal subjects.

345

Benton, M. 1958 EARTH SATELLITES, GUIDED MISSILES, ROCKETS, AND SPACE FLIGHT: A BIBLIOGRAPHY OF BOOKS AND PERIODICAL ARTICLES. Wilson Library Bulletin 32:412-419

ABSTRACT: An annotated list of selected publications covering the period 1936 to October 1957, with emphasis given to items of recent date.

346

Benton, Mildred 1958 THE LITERATURE OF SPACE SCIENCE AND EXPLORATION. (Naval Research Laboratory, Washington, D. C.) NRL Bibliography No. 13. ASTIA AD-210 057.

ABSTRACT: An annotated bibliography of 2274 references from 1903 to June 1958 on all aspects of space flight, rockets and satellites. Subject indexed.

347

Benzinger, Th. 1941 INJURIES TO HEALTH CAUSED BY FLYING - PART IV OF IV PARTS (DAS FLIEGEN ALS URSACHE GESUNDHEITLICHER SCHAEDEN)
ASTIA ATI 62 305 Handbuch der inneren Medizin

ABSTRACT: The physiological and pathological effects of flight upon the health of flying personnel are discussed. It is stated that the so called "aviator's illness," supposedly caused by the effects of flying and hitherto considered a vocational disease, is nonexistent. The physiological effects of high-speed high-altitude flight, effect of centrifugal forces and acceleration, and exhaust gases on the human organism are considered. Pathological conditions occurring in flhing personnel are altitude sickness, aeroembolism, kinetoses, and others caused by the effect of acceleration, cold, etc.

348

Benzinger, T., H. Doring, and W. Homberger 1941 PROTECTION OF FLYING PERSONNEL AGAINST THE EFFECTS OF HIGH ALTITUDE FLYING. (Schutz Der Flieger Gegen Die Wirkungen Gesteigerter Flughohen). ASTIA ATI-68 251.

349

Benzinger, T. 1943 PHYSIOLOGISCHE GRUNDLAGEN FUR BAU UND EINSATZ VON STRATOSPHARENFLUGZEUGEN (Physiological Basis for the Construction and Use of Stratosphere Airplanes) ASTIA ATI 76 122

350

Benzinger, T. 1951 CAUSES OF DEATH FROM BLAST.
[illegible] J. Physiol. 167:[illegible]

ABSTRACT: Arterial air embolism, induced by rupture of boundaries between alveolar spaces and alveolar capillaries, was shown on dogs to be the chief cause of death from blast in air as well as under water. Death from coronary air embolism ensues within 5 minutes. Cerebral air embolism results in a variety of focal symptoms, and may inflict death after 10-20 minutes. Air embolism artifically produced by injection of air into a pulmonary vein produces similar ECG changes, with similar time of survival, and similar post-mortem findings in the heart. The fatal outcome of arterial air embolism from both injection of air or blast effect may be retarded or prevented by instantaneously increasing the ambient pressure. The signs of cardiac anoxia disappear under such treatment, while the size of the emboli is reduced. The finding of arterial air circulation following blast throws light on some hitherto unexplained facts. Previous investigators had observed cardiac as well as cerebral anoxia as a consequence of blast injury. Its origin had remained unknown. Cerebral focal symptoms had been found when the head of an animal had been protected from the blast, while its trunk had been exposed. With the head exposed and the trunk shielded cerebral focal symptoms have not been ob-

served. Post-mortem findings had failed to explain why animals had died, and even more why they had died within a few minutes after a blast of a just fatal intensity. Colored slides from our test animals show air emboli in cardiac and cerebral arteries. The veins have never been affected. (The experiments described were carried out in 1942 and 1943 at the Aeromedical Department, German Air Force Testing Center, Rechlin, Germany, in collaboration with Dr. R. Rossle, Professor of Pathology, University of Berlin, Germany.)

351

Bergeret, P. and L. Gougerot 1939 EFFETS VESTIBULARIES DES ACCELERATIONS CHEZ L'AVIATEUR (Vestibular Effects of Acceleration with the Pilot) Travail humain (Paris) 7: 1-26

ABSTRACT: A centrifuge of long radius was used for the test. Although the various circulatory disturbances in negative pressure are very marked in acceleration about head, we must not neglect the vestibular effects in particular, as there remain wide gaps in the experimental and practical studies of the latter. Special attention is drawn to the labyrinthine effects of acceleration, including the sensory impression, the muscular reflexes and vegetative reflexes. The authors base their conclusions on the findings of Broca, Ewald, Kleyn, Magnus, Schubert, Quix, Steinhausen, Leiri and Frenzel. Mathematical details of the vestibular stimuli at various inclinations of the head are plotted in curves in looping and rolling. These are purely mathematical deductions. As the physiologic reaction, the author uses not the sense of equilibrium but the motor sensation. Level accelerations are transmitted chiefly through deep sensibility, the labyrinthine activity remaining uncertain. In particular, the transmitting capacity of the vestibular apparatus is subject to dispute. The inferior and superior thresholds are not known.

Angular accelerations are definitely transmitted by the semicircular canals, their threshold limits being exceeded only in very abrupt flight figures.

Coriolis accelerations produce hallucinations which are most disturbing to the aviator and may cause vertigo. Whereas the vegetative reflexes of the smooth muscles have not been thoroughly studied, although of definite significance, the vegetative reflexes of the striate musculature are characterized by classical symptoms. For instance, the nystagmus and counter-movement of the eyes follow definite laws but have not hitherto been adequately studied in aviation. There are, however, also reflexes of the muscles of the neck, body and limbs of static and kinetic types which are well known in animals and which are dependent upon the labyrinth. Delabyrinthine cats no longer fall on their feet but fall like a bundle. In human subjects, the super-imposition of voluntary movements renders testing difficult, especially during flight. This study has been omitted also in parachute jumpers. Further studies on the reflexes of the extremities are of great importance. The author suggests the possibility that just as a black veil forms over the eye in ischemia, severe reactions of like nature may occur in the labyrinth which have probably been the cause of death of many an aviator.

352

Bergeret, P., P.M. Van Wulfften Palthe et al. 1957 AERONAUTICAL PREVENTIVE MEDICINE. PAPAERS PRESENTED AT THE SYMPOSIUM HELD BY THE AGARD AEROMEDICAL PANEL (Advisory Group for Aeronautical Research and Development, Paris) AGARDograph no. 36; Nov 1957, ASTIA AD-233 126

CONTENTS:

Aeronautical preventive medicine in the United States Air Force
Outline of USAF preventive medicine activities
Training in health education
Defense against special types of warfare
Aeronautical preventive medicine in the U.S. Navy
Hazards in air stations
Industrial hygiene program
Organisation de la medecine du travail dans les formations militares et les establissements industriel de l'aeronautique Francaise
Les grands principes de la loi sur la medicine du travail
Application de la loi sur la medecine du travail au Department de l'Air
The preservation of health and efficiency
Environmental conditions
Excessive noise
Psychological stresses
Design of equipment
The re-organisation of tasks
Training and selection
Aeromedical problems in operating all-weather aircraft; some Canadian observations
All-weather operations
Aeromedical problems
Preventive measures
Changes in elementary neuron activity produced by some neurotropic drugs

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Bergeret, P., Ed. 1961 AIRCRAFT ACCIDENT INVESTIGATION MANUAL FOR AIR SURGEONS (MANUEL D' ENQUETE SUR LES ACCIDNETS AERIENS A L' USAGE DES MEDECINS DE L' AVIATION).
(New York; Oxford; London; Paris: Pergamon Press, 1961)
ASTIA AD 272 690
NOTE: In English and French. Published for and on behalf of Advisory Group for Aeronautical Research and Development.

ABSTRACT: This manual discusses aircraft accidents in regard to injuries and their causes, investigation of accidents, pathology, and injury prevention. Chapter III considers etiological factors including physical and physiological aspects. (CARI)

354

Bergeret, P. 1961
BIO-ASSAY TECHNIQUES FOR HUMAN CENTRIFUGES AND PHYSIOLOGICAL EFFECTS OF ACCELERATION, (New York, London, Paris: Pergamon Press, 196') AGARDograph No. 48. Oxford,

The papers discuss various aspects in the study of the human centrifuge and the physiological effects of acceleration.

355

Bergeret, P., ed. 1961 BIO-ASSAY TECHNIQUES FOR HUMAN CENTRIFUGES AND PHYSIOLOGICAL EFFECTS OF ACCELERATION. (London, New York, Paris: Pergamon Press, 196[illegible]) AGARDograph 48. ASTIA AD 261 880.
Library of Congress Card No. 61 11545.

CONTENTS: The human centrifuge and its application to pilot selection; some recent definitions of the acceleration problem; a review of the physiological effects of angular accelerations; Human tolerance and limits to acceleration; Instrumentation and the human centrifuge; Centrifuge methods and techniques in the U.S. Navy; End points for acceleration tolerances on the centrifuge; A discussion on restraint and protecti[illegible] man experiencing the smooth and oscillating accelerations; The physiological effects of acceleration on respiration and protective m[illegible] des accelerations positives repetees de faible intensite et l[illegible]ee; Etude anato[illegible] sur le rein de chien; Cardiovascular effects of forward acceleration; Hea[illegible] factors in resistance to acceleration stress; Interet et [illegible] des recherches [illegible] sur l'animal et sur l'homme au moyen des centri[illegible], and Medical [illegible] record cards--their development and use in the astronaut sele[illegible]

356

Bergeret, P., ed. 1961 ESCAPE AND SURVIVAL: CLINICAL AND BIOLOGICAL PROBLEMS IN AERO SPACE MEDICINE.
(London, New York, Paris: Pergamon Press, 1961) AGARDograph No. 52.
ASTIA AD 261 881. Library of Congress Card No. 61-11 546.

CONTENTS:

Biological problems of escape at high altitudes, by H.L. Roxburg.
Escape from aircraft at high speeds and low altitudes, by F.G. Cumming.
Parachutist's spin problem, by O. Walchner.
Aspect medical des ejections practiquees en France sur differents types de sieges ejectables, by J. Fabre.
Fundamental concepts in RCAF Arctic survival training, by S.E. Alexander and J.G. Fraser.
Aviation medicine consultation problem cases, by C.A. Berry.
Early diagnosis of hydrops of the labyrinth, by R.N. Kraus.
Therapy of spontaneous pneumothorax in RCAF flying personnel, by

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C.N. Burgess and D.G.M. Nelson.
A brief survey of the role of elective surgery in a modern air force, by J.W. Garraway.
The choice of gas mixture for breathing in high performance aircraft, by J. Ernsting et al.

358

Berghaust, E., & W. Beller 1956 MICE AND MONKEYS, THEN MEN
In Satellite (New York: Hanover, 1956), pp. 155-166

359

Berghaust, E., & W. Beller 1956 SURVIVAL IN SPACE.
In Satellite (New York: Hanover, 1956), pp. 181-195

360

Bergin, K.G. 1949 AVIATION MEDICINE: ITS THEORY AND APPLICATION
(Baltimore: Williams & Wilkins, 1949)

361

Bergin, K.G. 1949 EFFECTS OF ACCELERATION ON MAN.
In his Aviation Medicine (Baltimore: Williams and Wilkins, 1949)
Pp. 109-115

362

Bergstedt, M. 1960 STUDIES OF POSITIONAL NYSTAGMUS IN THE HUMAN CENTRIFUGE
Acta Oto-Laryngologica (Stockholm) Supplementum 163, pp. 1-143
NOTE: Reel 7, Flash 6, Item 28

ABSTRACT: While making experimental studies into alcohol nystagmus the author, like others before him, noticed the strong connection between the phenomenon and the position of the head; the horizontal nystagmus being most pronounced when the head lay on its left or right side and completely absent when the head was supine. Moreover, this phenomenon could be repeated time and again with the greatest regularity, and this clearly suggested the connection between the position of the head and the direction of the gravitational field.

From previous studies of the subject literature the author was aware not only of the divided opinions over the release mechanism of positional nystagmus but also of the difficulties surrounding any attempt to show a relationship between the phenomenon and the receptor organ for gravitational stress.
It then struck the author that if, during the course of positional nystagmus tests, with the head in the side position, one were to vary the stress due to gravity -- and thus varied the stimulus for the appropriate receptor organ -- one could perhaps influence the intensity of the nystagmus. A search of the literature revealed no previous experiments based on this line of thought.
A pilot experiment, carried out with two students who were tested in a large centrifuge both before and after acute alcohol consumption, showed that while prior to the intake of alcohol no nystagmus arose, the nystagmus produced after consumption showed a variation in intensity strongly related to variations in gravitational stress. The hypothesis which led to the experiment was supported.
A closer experimental study of this relationship between positional nystagmus and gravitational stress followed. Alcohol nystagmus can be considered as a pathogenically specific form of nystagmus. In the beginning, these experiments on alcoholically intoxicated subjects were carried out under conditions which varied from case to case; later, these conditions were standardised. The studies were further broadened to include clinical cases of positional nystagmus and here experimental conditions were as standard as possible. These experiments, which were begun on February 19, 1957, are the subject of this thesis. (AUTHOR)

363

Bergstedt, M. 1961 THE EFFECT OF GRAVITATIONAL FORCE ON THE VESTIBULAR CALORIC TEST.
Acta Oto-laryngol. 53(6):551-562

ABSTRACT: Vestibulary caloric tests were carried out on four subjects at 1 g, 1.25 g, 1.5 g and 1.8 g in a large centrifuge. The experiments showed that (1) vestibular caloric tests are influenced by the strength of the gravitational field; (2) the maximum intensity of nystagmus increases with higher values of g; (3) this increase is in direct proportion to the increase in the gravitational field strength; (4) the latency period decreases with higher values of g; (5) the results are the same with cold and hot water irrigation. It is also shown that the duration increases with higher g-values but the material relating to this factor is not complete. An extrapolation of the result towards values of g less than 1 tends to show that there is no nystagmus in conditions of weightlessness and that the liminal value for nystagmus is about 0.1 g. An investigation involving the caloric test and preponderance at higher g-loads is planned.

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Bergstedt, M. 1961 STUDIES OF POSITIONAL NYSTAGMUS IN THE HUMAN CENTRIFUGE. Acta oto-laryngol. Suppl. 165

ABSTRACT: Research was planned to study positional nystagmus in man under the influence of the physical conditions obtained in a large centrifuge, using the technique of electronystagmography.

The central point was the question: does stimulation of the otolith organ, in the form of increased or decreased g-stress in a centrifuge, give rise to variations in either the intensity or direction of positional nystagmus in subjects who already evince positional nystagmus.

365

Bergstrom, O., & H. Koch 1956 THE EFFECT OF CHLORPROMAZINE ON THE VESTIBULAR FUNCTION. Acta oto-laryngologica (Stockholm) 46(6):484-498, Nov.-Dec. 1956

ABSTRACT: Administration of chlorpromazine generally produced a substantial prolongation of postrotatory nystagmus in guinea pigs and cats In some animals total subsidence of postrotatory nystagmus was observed some time after injection, and this was usually preceded by a considerable prolongation. Both conditions were correlated to the degree of somnolence observed. Continuous chlorpromazine administration for relatively long periods had no effect on the vestibular apparatus. Administration by the intracarotid route and directed to the right half of the brain stem via the vertebral artery produced a typical intracarotid syndrome with torsion and sometimes spontaneous nystagmus. Chlorpromazine is shown to have a central effect on the vestibular function. The probabil is discussed of the occurrence of a nystagmus inhibitor in the brain stem (reticular formation) and of the observed prolongations of postrotatory nystagmus being due to inactivation of that inhibitor by the administered chlorpromazine. (AUTHOR)

366

Beritashvili, I. S. 1962 REPORT ON SPACE ORIENTATION FBIS USSR & East Europe, No. 23, Feb. 1, 1962

ABSTRACT: Physiologists and psychologists have long believed that skin and muscular stimuli play an important role in orientation in space. However, Academician I. S. Beritashvili, an outstanding 78-year old Soviet physiologist and author of more than 400 scientific works, has substantiated a different point of view: "The leading role in orientation in space is played by visual and vestibular stimuli, and in the absence of visual stimuli, by vestibular stimuli alone. The internal ear with its labyrinths and vestibular apparatus is the organ capable of feeling direction, the speed of movement, and even turns and distances. During losses of sight and hearing, the extremely sensitive vestibular apparatus, which is found in the internal ear of man and animals, supplies signals of the outer

world and helps man and animals orient in the surrounding environment.' I. S. Beritashvili generalized the results of his long observations and experiments in this field in another monograph, "On Nervous Mechanism of Spatial Orientation of Higher Vertebrates,"

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Beritov, I. S. 1959 THE MECHANISM OF SPATIAL ORIENTATION IN MAN
Pavlov J. Higher Nervous Activity 9:1-10

ABSTRACT: Man orients himself in space mainly through visual and labyrinthine receptors. Through the medium of these receptors, there is projection into the surroundings of all the objects which are preceived by other receptors—tactile, temperature, taste, and likewise olfactory and auditory.

Not only are images of the path traversed, with its projection in the surroundings, created in man through the agency of the vestibular analyser, but the positions of all the external objects in the surroundings, which the individual perceives during his actual passage along the path are similarly determined: as a result the power to make oriented movements is acquired.

Muscle-joint receptors do not play any essential part in spatial orientation as no images of the paths traversed are created by their stimulation. With repeated passage along the same path, however, the stimulations of these receptors, together with labyrinthine stimulations are converted into conditioned signals for certain movements and so lead to the formation of a chain conditioned reflex. This represents an oriented movement of a special kind, occurring automatically.

The deaf-mute individual with functioning labyrinths orients himself in space with his eyes covered just like the healthy individual. The deaf-mute with nonfunctioning labyrinths is incapable of orienting himself in space when the eyes are covered—is incapable of projecting objects perceived by him in the surroundings and of executing oriented movements in accordance therewith. With many repetitions, however, he can execute more or less oriented movements with covered eyes because of the conversion of proprioceptive stimulations into conditioned signals for certain movements.

The blind individual orients himself in space mainly through his labyrinthine receptors. This labyrinthine reception determines the location of external objects which the blind person perceives with other sense organs during his passage along a particular path. It in fact plays the essential part in the production of oriented movements.

368

Berkner, L.V., et al., Ramo, Simon ed. 1961 PEACETIME USES OF OUTER SPACE.
(New York; Toronto: McGraw-Hill, 1961)

369

Berman, L.J. 1961 OPTIMUM SOFT LANDING TRAJECTORIES. PART I. ANALYSIS. (Air Force Office of Scientific Research, Air Research and Development Command, Washington, D.C.) AFOSR519

ABSTRACT: A variational calculus solution is obtained for the thrust program for minimum propellant consumption to achieve landing of a rocket vehicle from a space orbit with zero relative velocity at touchdown, under the simplifying assumptions of no atmospheric forces and a uniform (i.e., flat-earth) gravitational field. These assumptions are appropriate for lunar landing of a moderately high thrust rocket. The results of the variational solution are interpreted to provide an appreciation of the physical nature of the requirements established by different initial conditions, as specified by initial conditions parametrically by an equivalent energy altitude and the actual altitude, five different regimes are identified and the corresponding thrust programs described.

370

Berman, M.L. 1959 A PRELIMINARY REPORT ON QUANTITATIVE ESTIMATION OF A URINARY METABOLITE OF EPINEPHRINE AND NOREPINEPHRINE AS POSSIBLE INDICATOR OF TOLERANCE TO GRAVITATIONAL STRESS. (Paper, Aero Medical Association Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: 3-Methoxy-4-Hydroxy-D-Mandelic acid is a urinary metabolite of epinephrine and norephinephrine. To determine whether estimation of this compound might prove useful as indicator of gravitational stress, six human subjects rode the Air Force centrifuge at 6G forward acceleration for three minutes; periodic sampling of urine was made before and after acceleration. Determination of performed creatinine showed the rate of excretion of this substance to increase in four subjects immediately after acceleration, while in two subjects the creatinine rate dropped. Preliminary results from quantitative measurement of 3-methoxy-4-hydroxy-D mandelic acid by two dimensional paper partition chromatography suggest a rise in the metabolite immediately after acceleration and this rise is independent of the rate of excretion of creatinine. (J. Aviation Med. 30(3):175, March 1959)

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Berman, M.L. 1959 QUANTITATIVE ESTIMATION OF URINARY METABOLITE OF ADRENALINE AND NORADRENALINE AS POSSIBLE INDICATION OF TOLERANCE TO GRAVITATIONAL STRESS. (Wright Air Development Center, Air Research and Development Command, Wright-Patterson AFB, Ohio)WADC TN 59-376 Nov. 1959. ASTIA AD 229 779

ABSTRACT: Using the method of two dimensional paper partition chromatography, a quantitative estimation of the urinary output of 3-methoxy-4-hydroxy-D-mandelic acid, a major catabolite of both adrenaline and noradrenaline, was determined in six human subjects before, during, and after exposure to a 6 G forward acceleration for three minutes.

The results showed that there was an increased rate output of this catabolite in the period just before acceleration which averaged 274 % over the pre-acceleration control level. In the period encompassing acceleration there was an average increase of 1128% over the control level ($P < .01$). The period following acceleration showed a drop to an excretion rate slightly below the pre-acceleration level and in the next period of sampling, the excretion rate returned to this level. These results indicate a corelation between the output of this metabolite and acceleration.
Preformed urinary creatinine excretion were not significant indicating that the changes in rate of output of 3-methoxy-4-hydroxy-D mandelic acid were independent of glomerular filtration rate.

372

Berrian, 1960 ASSISTANCE IN PRELIMINARY TESTING OF ACCELERATION SUPPORT SYSTEM FOR PROJECT MERCURY CAPSULE AS REQUESTED BY NASA SPACE TASK GROUP (SIG) (Naval Medical Research Institute, Bethesda, Md.) April 1960

373

Berry, C.A. 1958 THE ENVIRONMENT OF SPACE IN HUMAN FLIGHT.
In USAF School of Aviation Medicine, Randolph AFB, Texas, Epitome of Space Medicine, Item No. 41
See also Aeronaut. Eng. Rev. 17(3):35-39, March 1958

ABSTRACT: The problems presented by space as an environment for human travel are extensions of those encountered in present day flight. This paper defines "space" as an environment for man. It discusses the problem of space equivalence, oxygen, dysbarism, embolism, ozone, cosmic radiation, and meteors. It also discusses the dangers of solar radiation, weightlessness, and the sealed cabin. (CARI)

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Berry, C.A. 1958 THE ENVIRONMENT OF SPACE IN HUMAN FLIGHT.
Aeronaut. Eng. Rev. 17(3):35-39, March 1958
See also USAF School of Aviation Medicine, Randolph AFB, Texas, Epitome of Space Medicine, Item No. 41

ABSTRACT: The problems presented by space as an environment for human travel are extensions of those encountered in present day flight. This paper defines "space" as an environment for man. It discusses the problem of space equivalence, oxygen, dysbarism, embolism, ozone, cosmic radiation, and meteors. It also discusses the dangers of solar radiation, weightlessness, and the sealed cabin. (CARI)

375

Berry, C.A. 1958 THE ROLE OF PHYSICAL STANDARDS IN JET AND ROCKET AIRCRAFT FLIGHT. J. Aviation Med. 29(9):631-640, Sept. 1958.

ABSTRACT: Complex modern weapons systems demand that the flight surgeon develop proper aircrew selection and maintenance programs to insure the greatest probability of successful human function. Physical standards attempt to provide personnel who will fly with increased safety, proficiency and longevity. Standards should offer some assurance of acceptable performance under the stresses of flying. Prior to establishing definite standards a good job analysis is needed to determine proper instruments or tests required. These must then be validated. Suggested tests for jet and rocket pilots which involve the cardiovascular, pulmonary, and neuropsychiatric systems, and weight, vision, and mixed stresses in the flying environment, have been discussed. Consideration was given to special requirements for space operations. It is important continually to review and revise the physical standards in the light of new knowledge, validity or the appearance of new tasks and equipments. In any case the role of physical standards in high performance aircraft, or space craft, is to insure that the candidate will not fail at his task "due to discoverable physical defect".

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Berry, C.A., and A.H. King 1959 AEROMEDICAL PROBLEM CASES: THREE YEARS' EXPERIENCE IN AVIATION MEDICINE CONSULTATION CENTER. Aerospace Med. 30(11):806-815

ABSTRACT: To assist in evaluating problem aeromedical cases, three U.S. Air Force Aviation Medicine Consultant Centers were established. During the three-year period 1956 to 1958, these centers evaluated 1,159 cases, and recommended return to flying status in 51 per cent of the cases. The majority of the consultees had both conventional and jet aircraft experience with 68 per cent having between 500 and 4,000 hours. The recorded diagnoses are tabulated and discussed.

377

Berry, C.A. 1961 AVIATION MEDICINE CONSULTATION PROBLEM CASES. In Bergeret, P., ed., Escape and Survival: Clinical and Biological Problems in Aero Space Medicine. (London, New York, Paris: Pergamon Press, 1961)

378

Berry, Charles A., Howard A. Minners, Ernest P. McCutcheon, & Richard A. Pollard 1962
AEROMEDICAL ANALYSIS
In: Results of the Third United States Manned Orbital Space Flight, October 3, 1962.
(National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Texas) N63-11990. Pp. 23-36.

ABSTRACT: Astronaut Walter M. Schirra, Jr., incurred no detectable physiologic decrement during his spaceflight which included over 9 hours of weightlessness. His body functions since the flight have remained normal and unchanged from their healthy preflight condition. A variation of the astronaut's instantaneously observed heart-rate response was noted during flight. Immediately following recovery, an orthostatic rise in heart rate, accompanied by a fall in systolic blood pressure, was observed for a brief period. In-flight ionizing-radiation monitoring showed that the astronaut sustained no significant exposure.

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Berry, F. B. & V. A. Stembridge 1958 THE HUMAN ELEMENT IN AIRCRAFT ACCIDENTS. Ann. Surg. 147(5):590-595.

ABSTRACT: From the flight safety standpoint there are fewer but more frequently fatal aircraft accidents than in the past. The chief increase in the number of fatal accidents can be correlated with the high performance aircraft—flying higher and faster.

Currently, military medicine evaluates the human element in three major categories: 1) environmental factors 2) traumatic factors, and 3) pre-existing disease.

By taking the man out of his normal habitat he is subjected to a change in his environment. With the increase in altitude he has less oxygen and less pressure. Many times he is placed in a situation which is beyond his capabilities, involving mainly the special senses such as vestibular and visual perception. The vestibular intolerance results in vertigo or spatial disorientation. The traumatic events sustained in an aircraft accident often involve more than one lethal lesion and many observers do not deem it worthwhile to make an investigation. Nevertheless, the death may be the cause of the accident rather than the result. Pre-existing disease will become increasingly important in the jet age. Any condition that might produce death on the ground can also produce death in the air, and the most dramatic among these is the heart attack. The points demonstrate the necessity for closer medical supervision of the aircrew particularly as the newer jet propelled aircrafts are put into service.

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Berry, F.B. 1960 "WHICH ERRING MEN CALL CHANCE". Aerospace Med 31:91-100, February 1960

ABSTRACT: It is evident that "the increasing performances of modern aircraft give to flight safety a more and more important role in the responsibilities of the authorities concerned. In spite of the improvements and aeronautical techniques, the human element is still an essential feature in the operation of an aircraft and the origin of aircraft accidents." The greater the efforts for prevention for humans, appliances and structure, the less there will be "which erring men call chance."

381

Berry, M. R., Jr., B. T. Horton, & A. R. MacLean 1940 THE IMPORTANCE OF STUDYING THE POSTURAL RESPONSES OF THE BLOOD PRESSURE AND THE HEART RATE, WITH A NOTE ON THE METHOD OF TAKING THE BLOOD PRESSURE IN THE ERECT POSTURE. The Medical Clinics of N. America 24(4):1095-1126, July 1940.
NOTE: Reel 7, Flash 7, Item 56

SUMMARY AND CONCLUSIONS: In this review of postural maladaptation, we have tried to present a working picture of the complex chain of mechanisms which allow man to walk instead of to crawl; to point out that postural maladaptations may occur in the presence of a variety of diseases which may affect any link of the postural adaptation chain and account for many symptoms; to stress the diagnostic value of the simple procedure involved in comparing the blood pressure and pulse rate with the patient in the recumbent and erect postures; and finally, we propose a simple method of taking the blood pressure when the patient is erect which obviates some of the errors which occur with vascular engorgement of the arm distal to the cuff. Sewall in 1919 stated the problem of the physician well: "In his examination of a patient the doctor is guided by his conception of the ratio of effort to use; necessity not luxury, determines his technic; the burden of a new method is intolerable unless it yields very practical results and fits easily into the routine of examination." We believe so strongly that comparison of blood pressure and pulse rates when the patient is in the erect and recumbent positions fulfills these requirements that two of us (MacLean & Horton) have advocated this procedure as a routine part of the general physical examination at The Mayo Clinic.
We suggest the following procedure for recording the postural changes in blood pressure as a routine part of the physical examination: 1) After the general examination has been completed and while the results are being written, allow the patient to rest quietly for about five mins., lying supine on the examination table. 2) While the patient is supine, record the blood pressure rapidly 3 to 5 times, depending on the amount of fluctuation between the readings, and also record the pulse rate. 3) Ask the patient to stand quietly for one min. and then take the pulse rate. 4) Elevate the patient's arm above shoulder level until the veins collapse and then rapidly inflate the cuff. 5) Lower the patients' cubital fossa to the level of the heart. Clasp the subject's right hand between your right upper arm and thorax so that his forearm is horizontal at the level of the heart. Supporting the patient's elbow with the last 3 fingers of your right hand, clasp the stethoscope in place over the brachial artery with the right thumb and forefinger and take the blood pressure in the usual way. 6) In cases in which the examiner has reason to suspect latent postural maladaptation, the blood pressures and pulse rates with the patient standing should also be taken just after an exercise test. (AUTHOR)

382

Berus, W.J. 1961 DEVELOPMENT OF PERSONNEL PROTECTIVE SYSTEMS FOR SPACE FLIGHT AND EXPLORATION MISSIONS.
(B.F. Goodrich Aviation Products, Akron, Ohio) Contract NOw 61-0554-c First Monthly Engineering Report, 18 May 1961 through 17 June 1961 ASTIA AD-293 056

ABSTRACT: The initial phase of this program has dealt with establishing a set of requirements or conditions the space suit must withstand. This has included cataloging crew activities and tasks in addition to classifying the hostile environment to be encountered.

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Besco, R.O. 1961 THE EFFECTS OF COCKPIT VERTICAL ACCELERATIONS ON A SIMPLE PILOTED TRACKING TASK. (North American Aviation, Los Angeles, Calif.) Report No. NA-61-47, 13 April 1961.

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Besco, R. O. 1961 THE EFFECTS OF COCKPIT VERTICAL ACCELERATIONS ON A SIMPLE PILOTED TRACKING TASK
Hum. Factors 3(4):229-236, Dec. 1961

ABSTRACT: The effects of vibratory, linear, and vertical accelerations on tracking errors during a one-dimensional, pitch tracking task were studied. Four experienced test pilots performed this compensatory tracking task on the "Pilot Operated Dynamic Flight Simulator"; motion (four levels), frequency (three levels), and amplitude (three levels) of the command signal were varied. The measure of performance was the root mean square error in pitch attitude. These data were examined by analysis of variance technique. Suggestions for future research were included. (Tufts)

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Best, C. H. and N. B. Taylor 1963 EFFECT OF GRAVITY UPON CIRCULATION
In The Human Body: It's Anotomy and Physiology Fourth ed. (New York: Holt, Renehart and Winston) Pp. 273-275.

ABSTRACT: A physiological description of fainting and "blackout" is provided, and the effect of centrifugal force upon the circulation is detailed. In the gravity-free state it is noted that the normal circulatory reflexes elicited by the stimulation of pressorecptors in the carotid sinus and other vascular areas will be reduced or suspended. The blood will have no weight, so the work of the heart will be reduced and the skeletal muscles will not be called upon to expend energy upon ponderable objects. These will have no short time effects but would lead to atrophic changes if extended over long periods. (CARI)

386

Beyer, J.C. & A.A. Bezreh 1962 REVIEW AND FORECAST OF IMPACT STUDIES, UNITED STATES ARMY
In Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, (National Academy of Sciences, National Research Council, Washington, D.C.) Publication No. 977. Pp. 17-20

ABSTRACT: During the past ten years, the Commission on Accidental Trauma of the Armed Forces Epidemiological Board has been sponsoring projects which fall roughly into the following areas: (1) Identification of major problems of accidental trauma within Armed Services. (2) Development of quantitative methods for analyzing causative factors in accidents and their control. (3) Determination of human factors problems relative to frequency of errors and injuries. (4) Application of human engineering principles to the design of equipment to increase operational efficiency and safety. (5) Development of personnel protective measures, and (6) Evaluation of program effectiveness. At the present time, the activities of this Commission have been somewhat curtailed.

Beginning in July 1959, the U.S. Army Medical Research and Development Command has been participating with the Transportation Corps in the support of the medical aspects of the overall Aviation Crash Injury Research program with the Flight Safety Foundation, Incorporated, at Phoenix, Arizona. This research in the field of Army aviation is concerned with the delethalizing of the cockpit and aircraft cabin structures in order to prevent injury or death to the occupants of such aircraft when they are involved in survivable-type accidents.

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Bezreh, A.A. 1961 ARMY EXPERIENCE WITH CRASH INJURIES AND PROTECTIVE EQUIPMENT
Paper: Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Material Center, Philadelphia, Pa., June 14-15, 1961

ABSTRACT: Reports data representing some features of Army experience, as a user of light fixed wing aircraft and of helicopters, with respect to crash injuries and protective equipment. Because of the performance characteristics of Army aircraft such as relatively low speed, most accidents, approximately 97%, are theoretically survivable. However, far less accidents are actually survived. The development and incorporation of crashworthiness characteristics and improved personal protective equipment, therefore, is of crucial importance if the discrepancy between survivable and survived accidents is to be eliminated.

Some statistical findings are given whihc illustrate the effectiveness of items of personal protective equipment. Injury patterns are given with respect to injury severity, type, and location; and a comparison between fixed wing and rotary wing injury patterns reveals no striking differences, except that injuries incurred in helicopter accidents appear to have been somewhat more severe.

The dramatic effect of post-crash fire upon mortality is illustrated statistically. Although only 5.7% of all major accidents, both fixed and rotary wing, were complicated by post-crash fire, this relatively small percent of accidents accounted for 49.6% of all fatalities, pointing out the serious need for crash-resistant fuel systems.

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Bezreh, Anthony A. 1963 HELICOPTER VERSUS FIXED WING CRASH INJURIES Aerospace Medicine 34(1): 11-14, Jan 1963

ABSTRACT: The purpose of this presentation is to compare the crash injuries and some of the crash injury problems experienced by Army aviation in its fixed wing and in its rotary wing types of aircraft.

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Bialecki, A. 1961 ANALIZA MOZLIWOSCI WYKORZYSTANIA EFEKTU GIROSKOPOWEGO ORBITALNEGO RUCHU CZASTEK ELEMENTARNYCH DO POMIARU PREDKOSCI KATOWEJ (Analysis of the Possibility of Using the Effect of the Gyroscopic Orbital Movement of Elementary Particles for Measuring Angular Velocity) Pomiary Automatyka Kontrola 6:386-391, 1960.
Palmer, J.W., Trans. (Royal Aircraft Establishment, Great Britain) Library Trans. No. 971, Oct. 1961. ASTIA AD 268 268

ABSTRACT: The idea of a new instrument for measuring angular velocity within the limit of application of gyroscopic instruments is put forward. To make certain analogies, the gyrotron is shown as a mechanical system subject to returning oscillations under the action of the Coriolis force. An analysis was made of the motion of elementary particles on the circular orbit of an accelerator, after applying to it angular velocity of transfer as the input quantity. Formulae were obtained on the mean deviation of particles for the variants examined of the electron gyroscope and conclusions are drawn as to the suitability of the most accurate theoretical designs. An introductory scheme of a "gyro-accelerator" and considerations relative to the design should be treated solely as an indication of the trend of the investigations. (Author)

390

Bezreh, A. A. 1962 HELICOPTER VERSUS FIXED WING CRASH INJURIES, ARMY EXPERIENCE.
(Paper presented at the Aerospace Med. Assocn. Conf., Atlantic City, N. J., 11 April 1962).

ABSTRACT: A review of three years of Army aviation major accident data revealed more similarities than differences between crash injuries received in rotary wing and fixed wing types of aircraft. The same preponderance, namely 97% of the accidents in both types of aircraft were considered as survivable, although as many aviators were killed in survivable as in non-survivable accidents. There were twice as many injuries produced per accident in rotary wing crashes as there were in fixed wing crashes. When injury patterns were analyzed for injury location, injury type, and for the types of injuries causing death, it was found that rotary wing and fixed wing data paralleled each other remarkably closely. The same similarity appeared in the breakdown for agents of injury

causation. The head and upper and lower extremities were the most frequent body areas involved. Wounds, fractures, and burns were the prevalent types of pathology produced. The most common causes of death were head injuries, multiple extreme injuries, and burns and complications, while the major agents of injury causation were cockpit agents, fire, and decelerative forces. The important cockpit agents of injury causation were the instrument panel, windshield or bubble, and the control column, cyclic or collective stick. Thus, Army crash injury patterns are typical of those found from other sources of light aircraft accident data, in spite of the fact that over 50% of the Army aircraft inventory is rotary wing in type. Further discussion will be devoted to the astounding implications of post-crash fire and to the differences in the injuries attributable to pure decelerative forces in rotary wing and fixed wing aircraft. (Aerospace Med. 33(3):329, March 1962.)

391

Bidwell, J.B. Jan. 1959 VEHICLES AND DRIVERS --1980.
(Society of Automotive Engineers) Pre-print 125.

392

Bierman, E.O. 1959 TRAUMA FOLLOWING EJECTION FROM JET AIRCRAFT: A CASE REPORT
Am. J. Ophthalmol., 48(3, Part 1): 399, Sept. 1959

ABSTRACT: A 34-year-old man, ejected from a jet aircraft at approximately 18,000 ft. at a speed of over 600 miles per hour (0.9 the speed of sound), sustained a multiplicity of broken bones, subconjuntival hemorrhages, marked extravasation of the eyelids, and marked swelling of the face and lips. Examinations within a few hours after the accident and two months later revealed no damage to the eye itself.

393

Bierman, Howard R. 1945 DESIGN OF AN IMPACT DECELERATOR
(Naval Medical Research Institute, Bethesda, Md.)
Research Project X-630, Report No. 3, 30 Nov. 1945

ABSTRACT: An apparatus for applying an impact force to a human being through aircraft shoulder straps and seat belts has been devised. The impact forces are produced by the arresting of freely falling weights which are dropped through varying distances. The duration of the impact forces can be varied by the interposing of resilient materials between the falling weight and the arresting plate. The design of the seat permits alteration of the position of the subject relative to the direction of the impact force. Wire strain gages are used to indicate the magnitude, duration, and characteristics of the impact forces. The limitations of the apparatus include the following: (a) The position of the subject is normal. (b) The restraining mechanism rather than the individual is accelerated. (c) Visceral movement is restricted by the apparatus.

394

Bierman, H.R., & H.K. Hellems 1945 INCREASED PROTECTION TO IMPACT FORCES BROUGHT ABOUT BY A LARGER AREA OF DISTRIBUTION. (Naval Medical Research Institute, Bethesda, Md.) Rept. No. 3, Project NM001006, 30 Nov. 1945.

395

Bierman, H.R. 1946 DESIGN OF AN IMPACT DECELERATOR Science, 104:510-513

ABSTRACT: Describes an apparatus to simulate the magnitude and duration of a force experienced by an individual . an aircraft crash. This is accomplished by holding the individual in a seat by shoulder straps and seat belt and, at a given time, jerking these back against the body.

396

Bierman, H. R. 1946 HUMAN REACTIONS TO EXPERIMENTALLY INDUCED IMPACT FORCES. California Medicine 65(4):149-152, Oct. 1946

ABSTRACT: The possibility exists of surviving high impact forces in crashes in military aircraft. 2) The magnitude and duration of a given force in part determines its effect upon the body. Increasing the area of distribution of a force reduces the untoward effects upon subjects. 3) Forces should be distributed to those areas of the body more capable of withstanding these forces. 4) The rate of loading bears a critical relationship to the tolerance of the subject to impact forces. 5) Small oscillations and irregularities in a force are disagreeable to subjects. 6) Force is the etiological agent of trauma, and as such requires much further investigation of a fundamental nature. (AUTHOR)

397

Bierman, H.R. 1946 A STUDY OF METHODS OF INTENTIONALLY CRASHING AIRCRAFT WITH PURPOSE TOWARD THE SURVIVAL OF PERSONNEL. (National Research Council, Washington, D.C.) CAM Rept. No. 496, 21 Feb. 1946.

398

Bierman, H.R., H.K. Hellems, & R.M. Wilder, Jr. 1946 PHYSIOLOGICAL FINDINGS OF HUMANS UNDERGOING IMPACT FORCES. (Naval Medical Research Institute, Bethesda, Md.) Research Project X-630

399

Bierman, H.R., H.K. Hellems, & R.M. Wilder, Jr. 1946 THE RATE OF LOADING OF IMPACT FORCES AND ITS RELATIONSHIP TO THE TOLERANCE OF THE HUMAN TO MAXIMAL LOADS. (Naval Medical Research Institute, Bethesda, Md.) Research Project X-630.

400

Bierman, H.R. & V. Larsen 1946 DISTRIBUTION OF IMPACT FORCES ON THE HUMAN THROUGH RESTRAINING DEVICES
Naval Medical Research Inst., Bethesda, Md. Proj. X-630, Rept. No. 4
March 21, 1946
NOTE: CARI P&S 4.24na

ABSTRACT: The distribution of impact pressures transmitted to the human body through the regulation shoulder straps and seat belt of aircraft has been investigated. The seat belt exerts a maximal impact pressure to the body at the umbilicus through the center of the belt. Maximal impact pressures are exerted by the shoulder straps to the body at the clavicular areas. An improved design of the present restraining devices in aircraft allowing a more equal distribution of the impact pressures on the body may permit increased tolerance to such pressures.

401

Bierman, H.R., & V.R. Larsen 1946 REACTIONS OF THE HUMAN TO IMPACT FORCES REVEALED BY HIGH SPEED MOTION PICTURE TECHNIQUE.
J. Aviation Med. 17(5):407-412.
See also (Naval Medical Research Institute, Bethesda, Md.) Project X-630 Report No. 5, 25 April 1946.
NOTE CARI P&S 2.13na

ABSTRACT: (1) The effects of impact upon human subjects on the impact decelerator were studied by high speed cinematography. The motion pictures were taken at a rate of 3000 frames a second, permitting the action to be slowed 125 times when projected at the standard rate of 24 frames per second. (2) Interpretation of these films has shown that the pilot's conventional shoulder straps elongate under impact load simultaneously with the shortening of the long axis of the body. This causes the straps to slide over the skin during the onset of the impact. Abrasions, contusions, and ecchymoses about the clavicular areas similar to those lesions seen in aircraft crash victims have been caused by the sliding action of the straps. (3) The widening of the transverse axis of the body has been observed during impact; injuries such as bone bruises, costochondral or ligamentous detachments, and hemorrhage into an abdominal rectus muscle may occur under maximal impact loads. (4) The compression of the body under a maximal impact load of 3500 pounds is estimated to be 5.5 centimeters. (5) With the seat free to rotate, rapid accelerations of the head and neck have been obtained and a temporary alteration of the facial contour has been observed during impact. (6) Various

forms of wave transmissions in the skin and underlying tissues have been observed during impact. These waves travel at a rate of 4 to 14 feet per second, depending upon the type of tissue in which the wave is located. A rapid fluid wave in the engorged external jugulars has been seen to occur immediately after the onset of the impact. (7) If one shoulder strap breaks during impact, its force is then shifted to the companion strap resulting in a twisting movement of the torso. (8) Alteration of the rate of increase of impact loading bears a critical relationship to the tolerance of the individual to such forces. Subjects usually prefer slower rates of loading rather than rapid applications of force. (DACO)

402

Bierman, H.R., et al. 1946 THE PRINCIPLES OF PROTECTION OF THE HUMAN BODY AS APPLIED IN A RESTRAINING HARNESS FOR AIRCRAFT PILOTS
Naval Medical Research Institute, Bethesda, Md. Proj X-630; Rept. No. 6, 10 May 1946
NOTE: CARI P&S 4.24na

ABSTRACT: A restraining harness for aircraft pilots has been developed which has successfully protected volunteers against 2500 foot-pounds delivered on the impact decelerator by dropping a 500 pound weight five feet. This impact force expended in 0.15 seconds on a dummy enclosed in a semi-rigid harness is featured by 10,000 pound peaks as measured by strain gages.

The factors which contribute to the effectiveness of this harness are: (a) Distribution of the impact load over a large body area. (b) Distribution of the impact load to regions of the body best able to withstand high impact forces. (c) Gradual rate of application of force due to high initial elasticity of the material. (d) Damping of small irregularities during the period of impact. (e) The property of the material to elongate inelastically when the applied force reaches a predetermined tolerable limit, permitting the absorption of large amounts of energy.

403

Bierman, H.R., R.M. Wilder & H.K. Hellems 1946 THE PHYSIOLOGICAL EFFECT OF COMPRESSIVE FORCES ON THE TORSO. (Naval Medical Research Institute, Bethesda, Md.) Project X-630, Report No. 8, 19 Dec. 1946.

ABSTRACT: Biophysical technics have been utilized to study the effects of impact forces and of static loading on volunteers. These technics include the use of the electrocardiograph, thermocouple respirometer, and a photoelectric cell for determining ear pulse and ear opacity. Electrical wire strain gages were employed for pulse and pressure determinations. A static load of 550 pounds was applied to the anterior chest and abdomen of eight male volunteers by the use of traction on a vest type restraining harness. The results of 18 such loadings are reported.

404

Bierman, H. R. 1947 THE PROTECTION OF THE HUMAN BODY FROM IMPACT FORCES OF FATAL MAGNITUDE.
Mil. Surgeon, 100(2):125-141., Feb. 1947

ABSTRACT:
1. The protection of aircraft personnel in crashes up to 65 G's is a possibility. Many injuries and deaths in aircraft crashes may be caused by inadequate restraining devices.
2. Investigations on the impact decelerator have uncovered at least six fundamental principles which will diminish the effect of linear accelerative forces (impacts) upon the human. They are:
(a) Distribution of the impact force over a large body area.
(b) Distribution of the impact force to regions of the body best able to withstand high impact forces.
(c) Gradual rate of application of the impact.
(d) Damping of small irregularities during the period of impact.
(e) Small distances of movement in the same direction of the impact during the period in which the force would exceed the injury threshold.
(f) Maintenance of the force below the injury threshold at all times.
3. These principles have been incorporated into the construction of a vest-type harness of undrawn nylon and have effectively protected humans from maximal impact forces equivalent to 10,000 impact pounds on a wooden dummy with the conventional harness.
4. Parachute riser straps of the same material have effectively reduced decelerations of 54 G's to 6 G's on a wooden dummy. Volunteers free falling distances of 15 feet were decelerated in less than 0.2 second yet experienced only 6 G's.
5. The principle of reducing impact forces below the damaging threshold by small distances of controlled movement can be applied to prevent injuries in many types of accidents due to rapid acceleration or deceleration.

405

Bierman, H.R., R.M. Wilder and H.K. Hellems 1947 PROTECTION OF THE HUMAN BODY. PRINCIPLES AS APPLIED IN A RESTRAINING HARNESS FOR AIRCRAFT PILOTS.
J.A.M.A. 133(8):522-526, Feb. 22, 1947.

ABSTRACT:
1. A restraining harness for aircraft pilots has been enclosed in a semi-rigid harness is featured by 10,000 pound peaks as measured by strain gages.
2. The factors which contribute to the effectiveness of this harness are: (a) distribution of the impact load over a large body area; (b) distribution of the impact load to regions of the body best able to withstand high impact forces; (c) gradual rate of application of force due to high initial elasticity of the material; (d) dampening out of small irregularities during the period of impact, and (e) the property of the material to elongate inelastically when the applied force reaches a predetermined tolerable limit, permitting the absorption of large amounts of energy.
The principles outlined in this report may be applied to protection against many other types of large accelerative forces that may be encountered.

406

Bierman, H.R. 1948 A STUDY OF METHODS OF INTENTIONALLY CRASHING AIRCRAFT WITH PURPOSE TOWARD THE SURVIVAL OF PERSONNEL. J. Aviation Med., 19(4):238-252, Aug. 1948.

ABSTRACT: Three pilots who are experienced in intentionally crashing aircraft for the motion picture industries were interviewed to gain information concerning the performance of nonfatal aircraft crashes.

407

Bierman, H.R. 1949 TEST AND EVALUATION OF EXPERIMENTAL HARNESS UNDER CONTROLLED CRASH CONDITIONS. (Naval Medical Research Institute, Bethesda, Md.) Proj. X-630, Rept. No. 11, 10 Apr. 1949.

408

Billingham, J. 1958 SPACE MEDICINE Nature (London) 182(4650):1645-1646, Dec. 13, 1958

ABSTRACT: Reviews the first symposium on space medicine in Great Britain, held in London, October 16 and 17, 1958. Among papers presented were: Consequences of Weightlessness (M. P. Lansberg), Impairment of Human Performance in Control (K. F. Jackson), and Effects of Sensory Impoverishment, Confinement, and Deprivation of Sleep (C. Cunningham).

409

Billings, C.E. and W.F. Ashe 1962 THE MEDICAL ASPECTS OF BUSINESS AVIATION (Ohio State Univ. Research Foundation, Columbus) OSU-RF-1260-2, Contract no. FA-2192, June 30, 1962

410

Billington, I.J. E.Eggmann, B.C. Stonehill & J.C. Lafrance 1961 THE ROTATING ARM FACILITY FOR HIGH SPEED LOW DENSITY AERODYNAMIC STUDIES. (Institute of Aerophysics, University of Toronto) UTIA Report No. 77. Oct. 1961. ASTIA AD 275 831.

ABSTRACT: The feasibility and usefulness of a rotating arm facility for aerodynamic studies at low density has been studied. Structure of the arm itself appears to be the most critical aspect of the design of such a facility. A theory for optimum arm design is outlined and a number of design charts based on this theory are presented.

This study suggests that it is mechanically feasible to construct a rotating arm facility with a capability of Mach numbers up to about 8 over a range of pressure levels encompassing most of the low density flow regimes of interest. Although somewhat higher Mach numbers are theoretically possible, justification of the attendant increase in facility size and cost.

Based on the theory and design data of this report, facilities with maximum capabilities of 4000 and 8000 ft/sec respectively are discussed. It is concluded that a facility of the 4000 ft/sec class could be designed by direct application of the present analysis. For the higher speed facility, however, analytical investigation and probably some related engineering development work would appear necessary. (Author)

411

Billington, I. J., E. Eggmann, B. C. Stonehill, & J. C. Lafrance 1962 THE ROTATING ARM FACILITY FOR HIGH SPEED LOW DENSITY AERODYNAMIC STUDIES. (Aeronautical Research Laboratory, Wright-Patterson AFB, Ohio) Contract AF 33(616)-6990; Project 7064; Task 70169; ARL EXHIBIT 62-300; Jan. 1962

ABSTRACT: The feasibility and usefulness of a rotating arm facility for aerodynamic studies at low density has been studied. Structure of the arm itself appears to be the most critical aspect of the design of such a facility. A theory for optimum arm design is outlined and a number of design charts based on this theory are presented.
This study suggests that it is mechanically feasible to construct a rotating arm facility with a capability of Mach numbers up to about 8 over a range of pressure levels encompassing most of the low density flow regimes of interest. Although somewhat higher Mach numbers are theoretically possible, justification of the attendant increase in facility size and cost appears doubtful.
Based on the theory and design data of this report, facilities with maximum capabilities of 4000 and 8000 ft/sec respectively are discussed. It is concluded that a facility of the 4000 ft/sec class could be designed by direct application of the present analysis. For the higher speed facility, however, analytical investigation and probably some related engineering development work would appear necessary. (AUTHOR)

412

Bingel, A. 1948 FIAT REVIEW OF GERMAN SCIENCE 1939 - 1946 PSYCHIATRY - XVI - PSYCHIATRY IN AIR FORCE MEDICINE (Wiesbaden: FIAT, 1948). Pp. 276-288

413

Bingham, W.W. 1962 A RATIONAL METHOD OF DETERMINING AIRPLANE DECELERATION FORCES DURING ABNORMAL LANDING CONDITIONS. (Boeing Co., Seattle, Washington) July 1962.

414

Biot, M.A. & R.L. Bisplinghoff 1944 DYNAMIC LOADS ON AIRPLANE STRUCTURES DURING LANDING. (National Advisory Committee for Aeronautics, Wash., D.C.) NACA ARR No. 4H10, October 1944

ABSTRACT: The application of transient theory to the rational determination of dynamic loads on airplane structures during initial landing impact is discussed. Simplified procedures are described by which the distribution of the maximum attainable value of the dynamic stresses in the structure may be obtained. Illustrations of the procedure are given by nemerical examples for the case of airplane wings. This indicates approximate orders of magnitude to be expected in a typical problem. The validity of the underlying simplifications and assumptions is discussed. A brief outline of the general mathematical theory of transients in undamped elastic system is presented.

415

Bird, J. W., C. C. Wunder, N. Sandler & C. H. Dodge 1963 ANALYSIS OF MUSCULAR DEVELOPMENT OF MICE AT HIGH GRAVITY. Amer. J. Physiol. 204:523-526, March 1963.

416

Birren, J. 1945 STATIC EQUILIBRIUM AND VESTIBULAR FUNCTION. J. Exp. Psychol. 35:127-133.

SUMMARY: Observations of body-sway and rail-walking test were made on a 19 year old male who had lost all VIII never functions (vestibular) following an attack of acute meningococcus menigitis. The existence of the vestibular defect was established by complete absence of response to the caloric and Barany Chair tests.

This S manifested marked body sway during the first trial period. He did, however, maintain his balance standing erect with eyes open and with eyes colsed. One month later this S displayed improvement in his postural control so that the record would not be categorized as pathological. During neither of the sessions could the S score above zero on the rail-walking test.

Postrotational nystagmus time and body-sway measurements were made on 45 male Ss. None of the correlation coefficients obtained between body-sway measurements, eyes open or closed, and nystagmus time were significantly greater than zero.

The findings of this study are interpreted as indicating that man may maintain stable posture despite loss of vestibular function, and that measurements of body sway cannot be used to detect vestibular defects. Postural defects may occur following the loss of vestibular functions, but the defect is soon compensated for. The lack of correlation between postrotational nystagmus time and body sway is further indication of the lack of complete dependence of posture on vestibular functions, or at least on those functions reflected in nystagmus. Superficially it would seem that body-sway measurements were indicative of the adequacy of integration by the cerebellum of sensory cues arriving from many sources, among which those from the labyrinth are not the most important.

417

Birren, J.E., & M.B. Fisher 1945 FURTHER STUDIES ON THE PREDICTION OF SUSCEPTIBILITY TO SEASICKNESS BY A MOTION SICKNESS QUESTIONNAIRE. (Naval Medical Research Institute, Bethesda, Md.) Research Project X-278, Rept. No. 6, 8 Oct. 1945.

418

Birren, J.E. 1949 MOTION SICKNESS: ITS PSYCHOLOGICAL ASPECTS. In Committee on Undersea Warfare, National Research Council, Washington, D.C., Human Factors In Undersea Warfare.

419

Bjurstedt, H. MEASUREMENT OF O_2 SATURATION OF ARTERIAL BLOOD IN THE HUMAN DURING PROLONGED ACCELERATION. (Karolinska Inst., Sweden) Project 7220(805A), Contract AF 61(052)-153; MRM, AMRL

ABSTRACT: This work effort involves the measurement of oxygen and carbon dioxide exchange in subjects exposed to prolonged accelerations (positive) and (transverse) and specifically, the measurement of oxygen saturation of the arterial blood, as well as concentrations of oxygen and carbon dioxide in the alveolar air. The techniques and experimental data obtained should be applicable to the establishment of objective physiologic indices of human tolerance of accelerations in various vectors.

420

Bjurstedt, Hilding 1958 EFFECTS OF PROLONGED EXPOSURE TO POSITIVE G LOADINGS ON THE PULMONARY GAS EXCHANGE. (Reports from the Lab of Avn and Naval Med., Karolinska Institutet, Stockholm. British Interplanetary Society, Symposium on Space Medicine, London, 16-17 Oct. 1958)
J. Brit. Interplanet. Soc., 17(9):288-289, May-June 1960

ABSTRACT: The results of subjecting anaesthetized dogs to prolonged g forces in the head-to-tail direction are reported. In spite of the fact that the animals were hyperventilating and breathing 100% oxygen, hyperoxaemia was found; this is attributed to disturbances of ventilation and perfusion in the lungs. It was not clear why marked alkalosis was also present.

421

Bjurstedt, H., L. E. Hansson, & G. Strom 1958 ELECTROCARDIOGRAPHIC, HEART-RATE AND SUBJECTIVE RESPONSES TO PROLONGED GRAVITATIONAL STRESS IN RELATION TO SOME DIMENSIONAL AND FUNCTIONAL PARAMETERS OF THE CIRCULATORY SYSTEM. (Reports from the Lab of Avn and Naval Med., Karolinska Institutet, Stockholm, Dec. 1958) Acta Physiol. Scand. 47:97-108, 1959

ABSTRACT: Heart-rate and ECG (including 5 precordial leads) responses were studied in 16 healthy subjects during up to 6 min exposure to 3-3½ times the force of gravity in a human centrifuge. The subjective g tolerance (resistance to kimming or loss of vision) was determined in relation to various circulatory functional and dimensional parameters. The ECG did not show any remarkable alterations during or after the runs. Subjective g tolerance was correlated to orthostatic heart-rate (produced by normal gravity) but not to heart-rate response under increased gravitational stress, physical working capacity, heart volume in the horizontal or vertical body position, or total hemoglobin.

422

Bjurstedt, H. 1960 MEASUREMENT OF O_2 SATURATION OF ARTERIAL BLOOD IN THE HUMAN DURING PROLONGED ACCELERATION.
(Karolinska Inst., Sweden) Contract AF 61(052)-153; Project 7220(805)

ABSTRACT: This research involves the measurements of the O_2 and CO_2 exchange in human subjects during positive acceleration - specifically measurement of the O_2 in alveolar air.

423

Black, A.N., D.G. Christopherson, and S. Zuckerman 1942 FRACTURES OF THE HEAD AND FEET. (Ministry of Home Security, Oxford, England) Rept. RC-334, 12 Aug. 1942.

424

Black-Schaffer, B., & G.T. Hensley 1960 PROTECTION AGAINST ACCELERATION BY IMMERSION DURING HYPOTHERMIC SUSPENDED ANIMATION. A.M.A. Archives of Pathology 69(5):499-505, May 1960.

ABSTRACT: When baby mice eight to twelve days old in hypothermic suspended animation are centrifuged, the mechanical effects of acceleration upon the tissues are readily separated from the effects upon function, such as respiration, cardiovascular dynamics, and metabolism. Under these circumstances the highly effective protection against acceleration by immersion, to the limits of the apparatus used (ca.2,700g), are readily demonstrated. Immersion during acceleration introduces a new mechanical factor, hydrostatic pressure. Temperature changes may under given conditions reinforce or reduce the physiologic effects of pressure. Under the experimental conditions, a pressure up to 10 minutes of approximately 10 kg./sq. cm. at 4 to 8 degrees C. is successfully tolerated. When this is prolonged for 15 or more minutes, it is lethal. It is shown that when immersed, the mice can be protected against an accelerative stress, which, when translated into rectilinear velocity, would, at the end of 15 minutes, impart a constant speed of about 23,500 km. per second (14,500 miles/sec.). At such constant velocity a relativistic time dilation of 1 per cent would occur. (Authors)

425

Black-Schaffer, B., G. T. Hensley, & L. R. Simson 1961 PROTECTION OF THE ADULT MOUSE AGAINST 1800 G ACCELERATION BY HYPOTHERMIC IMMERSION Aerospace Medicine 32(12):1119-1126, Dec. 1961.

ABSTRACT: Deep hypothermia combined with immersion was used to protect adult mice against 15 min. of 1,800 g. The method was described in detail. After spinning, the mice, while being warmed, were subjected to positive pressure respiration with pure oxygen. After recovery of spontaneous respiration the mice were necropsied and selected tissues were fixed and sectioned for histophathologic examination. The results were tabulated and discussed in detail. (Tufts)

426

Black-Schaffer, B., 1962 PROTECTION BY DEEP HYPOTHERMIA AND IMMERSION AGAINST 2300 G ACCELERATION OF A NON-HIBERNATOR (RAT) AND A HIBERNATOR (HAMSTER). Aerospace Med., 33(3):286-296, March 1962.

ABSTRACT: A true hibernator, the adult hamster, can be protected against a spin of 2300 G of 30 minutes duration while in deep hypothermia and immersed in a fluid of specific gravity equal to its own, at a temperature of 0° to 10°C.

The adult rat, non-hibernator, can also be protected under the same circumstances, but does not permanently survive more than 5 minutes of the largely compensated 2300 G accelerative stress, despite a total period of deep hypothermia of as little as 50 minutes.

The immediate anatomic cause of death in the revived rats is a prominent congestive gastroenteropathy which does not affect the large bowel. It is suggested that this lesion is a consequence of autodigestion of the mucosa by gastric and pancreatic proteolytic enzymes.
In our experience, the same lesion is regularly found in rats revived after 90 or more minutes of deep hypothermia without any other stress, and rarely in rats revived within 70 or fewer minutes.

It is suggested that the circulatory stasis of deep hypothermia impairs the normal protective devices of the enteric mucosa, and the hydrostatic pressure of the spin accelerates the proteolysis sufficiently to overcome, in a shorter time, these imparied defenses.

The recirculation of blood through large areas of severly injured enteric mucosa must result in the absorption of water soluble substances which ordinarly are not absorbed. It is proposed that these, whether gram negative endotoxins, peptones, or other substances, elicit the erreversible shock to which the revived rats succumb. (Author)

427

Blagonravov, A.A. 1960 THE JOURNEY OF 'OTVAZHNAVA'
Pravda p. 4, 5 July 1960.

ABSTRACT: News article quoting academician Blagonravov. Discusses geophysical rockets and biological apparatus and payloads. "The size of the payload lifted by the rocket makes it possible to make careful biological research, a preliminary step in preparing for flight by a man. In recent experiments we have received new data in respect to muscle tone under conditions of weightlessness." (CARI)

428

Blakemore, C. 1940 VISUAL COMPLICATIONS OF HIGH-SPEED FLYING. Tr. Ophth. Soc., (Australia) 2:28-33

ABSTRACT: The visual complications that may occur fall roughly into two groups: (a) sudden transient blindness, or some modification thereof, with or without a train of cerebral symptoms, such as fainting, coma, etc., (b) retinal and subconjunctival hemorrhages. One of these two groups the former not only is met with more frequently but is the more important. This type of transient blindness is known colloquially as a "black-out". A "black-out" may occur in an individual if, while flying, sufficient corticifugal centrifugal force is created and provided always the exposure to this force is of sufficient duration. The "black-out," however, does not come on i immediately; an individual is subjected to the effects of a suitable centrifugal force, but there is a latent period which varies in length in different individuals. This latent period is followed by a period of complete blindness, after which sudden recovery takes place.

The experimental evidence appears to suggest that the "black-out" threshold is reached when a corticifugal centrifugal force of from 4.5 to 5 is applied for from 5 to 15 seconds.
Resistance to "black-out" conditions can be increased by constant flying practice, but the tolerance established is very limited and depends on (a) individual idiosyncrasy, and)b) conditioning of the blood-vascular system to the sudden onset of centrifugal force.

429

Blanchard, W. & S. Bondurant et al 1958 SUBJECTIVE EFFECTS OF TRANSVERSE ACCELERATIONS ON SUBJECTS IMMERSED IN WATER (Paper, 1958 Meeting of Aero Medical Association, Statler Hotel, Washington, March 24-26)

ABSTRACT: To explore the acceleration protection offered by complete submersion in water forty-six centrifuge runs were made on four human subjects lying flat in a water filled container. Compressed air for respiration was supplied through an aqua-lung valve positioned to maintain a balance between endotracheal pressure and extrathoracic pressure. In each run the subjects were held at peak G for 15 to 55 seconds, after which their subjective impressions were recorded. The tolerance to chest to back G (supine) was limited by increasingly severe substernal pain. The onset of this pain occurred at an average level of 4.1 G with the maximum tolerable level being about 7G. In the prone position (back to chest G) the chest pain did not appear at the same levels noted above but the absolute limit of tolerance was not determined due to difficulties with respiration and chest buoyancy. In contrast to the unimmersed situation all subjects noted a feeling of weightlessness with freedom of limb and head movement. These preliminary experiments do not indicate any marked gain in transverse G tolerance due to water immersion.

430

Blanchard, U.J. 1960 LANDING-IMPACT CHARACTERISTICS OF LOAD-ALLEVIATING STRUTS ON A MODEL OF A WINGED SPACE VEHICLE (National Aeronautics and Space Administration, Washington, D.C.) NASA TN D-541, Oct. 1960. ASTIA AD 244 504.

ABSTRACT: The landing-impact characteristics of a 1/9-scale dynamic model of a winged space vehicle were investigated. The tests were made by catapulting a free model onto a hard-surface runway and onto water. The model had a conical fuselage and a flat-plate wing with a basic delta platform and 75° sweepback of the leading edge. The use of yielding metal shock absorbers and various landing-gear arrangements was investigated during landing impact. The basic landing gear consisted of a dual rubber-tired nose wheel and twin main skids aft of the center of gravity near the wing tips. Landing motion and acceleration data were obtained over a range of landing attitudes, gross weights, and initial sinking speeds. Brief tests were made with an alternate nose-wheel location. An all-skid configuration also was briefly evaluated for hard-surface and water landings. The landing gear employing yielding struts for impact-energy absorption during hard-surface landings resulted in accelerations of approximately 5½g near the nose gear over a range of landing parameters. Replacing the nose wheel and tire with a skid did not significantly change the accelerations. Landings in smooth water with rigid struts and adequate planing area at the nose skid resulted in a maximum landing acceleration of approximately 4g. (Author)

431

Blanchard, W. G. 1961 THE EFFECTS OF FORWARD ACCELERATION ON RESPIRATION. In Bergeret, P., ed., Bio-Assay Techniques for Human Centrifuges and Physiological Effects of Acceleration. (London, New York, Paris: Pergamon Press, 1961) AGARDograph 48. Pp. 96-100.

ABSTRACT: Respiratory embarrassment has previously been found to limit human tolerance to prolonged transverse acceleration. Various aspects of the respiratory abnormalities engendered by headward and traverse acceleration have been studied. Quantitative measurements have been made of the degree of respiratory impairment, and roentgenographic study made of the abnormal intrathoracic organ relationships. These experimental results and roentgenograms are reviewed, and their implications discussed.

432

Blasingama, B.P., et al., ed., Brown, K. and L.D. Ely 1962 SPACE LOGISTICS ENGINEERING. (New York, Wiley, 1962)

433

Bledsoe, Margaret D., Otto Bussemaker, and William E. Cummins 1961 SEAKEEPING TRIALS ON THREE DUTCH DESTROYERS. (David Taylor Model Basin, Washington D.C) Rept. no. 1559. ASTIA AD-269 311.

ABSTRACT: The results are presented of destroyer trials conducted under the joint sponsorship of the Royal Netherlands and United States Navies. Three destroyers of different types participated in the trials. The purpose was to obtain sufficient data for evaluating their relative seakeeping ability when operating parallel in the same seaway. Motions, stresses, accelerations, and slamming pressures were measured for a series of speeds and headings in 2 different sea conditions to obtain a representative picture of the behavior of the ships. While the sea was not recorded, photographs were taken and an attempt was made to reconstruct the sea state from hindcasts. With the exception of slamming, a statistical approach was used in the analysis of a parameter E which defines the behavior of the double amplitudes. In the slamming analysis, pressures and the increased vibratory stresses are noted and an attempt was made to derive the impact pressure theoretically for one slamming condition. All results are presented in the form of plots and for completeness many are also recorded in tabular form. (Author)

434

Blocker, T. G., Jr., V. Blocker, J. E. Graham and H. Jacobson 1959 FOLLOW-UP MEDICAL SURVEY OF THE TEXAS CITY DISASTER.
American J. Surgery 97:604-623, May 1959
NOTE: Reel 7, Flash 7, Item 13

ABSTRACT: The medical follow-up examinations of the Texas City disaster patients demonstrated the same general pattern as in the original survey conducted in 1947 except for an increase in multiple injuries of all kinds, the prominence of functional complaints which contributed greatly to the periods of disability and suggested both real and assumed psychic trauma residua, and the absence of presumptive evidence of internal blast injury. It was noted that minor injuries to soft tissue has healed well with a minimum of cosmetic disfigurement. The majority of eardrum perforations were associated with subjective hearing impairment, and even without gross evidence of deafness there were varying degrees of permanent nerve-type deafness, as determined by audiogram. In reviewing the fractures a large number of deformities were found, often in association with major injury to soft tissue and accounting for delay in recovery of the majority of patients who were disabled beyond an arbitrary three-month period. Patients with severe penetrating injuries to the eye did poorly, as might be expected; those with mild injuries to the eye, on the other hand, showed good recovery. (CARI)

435

Bloom, Aaron 1961 DEVELOPMENT OF SYNTHETIC HUMAN SKULLS FOR TESTING IN CRASH INJURY EXPERIMENTS
(Paper, Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Material Center, Philadelphia, Pa , June 14-15, 1961)

ABSTRACT: Concurrent with the development of a crash injury protection helmet, it appeared that it would be of considerable aid to the Engineering Department at Sierra Engineering Co. to have certain physiological information related to the effects of impact loading on the human skull.

A moderately concentrated literature search indicated there was little quantitative data which one might use as criteria for selecting materials of construction and energy absorption in helmet development.

Even though it is known that a considerable amount of work has been done by many able investigators using live skulls and human cadavers for impact studies as related to crash injury, it was felt that a synthetic skull would allow repetitive testing under controlled conditions which would afford quantitative statistical analysis of crash injury protective materials.
The subject of this paper is related to the development of material which can readily by conventional techniques, be molded into an intricate shape of the human skull and maintain the same physical characteristics of human bone. Further, this paper will show the results of the subject development.

436

Bloschies, H.H. 1960 LOW SPEED WIND TUNNEL TEST EJECTION OF .042 SIZE F8U-1 DYNAMIC MODELS OF THE NAVY INTEGRATED FLIGHT CAPSULE.
(Chance Vought Aircraft Inc., Dallas, Texas) Rept. No. EOR-12652, Wind Tunnel Rept. No. 84, 11-18 Jan. 1960. ASTIA AD 263 496L

ABSTRACT: The test objective was to pictorially demonstrate the capsule stability of a .042 size capsule at several speeds, angles of attack, and angles of yaw. These models all had the same configuration which was -9 fins with extended chord S_{te} + -10° and I + 57.5°

437

Boaz, C.W. 1961 A BASIC INVESTIGATION OF CONTROLLABLE THRUST DEVICES FOR ESCAPE FROM SPACE VEHICLES. (Frankford Arsenal, Philadelphia, Pa.) Rept. No. R-1547; (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 60-348, Jan. 1961. ASTIA AD 256-851.

ABSTRACT: The control of thrust form propellant actuated devices (PAD's) used for escape from space vehicles was investigated. Repetitive start-stop operations and control or thrust rate and direction were considered for gaseous, liquid, solid, and mechanical systems, with respect to the problems of operating in the environmental zone bounded by altitudes of 75,000 and 300,000 ft. Of the

various methods studied for controlling thrust rate, hydraulic or pneumatic systems are the least difficult; control in liquid propellant systems, which give a uniform, reliable, fixed-type performance, offer good possibilities for control through design of the solid propellant charges. So far as the operation of escape mechanisms is concerned, the problems introduced by environmental conditions between 75,000 and 300,000 ft were found to differ only slightly from the problems common at lower altitudes. Vacuum effects, ozone concentration, and temperature were the chief factors considered. (Author)

438

Bock, A. V., D. B. Dill, & H. T. Edwards 1930 ON THE RELATION OF CHANGES IN BLOOD VELOCITY AND VOLUME FLOW OF BLOOD TO CHANGE OF POSTURE. J. Clin. Invest. 8:533-544
NOTE: Reel 7, Flash 7, Item 60

SUMMARY: Estimations of the least circulation time as measured by reaction to histamine indicate a retardation of the velocity of blood flow in the standing position in man. The authors believe this fact supports previous experimental evidence showing a reduction of the total output of the heart when the subject stands still. (AUTHOR)

439

Bock, G. 1955 ORGANIZATION AND STATUS OF DEVELOPMENT OF AERONAUTICAL TECHNIQUE IN THE SOVIET UNION.
(Lecture given at Bonn, 1955)
(Royal Aircraft Establishment, Farnborough) R.A.E. Translation No. 557.

440

Bodner, S.R., & P.S. Symonds 1960 PLASTIC DEFORMATIONS IN IMPACT AND IMPULSIVE LOADING OF BEAMS. (Division of Applied Mathematics, Brown University, Providence, R.I.) ONR Contract 562-10 NR 064-406, TR No. 61, March 1960.

441

Bodó, G. 1961 APPROACH TO THE GENERATION CENTRE OF NYSTAGMUS ALTERNAS BY MEANS OF DRUG TESTS. Acta Otolaryngol, 53:328-332

ABSTRACT: Barbiturates and chlorpromazine stop nystagmus alternans temporarily. During the time of action of the barbiturate nystagmus can be elicited in the patient by caloric stimulation, whereas during the action of chlorpromazine there is no claoric reaction. From these observations the conclusion can be drawn that the generation centre of the nystagmus alternans is above the primary vestibular reflex arch.

442

Boeing Company 1962 DYNA-SOAR EJECTION SEAT AND SURVIVAL SYSTEM (Boeing Co., Seattle, Washington) Contract AF 33(657)-7132. ASTIA AD 282 004L

ABSTRACT: Military requirements, specifications, and design are given for the Dyna-Soar ejection seat and survival system.

443

Boes, A. 1957 BIBLIOGRAPHY OF RESEARCH REPORTS AND PUBLICATIONS ISSUED BY THE BIOACOUSTIC BRANCH (1947-1957) (Wright Air Development Center, Aero Medical Lab., Wright-Patterson AFB, Ohio)

444

Boies, L.R. 1957 OTOLOGICAL ASPECTS OF CRASH INJURIES JAMA 163(4): Jan. 26, 1957.

ABSTRACT: Impairments of hearing and disturbances of equilibrium can prevent normal performance of the automobile driver. Applicants for licensure who have an obvious hearing handicap or who give a history of vertigo should be examined by a physician in order to determine the extent of the disorder and to decide whether they are competent to drive.

445

Boland, J.D. and A.D. Grinstad 1951 COMPARISON OF SCOPOLAMINE HYDROBROMIDE AND DRAMAMINE IN THE TREATMENT AND PREVENTION OF AIRSICKNESS. J. Aviation Med., 22(2):137-145

ABSTRACT: Previous studies have shown the value of scopolamine hydrobromide in the prevention and treatment of airsickness, and of dramamine in the prevention of seasickness. This study was conducted to determine the effectiveness of dramamine in the case of airsickness, with scopolamine hydrobromide as a criterion group of fifty were given a standard dose of scopolamine and an experimental group of fifty were given identical appearing capsules containing a standard dose of dramamine. The two groups were taken in roughly random order as they reported to the flight surgeon for help, and no subject knew what medication was being used.

If a student eventually discontinued treatment and was able to continue flight training without further airsickness in the primary and basic phase of his training, he was classed as a successful case. Others were recorded as failures. Follow-up contacts were made to obtain an accurate record of success or failure in each case.

Such imbalance of known factors as chanced to occur between the two groups was found, if anything, to foreordain that the criterion group (on scopolamine) would respond the more readily, other things being equal. However, the subjects in the experimental group (on dramamine) responded with equal success.

446

Bonaretti, T. & A. Guida 1959 CONSIDERAZIONI SUL NISTAGMO OTTOCINETICO STUDIATE CON ACCORGIMENTI PARTICOLARI E L'IMPIEGO DI FARMACI (CONSIDERATIONS OF THE OPTOKINETIC NYSTAGMUS STUDIED WITH SPECIFIC STIMULI AND UNDER THE INFLUENCE OF DRUGS)
Archivio di Psicologia Neurologia e Psichiatria (Milano), 20 (2-3): 111-155, March-June 1959 (In Italian, with English summary)

ABSTRACT: The optokinetic nystagmus was investigated in order to determine the extent to which it may be influenced by variations in the level of attention or by pharmaceutical agents. Results indicate that the level of attention has a twofold influence on the nystagmus by exciting the nystagmogenous structures closely associated with vigilance mechanisms and by controlling the nystagmographic phases (slow phase lengthened, short phase inhibited). An evaluation of pharmaceutical compounds tested on basis of their effect on nystagmus was made. The depressants exhibited the strongest influence under the most passive experimental condition. Experimental conditions requiring active participation on the subject's part were more resistant to depressants. Comparison of the two stimuli showed that optokinetic nystagmus evoked by cylinder is less resistant to drug effect, due to lesser stimulative properties and a premature exhaustion of the powers of concentration.

447

Bonas, W. and M.J. Reilly 1955 THAT FIRST, LONG STEP--PROBLEMS OF AIR-CREW ESCAPE. Society of Automotive Engineers Preprint 430, Jan. 1955.

ABSTRACT: Escape by parachute, ejection seat and escape capsules. Influence on man of slipstream, wind blast, and centrifugal and deceleration forces.

448

Bond, A. C. and A. B. Kehlet 1960 REMARKS ON THE STATUS OF PROJECT MERCURY
(North Alantic Treaty Organisation, Advisory Group for Aeronautical Research and Development, Paris, France)
Rept. 290 October 1960 ASTIA AD 263 709

SUMMARY: A broad overall review of the initial program of the United States for manned orbital flight, Project Mercury, is presented in the light of

experience gained in the two years since its initiation. The basic Mercury guidelines and design concepts are discussed, along with the implementation undertaken for man's introduction to space flight. The space capsule and some of its primary systems are described in conjunction with the mission and its requirements. Status of the flight-test program and some aspects of current operational plans are also covered. The role of the astronaut and his contribution ot the achievement of the scientific objectives of Project Mercury are also discussed.

449

Bond, A.C. 1961 MERCURY SPACECRAFT SYSTEMS
In National Aeronautics and Space Administration, Proceedings of a Conference on Results of the First U.S. Manned Suborbital Space Flight, June 6, 1961. Pp. 11-18.

450

Bond, D.D. 1943 A STUDY OF THE EMOTIONAL FACTORS INVOLVED IN A GROUP OF THIRTY NAVIGATION CADETS IN THE PROCESS OF ELIMINATION FOR SEVERE AIRSICKNESS. (National Research Council, Washington, D.C.) C.A.M. Repts. No. 147 and 158, April 1943

451

Bond, D.D. 1943 PSYCHIATRIC ANALYSIS OF FORTY SUBJECTS MADE SICK BY A SWING. (USAF School of Aviation Medicine, Randolph AFB, Texas) Proj. No. 149(1), July 1943

452

Bondurant, S.D., N.P. Clarke, S.D. Leverett, & P. Yudkofsky 1957 PHYSIOLOGICAL RESPONSES TO "BACK-TO-CHEST" G-FORCES ON SEATED HUMAN SUBJECTS. (Second European Congress of Aviation Medicine, Stockholm, Sept. 1957)

453

Bondurant, S. 1958 EFFECT OF ACCELERATION ON PULMONARY COMPLIANCE
Fed. Proc. 17(1 pt. 1):18 March 1958.

ABSTRACT: Pulmonary compliance was found to decrease significantly in 5 subjects during acceleration on a human centrifuge for 30 seconds at 3 and

3.5 g in the foot-head direction, and at 4 and 5 g in the back-chest direction. The functional residual capacity of the lung increased in both cases but the increase was not great enough to account for the change in compliance.

454

Bondurant, S., W.G. Blanchard, N.P. Clarke, & F. Moore 1958 EFFECT OF WATER IMMERSION ON HUMAN TOLERANCE TO FORWARD AND BACKWARD ACCELERATION. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 58-290. ASTIA AD 155 808

ABSTRACT: Accepted physical principles suggest that immersion of subjects in water should constitute effective protection against some of the effects of acceleration. This premise has been evaluated in a study of the duration of tolerance of immersed subjects to forward accelerations of 6 through 14 g. Respiration was maintained by the use of skin diver's breathing equipment. With proper positioning, acceleration time tolerances were observed which were in excess of twice any previously reported. (Author)

455

Bondurant, S., W.G. Blanchard, N.P Clarke, & F. Moore 1958 EFFECT OF WATER IMMERSION ON HUMAN TOLERANCE TO FORWARD AND BACKWARD ACCELERATION. J. Aviation Med. 29(12):872-878
See also (Wright-Patterson AFB, Ohio) WADC TR 58-290, 1958.
ASTIA AD 155 808

ABSTRACT: To determine the magnitude of protection and technical problems associated with acceleration of subjects immersed in water, subjects were studied under the following conditions: 1) five subjects erect position, 25 accelerations in the forward position; 2) same as 1) but accelerations were in a backward position; and 3) six subjects, spine tilted forward at a 35 degree angle. The results are discussed in terms of magnitude and duration of tolerance, limitations such as chest pain, dyspnea, and blackout, the effectiveness of various breathing masks, e.g., full face, and semi-face (eyes uncovered), and respiratory rate.

456

Bondurant, S., N.P. Clarke, W.G. Blanchard, H. Miller, R.R. Hessberg, Jr., & E.P. Hiatt 1958 HUMAN TOLERANCE TO SOME OF THE ACCELERATIONS ANTICIPATED IN SPACE FLIGHT. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 58-156, ASTIA AD 151 172
See also U.S. Armed Forces Med. J. 9:1093-1105. Aug. 1958.

ABSTRACT: Selected studies of human tolerance to the linear accelerations which are anticipated in space flight have been reviewed. As defined in these studies tolerance limit is determined by the loss of a critical faculty, i.e., ability to see, think, or exercise at least finger control. Tolerance times at g levels between 2 and 12 in various body positions are presented. The capacity of subjects to stand repeated peaks of acceleration similar to those encountered in multistage rocket vehicles has been explored. Tolerance times longer than any previously reported are obtained by immersion of the subject in water in the semi-supine position.

457

Bondurant, S. & W.A. Finney 1958 THE SPATIAL VECTORCARDIOGRAM DURING ACCELERATION. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 58-263 June 1958.
See also J. Aviation Med. 29L10):758-762 1958.

ABSTRACT: Spatial vectorcardiograms and standard electrocardiograms have been recorded during severla patterns of positive, negative and transverse acceleration. Positive acceleration resulted in tachycardia, occasional auricular and ventricular extrasystoles inconsistent and variable increases in the QRS-T angle and open QRS loops. There were no consistent changes in the initial portions of the QRS loops nor in the orientation of these loops. Positive acceleration can be tolerated for considerably longer periods without evidence of cardiac disability than previously recognized. Transverse accelerations in back to chest or chest to back direction result in vectorcardiographic changes in similar to but less marked than those of positive acceleration. Seated back to chest G of large magnitude is associated with tachycardia which may exceed 180-190. Negative accelerations result in brachycardia and occasional sinus pauses but essentially no changes in the spatial vectorcardiogram were recorded

458

Bondurant, S., & W.A. Finney 1958 THE SPATIAL VECTORCARDIOGRAM DURING ACCELERATION. J. Aviation Med. 29(10):758-762, June 1958.
See also Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TR 58-263. ASTIA AD 155 653

ABSTRACT: Spatial vectorcardiograms and standard electrocardiograms have been recorded during several patterns of positive, negative and transverse acceleration. Positive acceleration resulted in tachycardia, occasional

auricular and ventricular extrasystoles, inconsistent and variable increases in the QRS-T angle and open QRS loops. There were no consistent changes in the initial portions of the QRS loops nor in the orientation of these loops. Positive acceleration can be tolerated for considerably longer periods without evidence of cardiac disability than previously recognized. Transverse accelerations in back to chest or chest to back direction result in vectorcardiographic changes similar to but less marked than those of positive acceleration. Seated back to chest G of large magnitude is associated with tachycardia which may exceed 180-190. Negative accelerations, result in brachycardia and occasional sinus pauses, but essentially no changes in the spatial vectorcardiogram were recorded.

459

Bondurant, S. 1961 TRANSVERSE G. PROLONGED FORWARD, BACKWARD, AND LATERAL ACCELERATION. In Gauer, O.H. & G.D. Zuidema, eds., Gravitational Stress in Aerospace Medicine (Boston: Little, Brown, and Co., 1961) Pp. 150-159

460

Bondurant, S. 1961 STRAINING MANEUVERS WHICH INCREASE TOLERANCE TO HEADWARD ACCELERATION. In Gauer, O.H. & G.D. Zuidema, Gravitational Stress in Aerospace Medicine (Boston: Little, Brown, and Co., 1961) Pp. 221-223

461

Bonner, R. H. 1957 THE EFFECTS OF STRESS ON UROPEPSIN EXCRETION. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TN 57-427. ASTIA AD-142 256

ABSTRACT: The effect was investigated of various forms of stress, as encountered in certain AF operational situations, on uropepsin excretion in urine. Twenty-three subjects were tested under conditions of prolonged positive G, crew confinement, exposure to high temperature-high altitude, and visual and auditory deprivation. Volumes, specific gravities, and collection times were recorded for the urine samples taken from the crew. The assay method of M. L. Anson (J. Gen. Physiol. 22:79, 1938) was used with some modification. The order of adding reagents was shown to be significant in developing color to reflect the degree of uropepsin excretion. An attempt was made to determine which proteolytic enzyme was being measured. The greatest activity was observed at pH 1.5 which is optimum for pepsin, indicating that pepsin was the enzyme being measured. The results showed that uropepsin excretion increased before the application of specific simulated flight stresses and decreased during the application of specific simulated flight stress. Deprivation of visual and auditory stimuli did not produce any significant change in uropepsin excretion from pretest levels.

462

Borgard, W. 1935 UBER DAS VERHALTEN DES KREISLAUFS BEI PLOTZLICHER RUCKKEHR VOM UNTERDRUCK ZUM NORMALDRUCK. BEITRAG ZUR PATHOPHYSIOLOGIE DES STURZFLUGES (Concerning the Behavior of the Blood Circulation During Sudden Return from Sub-Atmospheric Pressure to Normal Pressure. Contribution to the Pathophysiology of the Diving Flight) Klinische Wochenschrift (Berlin) 14: 198-200.

463

Borges, H. F. 1963 ANALYSIS OF ADVANCED TRACK PERFORMANCE CHARACTERISTICS (Office of Research Analyses, Science & Engineering Div., Holloman AFB, N.Mex.) Rept. No. ORA-63-1; NASA N63-13417

ABSTRACT: Velocity and acceleration profiles of rocket sleds on an advanced track were determined, based on existing and advanced rocket-engine, and sled designs. Sled families with a unit thrust of 100,000 pounds, using propellants of different specific impulse, were postulated. Rocket assembly weight and payload weight were expressed in terms of thrust, and tank and structural weight in terms of propellant weight. The upper limit for rocket sleds using liquid oxygen and liquid hydrogen as propellants is about 5400 feet per second in ambient air density at one percent payload-to-thrust ratio. This speed will increase to about 8000 feet per second if the track is enclosed in an evacuated tube at about one-third of the ambient air density. To attain this performance, a track about 40 statute miles long is required. (AUTHOR)

464

Boring, R. O. 1952 THE EFFECTS OF VISUAL STIMULUS VARIABLES UPON THE PERCEPTION OF THE VISUAL VERTICAL. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 110 500.28., 13 August 1952. ASTIA ATI 170974

ABSTRACT: Gibson has suggested that when the main lines of the visual field are parallel to the direction of the gravitational force, even though the head or body be tilted, there will be a consistency between visual and proprioceptive cues which yields an invariant resultant. When, however, the visual field is tilted relative to gravitational vertical, judgments of the latter will be less precise and more variable. Experimental results reported herein do not support this hypothesis. It is suggested that the visual frameworks used in this experiment were not sufficient to test the hypothesis.

465

Bornschein, H. 1962 THEORIE UND PRAKTISCHE BEDEUTUNG DES VESTIBULAREN CORIOLIS-EFFEKTES (THEORY AND PRACTICAL SIGNIFICANCE OF THE VESTIBULAR CORIOLIS EFFECT) Monatsschrift fur Ohrenheilkunde und Laryngo-Rhinologie (Wien and Innsbruck) 96(2):45-49, Feb. 1962

ABSTRACT: The vestibular Coriolis effect caused by certain head movements during constant whole-body rotation manifests itself through sensation of subjective rotation, nystagmus, and nausea. The mechanics of the semicircular canals and the resulting misperception are analyzed on the basis of the Mach-Breuer flow theory. The influence of different stimulus factors on the vestibular Coriolis effect is discussed in detail. Attention is called to the fact that the effect is not weakened by slower head movements as long as the duration of the movement is not more than 6 seconds. The direction of the effect is a function of the direction and extent of the head movement and not of the initial head position. The vestibular Coriolis effect is of importance in aviation medicine, clinical vestioular tests, and particularly space medicine in view of the proposed rotation of space ships and space stations. A long-term sojourn in a slowly rotating room results in progressive weakening of the effect. After-reactions indicate that it is not due to fatigue or adaptation directly, but is based on compensation within the central nervous system. (AUTHOR'S SUMMARY, MODIFIED) (Aerospace Medicine 34(3):274, March 1963)

466

Bornschein, H. & G. Schubert 1962 DIE RICHTUNG DES VESTIBULAREN CORIOLIS-EFFEKTES (The Direction of the Vestibular Coriolis Effect) Zeitschrift für Biologie (Munich) 113(2): 145-160. March 1962.

ABSTRACT: Coriolis nystagmus was produced by head movements during rotation. Its direction was measured in man and guinea pig by recording the vector of the electronystagmogram. For comparison theoretical values of these vectors were calculated and demonstrated in a physical model of the semicircular canal system. The values obtained for man were in full agreement with the theoretical model, while those for the guinea pig deviated systemetically. Several explanations are offered.

467

Bornstein, [illegible] 1946 PRESENCE AND ACTION OF ACETYLCHOLINE IN EXPERIMENTAL [illegible] J. Neurophysiology 9:349-366

SUMMARY AND CONCLUSIONS: 1) As a result of experimental trauma to the head, ACh is consistently present in the CSF in estimable quantities, 2.7 to 9.0 gamma per cent within a few hrs. of injury. The abnormal amounts of ACh may be detected for

as long as 48 hrs. following trauma, after which time the concentration falls below the sensitivity of the test object. The abnormal presence of ACh is presumed to be due to an excess production or release of the substance, an insufficient destruction, and consequent persistence within the intercellular spaces. It has been suggested that such persistent ACh be termed "free ACh." 2) The EEG of a number of cats and dogs have been studied for varying periods of time following trauma. Confirmation for both the previously described intense neuronal discharge and the transient flattening of all recorded electrical activity has been obtained. Following these effects, there occurs a prolonged period of abnormality in one or both hemispheres. The abnormalities are essentially paroxysmal, high amplitude sharp waves with frequencies varying from 6-7 per sec. to 16-20 per sec. 3) Changes in behaviour include tonic-clonic seizures, apnoea, and loss of ocular and corneal reflexes followed by partial or complete loss of hopping and placing reactions, sense of equilibrium, orientation, and a stuporous condition for varying periods of time of from hrs. to days. 4) The EEG patterns and the stuporous condition may be abolished by appropriate doses of atropine sulphate. 5) ACh perfused over an exposed area of cortex produces high amplitude sharp waves in small physiological concentrations, 1 gamma per cent or less, and a flattening of recorded cortical potentials in high physiological concentrations, 2 gamma per cent or more (depending upon the depth of general anaesthesia). 6) The intracisternal injection of ACh in amounts ranging from 0.02 to 10.0 gamma produces similar behavioural and EEG changes as previously noted, i.e., transient flattening with high concentrations and paroxysmal, high amplitude sharp waves of varying frequencies with low concentrations. 7) The EEG and behavioural effects of intracisternal ACh may also be abolished with appropriate doses of atropine sulphate. 8) It is suggested that "free ACh" may be one of the physiological factors underlying the acute paralytic and excitatory phenomena of cerebral concussion and more severe craniocerebral injuries. (AUTHOR)

468

Borries, G.V.T. 1921 EXPERIMENTAL STUDIES ON THE ROTATORY AND THE CALORIC TEST IN PIGEONS. Acta Oto-laryngol. 2(4):398-421

ABSTRACT: Reviews some of the literature on the rotatory and the caloric tests in pigeons. Argues that the use of a head cap for the pigeon is absolutely essential. Continues with a detailed discussion of experiments on the rotatory and caloric tests.

469

Borst, W. 1935 WERT UND BEDEUNTUNG VON KREISLAUFBELASTUNGPROBEN BEI FLIEGERUNTERSUCHUNGEN. (Significance of Circulation tests in examination of Aviation applicants.) Verh. deutsche. Ges. inn. Med., 58-61

ABSTRACT: The author recommends Buerger's test for determining the condition of the heart and circulation with simultaneous electrocardiography. Marked acceleration increases the intra-pulmonary pressure, leading to deficient blood

supply to the heart, the venous afflux to the right heart being diminished. Serial valsalva electro-cardiograms showed that physiologic changes in the electrocardiogram betrayed subjects who would react with functional strain to the pressure test. Of special significance were cases showing marked pathologic changes in the electrocardiogram, especially those showing a more or less marked change in the site of impulse orgin. In cases in which neither clinical nor roentgenologic examination nor simple electrocardiography revealed any pathologic change, slight exertion under pressure would cause severe circulatory disturbance. Such subjects should not be admitted as aviators, especially not for altitude flying. Another circulatory test is the righting reaction, which permits of certain conclusions as to the mechanism of circulatory regulation during sudden changes in position. ABSTRACT: Journal of Aviation Medicine, 7(2):103, Ju 1936

470

Bosee, R. A. n.d.* PERSONAL COMMUNICATION TO C. F. GELL: EJECTION ACCELERATION OF A LIVE SUBJECT (20-G Peak, 258 G'sec on-set rate)

471

Bosee, R.A. & W.C. Buhler 1955 ESCAPE FROM VERTICAL TAKE-OFF AIRCRAFT J. Aviation Med., 26(4):319-322

ABSTRACT: The U.S. Navy Bureau of Aeronautics has exploited a radically new concept in fighter type aircraft. Standing on their tails like rockets, the turbo-prop powered Lockheed XFV-1 and Convair XFY-1 take off vertically.

In an effort to reduce pilot confusion during emergency ejection, the escape procedure for vertical take-off (VTO) aircraft has been simplified. A completely automatic escape sequence has been devised, tested and installed in both the Lockheed XFV-1 and Convair XFY-1 aircraft. The system is outlined and described in this article.

472

Bosee, R. A., & C. T. Koochembere 1961 NAVAL AIRCRAFT ESCAPE SYSTEMS---PAST, PRESENT AND FUTURE. (Paper, 32nd Annual Meeting of the Aerospace Medical Assoc., Palmer House, Chicago, Illinois, April 24-27, 1961)

ABSTRACT: Escape systems as defined in this paper encompass the ejection seat concept as applied to naval operational and training type jet aircraft. It is also applicable to those escape systems that have been considered for vertical takeoff and landing (VTOL) types. The evolution of seat and seat catapult design as well as performance capabilities are described as they relate to post World War II naval aircraft. The need for increased ejection trajectory height to assure ground level escape is documented. Test and development relative to some

early escape capsule designs as well as a description of some energy attenuation systems are presented. The transition from sixty feet per second to eighty feet per second ejections in conventional seat catapult is explained. The effect of acceleration as applied to seat occupant and equipment is described. The design and function of rocket-type ejection seat systems for more advanced type manned military aircraft and tests to assure performance, reliability and personnel compatibility are also set forth. Finally, an experimental integrated flight capsule concept is described in which a shaped charge is used to cut the capsule away from the remainder of the aircraft. (Aerospace Med. 32(3):223, Mar. 1951)

473

Bosee, R. A. and C. F. Payne 1961 THEORY ON THE MECHANISM OF VERTEBRAL INJURIES SUSTAINED ON EJECTIONS FROM AIRCRAFT.
(Paper, Aerospace Med. Panel of AGARD, NATO, April 10-14, 1961)

474

Bostrom Research Lab. 1959 THE EFFECT OF LOW FREQUENCY, HIGH AMPLITUDE WHOLE BODY VERTICAL VIBRATION ON HUMAN PERFORMANCE.
(Bostrom Research Lab., Milwaukee, Wisc.) Progress Report No. 2A 31 Jan. 1958-1959.

475

Douhuys, A., & H. J. van Lennep 1962 EFFECT OF BODY POSTURE ON GAS DISTRIBUTION IN THE LUNGS. J. Applied Physiol. 17(1):38-42, Jan. 1962

ABSTRACT: Postural changes of functional residual capacity (FRC) and pulmonary nitrogen clearance efficiency were studied in six male subjects placed supine on a tilting table, in head-up, horizontal, and head-down positions. FRC varied linearly with the angle of tilt. The lung clearance index (LCI) increased significantly in the supine and head-down positions, compared to the head-up positions, which indicates less uniform gas distribution in the former postures. This was confirmed by analysis of semilogarithmic graphs of nitrogen washout. Inhalation of epinephrine did not affect the postural changes of FRC and LCI, but caused a small increase of LCI irrespective of posture. The increased uneven distribution in head-down and supine positions is probably a consequence of the lung volume decrease in these postures, and may be explained by mechanical factors such as surface tension, which tend to close lung units when the lungs are deflated. Bronchomotor tone has no appreciable influence on these postural changes in normal subjects. (AUTHOR)

476

Bourne, G. H., ed. 1963 MEDICAL AND BIOLOGICAL PROBLEMS OF SPACE FLIGHT (New York, London: Academic Press, 1963)

CONTENTS:

Kuettner, J. P., & F. I. Ordway, III, The Development of Manned Space Vehicles,
Smith, T. D., E. B. Konecci, & M. W. Hunter, Advanced Manned Space Systems,
Ibison, R. A., Marsflight II Space Cabin Simulator,
Levine, R. B., A Device for Simulating Weightlessness,
Graveline, D. E., Maintenance of Cardiovascular Adaptability during Prolonged Weightlessness,
Generales, C. D. J., Jr., Weightlessness: Its Physical, Biological, and Medical Aspects,
Ibison, R. A., E. N. Dingley, Jr., & T. Tanner, Remote Visual Monitoring during Extended Space Missions,
More, K., O. L. Tiffany, & K. Wainio, Cosmic Ray Shower Production in Manned Space Vehicles,
Wallman, H., & S. M. Barnett, Evaluation of Water Recovery Systems for Space Vehicles,
Adams, C. C., Nutritional Aspects of Space Flight,

477

Bowen, I. G., R. W. Albright, E. R. Fletcher, & C. S. White 1961 A MODEL DESIGNED TO PREDICT THE MOTION OF OBJECTS TRANSLATED BY CLASSICAL BLAST WAVES. (Civil Effects Test Operations, U. S. Atomic Energy Commission) Report CEX-58.9., June 29, 1961

ABSTRACT: A theoretical model was developed for the purpose of predicting the motion of objects translated by winds associated with "classical" blast waves produced by explosions. Among the factors omitted from the model for the sake of simplicity were gravity and the friction that may occur between the displaced object and the surface upon which it initially rested. Numerical solutions were obtained (up to the time when maximum missile velocity occurs) in terms of dimensionless quantities to facilitate application to specific blast situations. The results were computed within arbitrarily chosen limits for blast waves with shock strengths from 0.068 to 1.7 atm (1 to 25 psi at sea level) for displaced objects with aerodynamic characteristics ranging from those of a human being to those of 10-mg stones and for weapon yields at least as small as 1 kt or as large as 20 Mt. (AUTHOR)

478

Bowring, J. I. R. and B. P. Ebert 1961 A HYPOTHETICAL MISSION TO SPACE IN A THREE-MAN SEALED CABIN
Planet. Space Sci., 7:309-323. July 1961

479

Boyce, W.C. 1961 A DEVELOPMENTAL 60 "G" PERSONNEL RESTRAINT SYSTEM
(Paper: Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Material Center, Philadelphia, Pa. June 14-15, 1961)

ABSTRACT: This paper described a 60 "g" personnel restraint system currently under development for the Air Force for high g impact tests with live test subjects. The primary objective of these tests is to demonstrate that human tolerance to abrupt deceleration can be increased to 60 g's in all transverse directions. These tests will provide data, heretofore lacking, which may permit more efficient design of advanced, manned space vehicles of the future. These data may enable future space vehicles to land at higher rates of impact than are currently deemed possible, with resultant savings in overall weight and volume.
Design criteria for this restraint system have been derived from examination of representative advanced manned systems in order to determine in which regimes the significant accelerations may occur, the probable magnitude and duration, and the degree of predictability. This restraint system was evolved after analysis of the inertial loadings on the human body, conducted to determine unit pressures on the surface of the body exerted by a hypothetical restraint system. A summary of these studies is shown.
Physiological studies to determine areas and degrees of vulnerability also contributed to the requirements of this system. Unique design requirements that have arisen from the anatomical and engineering studies are described. The effects of fit, body sizing, and comfort upon the degree of protection obtained are examined. Problems of body positioning and geometry and their effect on vehicle cockpit geometry are discussed.
Arising from the analytical and design studies is an integrated support-restraint concept employing a segmented, rigid body shell. This system will soon be tested with human subjects in an effort to extend man's tolerance to abrupt deceleration well beyond the currently established limits. The system is described in detail, and the reasons for the choice of a rigid, molded torso shell are discussed, as well as some of the problems inherent therein.

480

Boyce, W.C. & H.E. Freeman 1961 CONSIDERATIONS AFFECTING THE DESIGN OF A 60 G PERSONNEL RESTRAINT SYSTEM
Paper: ARS Space Flight Report to the Nation, New York, Oct. 9-15, 1961
American Rocket Society Preprint No. 2105-61
ARS Journal 32(6): 939-942, June 1962

ABSTRACT: The design requirements for a personnel restraint system to protect a crewman against omnidirectional abrupt deceleration forces are examined and a system to meet these requirements is described. Personnel restraint is examined and a system to meet these requirements is described. Personnel restraint is examined from the standpoint of body segment weight and unit surface pressures. Seating geometry and its effect on cockpit envelope is discussed. Several restraint concepts examined during this program are shown, while the system

selected for development and live, manned testing is described in detail. A newly developed, self-contouring comfort padding with improved rebound characteristics is described. Since test results are not yet available, predictions of system performance are made. (Author)

481

Brady, J.S. 1961 THE DILEMMA OF MAN IN SPACE
Planetary and Space Science 7:301-308, July 1961

ABSTRACT: This paper pursues the idea that techniques exist within the state of the art capable of meeting the stringent requirements of manned space systems. (JPL)

482

Bramati, C. 1953 "SULLE ACCELERAZIONI DELL'ORGANISMO UMANO DURANTE ALCUNI MOVIMENTI VOLONTARI E PARTICOLARMENTF SUI LORO RAPPORTI CON L'ETA DEI SOGGETTI."(ON THE ACCELERATIONS OF THE HUMAN ORGANISM DURING SOME VOLUNTARY MOVEMENTS, PARTICULARLY ON THEIR RELATIONSHIP TO THE AGE OF THE SUBJECTS) Rivista di medicina aeronautica(Roma), 16 (1): 41-50 1953 (In Italian, with English, French, Spanish and German summaries)

Summary: Accelerograms and kymograms were recorded simultaneously in subjects (ranging in age from 19 to 47 years) while performing body-bending exercises. The accelerogram (acceleration in g, plotted against time in 1/10 second) revealed a distinct diphasic pattern corresponding to agonistic and antagonistic muscular activities. With progressing age of the test subjects a distinct decrease of the dimensions of these phases was observed.

483

Brand, E. D., S. W. Britton, & C. R. French 1951 GRAVITATIONAL SHOCK IN DIFFERENT ANIMAL SPECIES AND VARIOUS FACTORS AFFECTING RESISTANCE. Amer. J. Physiology 165:539-547, April-June 1951

ABSTRACT: Responses of many different animal types--snakes, opossums, rats, guinea pigs, rabbits, cats, dogs and monkeys--exposed in the head-up position have been studied on the tilt-table. Survival times to general collapse varied from a few mins. to many hrs. Of all animals, monkeys appeared least affected by gravity and showed the best general condition during exposure; rats, cats, and dogs also survived over long periods. Snakes and rabbits were least resistant. Greater tolerance was shown by rabbits after several exposures.

In all animals tested periods of activity alternated with torpidity in which reflexes were depressed or lost. The conscious state was apparently greatly reduced or suppressed between bouts of activity. In monkeys and dogs large swings in venous and arterial pressure were related to body movements, the rises in carotid pressure being especially marked.
It was noted that heart rate reflected postural changes even in the snake, increasing in the head-up and decreasing in the head-down position similarly as in more highly differentiated forms.
Noteworthy in mammals were a) a sharp rise in venous blood pressure together with b) a fall in venous flow in the lower part of the body immediately on tilting; concomitantly, c) arterial pressure in the head end was significantly and usually progressively reduced.
Under the stress of gravity through the length of the body, life itself may be ultimately preserved by certain compensatory vasoconstrictor reactions; notwithstanding this, there occurs a markedly reduced circulation even in the important areas of the trunk and certain basal levels, e.g. respiratory center, of the brain. Consciousness does not thus appear to be a rigidly safeguarded function of the animal's existence.
Alterations in E.E.G. patterns and loss of waves in later stages of exposure were in keeping with other expressions indicative of suppression of cerebral function.
Animals which survived several hrs. in the head-up position showed increases in blood sugar at first, followed by hypoglycemia in 3 to 5 hrs.
Rhythmic tilting to the head-up position was withstood for long periods even by gravity-sensitive rabbits, and arterial pressure in dogs was not significantly affected by this maneuver.
A pneumatic cuff around the pelvis inflated to 150 mm. Hg greatly increased survival time (rabbits) and maintained carotid arterial pressure (monkeys) in the upright position. Adrenaline and CO_2 were slightly helpful.
Functional inadequacies shown by lower animal forms in the head-up position are discussed; the most serious handicap appears to be loss of consciousness early in exposure because of cerebral anoxia. The significance of orthograde posture and progression achieved by man is emphasized, and the postulate that brain development may be involved is put forward. (AUTHOR)

484

Brandaleone, H. 1957 MEDICAL ASPECTS OF MOTOR-VEHICLE ACCIDENT PREVENTION IN INDUSTRY. JAMA 163(4): Jan. 26, 1957.

ABSTRACT: The significance of the human factor in automobile accidents is illustrated by the reduction in the annual rate of accidents (from 6,377 in 1946 to 3,130 in 1955) achieved by a metropolitan transit system by developing its medical program for drivers and introducing psychological tests. The data show that the cost of maintaining a medical department for a year is less than the cost of one bad accident. The division of motor vehicle drivers into categories makes it possible to set up fair standards for each. The details of the examination and the frequency of reexaminations depend on the applicant's age, the history of past and more recent illnesses, and the category for which he wishes to qualify. A reference list of hazardous conditions in drivers of motor-vehicles has been prepared on the basis of experience and is available for the guidance of physicians, industry, safety organizations, and licensing agencies. The comprehensive medical program enlists the cooperation of the family physician, and handicapped employees are grateful for safer jobs.

485

Brandt, U. 1961 INFLUENCE OF TRAINING ON THE MAINTENANCE OF EQUILIBRIUM. COMPARATIVE STUDY BETWEEN PILOTS AND INEXPERIENCED SUBJECTS. Rev. Med. Aero. (Paris) 2:22-24, Dec. 1961.

486

Brandt, U. 1961 VESTIBULAR REACTIONS DURING PREORBITAL FLIGHT. Acta oto-laryngplogica (Stockholm) 53(1):80-87, Feb. 1961

ABSTRACT: Accelerative forces affecting the astronaut placed in the nose cone of a rocket are considered. The vestibular sensations were studied experimentally in a human centrifuge in a number of dynamic conditions aimed at changing the resultant between linear and radial acceleration and gravity force. By applying Graybiel's "law of the otoliths," it seems permissible to draw some conclusions as to the probable vestibular experiences of the astronaut, at least during the "gravitational"part of the flight. However there is still insufficient knowledge in regard to the period of weightlessness. The nature of the vestibular sensations coupled with lack of external visual references will agravate the difficulties associated with active participation of the astronaut in correcting the flight path. (Author)

487

Brandt, V. 1962 THE CAUSE AND PRACTICAL IMPORTANCE OF OCULOGRAVIC ILLUSIONS. Acta Oto-Laryngol. 54(2):127-135.

ABSTRACT: The oculogravic illusion can be interpreted as a specific otolith response to a stimulus consisting of linear acceleration. It has been suggested as a conclusive proof that the phenomenon does not occur in deaf subjects with laybrinthine areflexia. Two fresh cases of acquired labyrinthine areflexia have been examined in the human centrifuge, the illusion being measured by a special technique. Although abnormal illusion curves much unlike those recorded in the congenitally deaft may be obtained at the end of the "destruction stage", complete compensation with illusion curves resembling those of healthy individuals developed in a comparatively short time. The logical conclusion would be that oculogravic illusion cannot be accepted straight off as a selective measure for otolith sensitivity. In connexion with a discussion of analogies, comparing oculogravic and oculogyral illusion, the author suggests that the "lag effect" (i.e., the time necessary for reorientation on rapid changes of the angle of incidence of the resultant vector) may offer a more adequate expression for static sensibility. The recent advances in the methods of observing these labyrinthine illusions should add to our somewhat unverified knowledge of vestibular physiology and pathology.

488

Brandt, U. 1962 REORIENTATION AND VESTIBULAR FUNCTION
Acta Oto-Laryngologica (Stockholm) 54:543-552
NOTE: Reel 7, Flash 7, Item 18

ABSTRACT: Determinations of oculogravic illusion at increasing rotation speeds of the centrifuge, in accordance with a technique previously described. Results of the two test groups are almost identical, in seeming contradiction to what has been shown of the habituation tendencies of the vestibular apparatus. Author suggests a psycho-physiological explanation to account for this. Among the conclusions oculogravic illusion in the normal human is suggested to indicate the effect of linear acceleration on the inner ear provided this stimulus remains within reasonable limits. For stronger linear stimuli the phenomenon is believed to be an expression of a combined otolith-proprio-exteroceptive excitation. (AUTHOR)

489

Brannan, P. 1960 DRML SCIENTISTS PROBE MAN'S SPACE LIMITATIONS.
Canadian Aviation 33(3):8-11, March 1960

ABSTRACT: The work of the Defence Research Medical Laboratories at Downsview, Ontario, Canada, towards the solution of the problems of weightlessness and motion sickness in space travel is discussed. Muscular deterioration, circulatory changes, and problems of movement, as results of the weightless conditions, are briefly considered. Experiments on motion sickness resulting from the utilization of angular acceleration to counteract weightlessness are also described.

490

Braun, F. 1958 INTRODUCING THE ROCKING AIRCRAFT PASSENGER SEAT.
Sabena, Direction Technique, Division Etudes, Brussels, Belgium)
Rapport No. XA-002, 2 May 1958.

491

Braunstein, P.W. 1957 MEDICAL ASPECTS OF AUTOMOTIVE CRASH INJURY RESEARCH.
J.A.M.A. 163(4):249-255, 26 Jan. 1957.

ABSTRACT: To determine the medical findings that might be expected in the one million persons injured by automobile accidents each year, 1,000 injury-producing accidents were carefully studied. Of the 2,253 occupants involved in the thousand accidents, 1,678 (74.5%) were injured to some degree. Of those persons receiving an injury, only half could be diagnosed as of a minor degree.

When considering body distribution, injuries to the head alone were the most frequent, followed by injuries with a combination of head and lower extremity involvement. Almost two-thirds of the injuries involved more than one body area, emphasizing the need for an extremely careful physical examination so as not to overlook concealed wounds. The practicing physician can profit greatly by knowing the representative picture resulting from automobile accidents.

492

Braunstein, P. W., & J. O. Moore 1959 THE FALLACY OF THE TERM "WHIPLASH INJURY". The American J. of Surgery 97(4):522-529, April 1959

SUMMARY: From 5,710 accidents in which injury occurred, 144 cases of cervical injury were recorded in which a whiplash phenomenon was experienced at the time of accident impact. Accident patterns and severity of injury are discussed. CONCLUSION: On the basis of evidence available in this study, serious cervical injuries caused by exposure to the whiplash phenomenon may be sustained; the majority are accompanied by moderate to serious injuries in other body areas. If an alleged cervical injury is not associated with injury to another body area and is not accompanied by clear-cut clinical findings or roentgenographic findings, on the basis of these data the injury must be considered minimal or nonexistent.
The term whiplash injury is not a diagnosis.
(AUTHOR)

493

Braunstein, M.L. & W.J. White 1961 THE EFFECTS OF ACCELERATION ON VISUAL BRIGHTNESS DISCRIMINATION. (Cornell Aeronautical Lab., Inc., Buffalo, N.Y.) Rept. No. OM-1570-G-1, December 1961. ASTIA AD 269 380.

ABSTRACT: Brightness discrimination thresholds were determined at five levels of transverse acceleration and four levels of positive acceleration. Four background luminance levels, ranging from 31 to .03 foot lamberts, were studied. Constrast required to detect an increment in illumination increased with acceleration. This increase was present for both directions of acceleration, and for the dimmest background. A preliminary study was conducted on the effects of breathing 100% oxygen and 100% oxygen under pressure, on brightness discrimination under acceleration. (Author)

494

Braunstein, M. L. and W. J. White 1962 EFFECTS OF ACCELERATION ON BRIGHTNESS DISCRIMINATION.
In J. Opt. Soc. Amer. 52:931-933, Aug. 1962.

495

Bray, J.L. 1957 INTERNAL BALLISTIC DESIGN AND TRAJECTORY ANALYSIS OF A ROCKET-ASSISTED PILOT EJECTION SEAT. (Naval Ordnance Test Station, China Lake, Calif.) NOTS 1701, NAVORD Rept. No. 5433, ASTIA AD 150 906

ABSTRACT: The problem of safe escape of a pilot from a disabled plane is discussed in general, and a rocket-assisted ejection seat is considered as a solution. Two tentative internal ballistic designs are presented. Equations are developed for the motion of an ejection seat after it leaves the plane. Graphs are included showing thrust-time curves, seat trajectories, forces on the pilot, aerodynamic drag, and physiological acceleration limits. (Author)

496

Brehm, H. E. 1961 COMPACT FEEDING CONSOLE, DESIGN, FABRICATION, AND EVALUATION (Aeronautical Systems Division, Air Force Systems Command, Andrews AFB, Washington, D.C.) AFSC Project 6373, TASK 63121; Contract AF 33(616)7503, ASD-TR 61-569, Oct. 1961, ASTIA AD 271475.

ABSTRACT: The purpose of this research project was to design, fabricate, and evaluate a Compact Feeding Console which will meet the sustenance requirements of three men for an extreme altitude mission of 14 days duration. A comprehensive study of the human and environmental conditions revealed that the astronauts would need equipment, devices, and facilities for storage, preparation--cooling or heating-- of canned, frozen, dehydrated, and ready foods; a water storage, heating and cooling system; and feeding tools. The equipment and systems were tested to evaluate expected performance under operating conditions from normal gravity and 1 atmosphere pressure to zero gravity and 1/2 atmosphere pressure, and acceleration forces from 2 to 8 g's, to insure both independent operation of the component sections and integrated operation of the total Console in compliance with pre-determined optimal performance standards.

497

Brent, H.P., T.J. Powell, & J.W. Scott 1957 THE EFFECT OF POSITIVE ACCELERATION WITH HYPERVENTILATION ON THE EEG. (RCAF Institute of Aviation Medicine, Toronto, Canada)

ABSTRACT: Jet fliers in the Royal Canadian Airforce who had shown unexplained periods of brief unconsciousness in flight were examined medically, and observed while subjected to stresses similar to flight stresses; also the circumstances in which the unconscious episode occurred were investigated. Routine electroencephalograms were recorded at rest, during hyperventilation, during positive acceleration and during a combination of hyperventilation and positive accelration. The studies were made in both the fasting and the postprandial states. EEG was found to be more stable in the postprandial state. In some who showed no slow activity with hyperventilation alone, combination of hyperventilation and positive accelration induced slow waves.

In others who exhibited slow waves with hyperventilation, positive acceleration hastened their onset. It is concluded that the stresses produced by hyperventilation and positive acceleration are additive, and combined may be sufficient to interfere with cerebral function, where either stress alone is not sufficient. (Electroenceph. Clin. Neurophysiol. 9:378, 1957)

498

Brent, H.P., G.J. Leitch, J.W. Scott & W.R. Franks 1959 CARDIAC IRREGULARITIES DURING COMBINED HYPERVENTILATION AND G. (Paper, Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: At the RCAF Institute of Aviation Medicine, aircrew officers were investigated under conditions of voluntary hyperventilation and acceleration. Electrocardiograms and electroencephalograms were recorded throughout the course of these experiments. Ectopic beats appeared more frequently during combined hyperventilation and G than during either of these conditions imposed separately; disturbances in consciousness were produced only when the two stimuli were combined. In the course of analysis of the ECG, successive instantaneous heart rates were computed from intervals between R-waves, and plotted against the time sequence of the experiment. Thus, changes in heart rate from beat to beat were depicted. In some subjects, abrupt fluctuations in heart rate occurred during the hyperventilation-plus-G runs, usually in association with either general convulsive seizures or slow activity in the EEG. Comparable graphs prepared from ECG records of patients undergoing clinical grand mal attacks, or showing EEG epileptic discharges without clinical manifestations of seizure, showed no such cardiac irregularities. It therefore appears that the cardiac irregularities during combined hyperventilation and G resulted from these physiological stimuli directly, rather than as sequelae to any cerebral disturbances during hyperventilation-plus G were in some respects similar to those immediately preceding onset of ventricular fibrillation. The possibility that the latter event is responsible for some of the many "obscure" fatal crashes must be considered.
(J. Aviation Med. 30(3):177, March 1959)

499

Brent, H. P., T. M. Carey, T. J. Powell et al 1960 SYNERGISM BETWEEN EFFECTS OF HYPERVENTILATION, HYPOGLYCEMIA AND POSITIVE ACCELERATION.
Aerospace Medicine 31(2):101-115
(Paper, 28th Annual Meeting, Aero Medical Assoc., Denver, Colo., 6-8 May 1957)
(Paper, 21st Annual Meeting Canadian Physiological Society, Ottawa, Oct. 1957)

ABSTRACT: Eighteen medically fit aircrew officers were exposed to combinations of voluntary hyperventilation, 3.4 G for five seconds on the centrifuge, and

changes in glycemia one hour and three hours after glucose feeding. A large proportion of the subjects was incapicated by the effect of two or more of these combined stimuli, although these same stimuli, when acting separately, had failed to induce comparable disturbances incardiac or cerebral function. The experimental findings are listed in the article.

500

Brewer, G. W. 1959 OPERATIONAL REQUIREMENTS AND TRAINING FOR PROJECT MERCURY (Presented to National Security Industrial Association, Los Angeles, California, 17 November 1959).

501

Briggs, F. E. R. THE FRANKS ANTI-BLACKING-OUT SUIT. (Report of plane tests at RCAF station, Rockcliffe, Ontario and at Wright Field.) FPRC no. 301-A. (RAF Institute of Aviation Medicine, Farnborough).

ABSTRACT: Two subjects wearing FFS were completely protected up to 7 "g" in the P 40 and Harvard III for 12 seconds. Fatigue and nausea were relieved. Some respiratory embarrassment was noted during inverted flight, but no other discomfort. An individually fitted suit is necessary.

502

Brimhall, D. R. and R. Franzen 1944 A PRELIMINARY STUDY OF PHYSICAL STANDARDS IN RELATION TO SUCCESS IN FLIGHT TRAINING (Civil Aeronautics Administration, Division of Research, Washington, D.C.) Rept. No. 26, Feb. 1944. ASTIA TIP UR54 258

ABSTRACT: The study presented in this report represents one of the first in a series of investigations aimed at accurately testing the efficiency of American medical standards of acceptance for flight training. This study, although providing only a partial answer to questions concerning physical standards, definitely points the way for further investigations and indicates the trend the results are taking.

503

Brinkley, J. W., R. N. Headley, and K. K. Kaiser 1961 ABRUPT ACCELERATION OF HUMAN SUBJECTS IN THE SEMI-SUPINE POSITION. (Paper, Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Material Center, Philadelphia, Penn., June 14-15, 1961.)

ABSTRACT: The Protective Equipment Section of the Aerospace Medical Laboratory is currently conducting a research program to determine principles and methods

of protection during deceleration in minimal stopping distances as associated with ground impact of aerospace vehicles. This report is concerned with a series of eighteen human subject experiments with vertical velocities of twenty feet per second at impact.

The tests have been conducted with each subject held in a semi-supine position with a 12° forward inclination of the head and torso. Individually form fitted, rigid urethane couches have been used in an effort to provide optimum body support. Body restraint included a combination forehead and chin harness, shoulder harness, lap belt and leg retention straps. The acceleration magnitudes have been controlled by crushing various configurations of aluminum honeycomb material under the body support system during impact. The resulting acceleration profiles have been characterized by durations less than 100 milliseconds, very short rise times, and magnitudes ranging up to 65 g's. Stopping distances associated with this series of eighteen experiments have ranged from 3-1/4 to 6-7/8 inches.

504

Brinkley, J. W., E. B. Weis, Jr., N. P. Clarke and W. E. Temple 1963
A STUDY OF THE EFFECT OF FIVE ORIENTATIONS OF THE ACCELERATION VECTOR ON HUMAN RESPONSE
AMRL Memorandum M-28, February 1963

505

Brissenden, R. F. 1957 SOME GROUND MEASUREMENTS OF THE FORCES APPLIED BY PILOTS TO A SIDE-LOCATED AIRCRAFT CONTROLLER. (Nat. Advisory Committee for Aeronautics, Langley Field, Va.) NACA TN 4171, Nov. 1957.

506

Brissenden, R. F., D. C. Cheatham, & R. R. Champine 1957 TOLERABLE LIMITS OF OSCILLATORY ACCELERATIONS DUE TO ROLLING MOTIONS EXPERIENCED BY ONE PILOT DURING AUTOMATIC-INTERCEPTOR FLIGHT TESTS. (National Advisory Committee for Aeronautics, Washington, D. C.) Rept. No. RM L56K20, Jan. 1957

ABSTRACT: This paper presents limited data on the level of lateral oscillatory acceleration due to rolling motions found to be tolerable by a pilot during flight tests. The stest were made during the final attack phase of an automatically controlled interceptor.

507

Britton, S.W. & E.L. Corey 1942 CENTRIFUGAL AND GRAVITATIONAL EFFECTS ON ANIMALS AND THEIR ALLEVIATION
(National Research Council, Washington, D.C.) CAM Rept. No. 40, 2 Feb. 1942

ABSTRACT: Experiments were conducted using a light duty, 6 ft. radius centrifuge capable of producing up to 50 "g". As a result of the experiments, conclusions were drawn on the following subjects: Orientation; Respiration; Tolerance; Sex; Age; Posutre; Lethal limits; Blood and tissue chemistry; adhesive straps; forced exercise; alcoholism; anoxia, oxygen, carbon dioxide; pitressin; cortico-adrenal extract and adrenalin; benzedrine sulphate and normal saline.

508

Britton, S.W., E.L. Corey & G.A. Stewart 1942 GRAVITATIONAL EFFECTS ON ANIMALS AND THEIR ALLEVIATION
(National Research Council, Washington, D.C.) CAM Rept. No. 41
3 March 1942

ABSTRACT: This report contains observations made on cats, rabbits, and rats during acceleration experiments. The experiments were conducted to observe the result of acceleration on the cardiac activity, nervous system, digestive system, and respiratory system of the animals.

509

Britton, S. W., E. L. Corey, & G. A. Stewart 1942 PHYSIOLOGICAL STUDIES ON HIGH GRAVITATIONAL FORCES. (National Research Council, Washington, D. C.) CAM Rept. No. 56, 10 April 1942 ASTIA ATI 121 011.

ABSTRACT: In 18 male rats mortality rate at 25 "g" was reduced 50% by suitably spaced and graded previous exposures to "g". Amyl nitrite inhaled during profound shock following centrifugation in dogs and cats restores normal rate and rhythm of heart, improves A-V conduction, alleviates bundle branch block. Shock gradually disappears and animal recovers. When centrifugation is continued until death, findings are extreme cardiac dilatation, subintemal hemorrhages in left heart, congested lungs, and lobal tears in liver.

Desoxycorticosterone greatly increases resistance to "g", as do glucose-saline injections. Exposure of rats for 5 minutes to 5 degrees C (icewater) increases tolerance. Atropine and pilocarpine do no good. Female rats are much more resistant than male rats. Castration of females and injection of testosterone propionate does not reduce resistance. High gravitational forces inhibit oestrus activity markedly. In dogs, blood concentration and blood sugar are increased by exposure to "g", return to normal levels within 3 to 4 hours following exposure. In frogs, dilation of vessels of web and bross hemorrhage occur in centrifugation.

510

Britton, S.W., E.L. Corey & G.A. Stewart 1946 EFFECTS OF HIGH ACCELERATORY FORCES AND THEIR ALLEVIATION. American J. Physiol. 146(1): 33-51

ABSTRACT: A centrifuge for subjecting laboratory animals to acceleratory forces up to 50 g is described. It had two 6-foot rotor arms, a range from 30 to 180 r.p.m., and attained maximum speed in about 1 second. Several nomographs for ready determination of g forces are reproduced. Over 3,000 tests were carried out on rats, and several hundred others on monkeys, dogs, cats, rabbits, guinea pigs, mice, chickens, ducks and frogs. Within limits, rat responses were fairly uniform for the same g x t (g-min. or g-sec.) values. Outside these limits, very high g-min. forces were tolerated. Increasing tolerance to g was shown by rats and dogs on giving a series of exposures, especially over a period of days or months. Minute hemorrhages were observed in the lower limbs of surviving animals after severe tests. At autopsy vascular congestion and small hemorrhagic areas were found in various body sites. It was nevertheless striking that the great majority of animals which were examined after moderate or even severe exposures showed no significant pathological lesions.

511

Britton, S. W., & C. R. French 1946 EFFECTS OF ACCELERATORY FORCES AND THEIR AMELIORATION (Physiological Lab., University of Virginia Medical School, Charlottesville)

ABSTRACT: Within limits, rat responses to g forces are fairly uniform for the same g x t values. Female animals tolerated g better than males, while young animals showed less resistance. Resistance differences for many animal species were observed. Negative g was tolerated only about half as well as positive g. Increased resistance was shown by animals which had been given several exposures over periods of days or months.

Considerable protection was afforded by a simple belt placed around the abdomen or upper thighs. The effects of pressor and other substances were studied. Respiratory and circulatory changes (including E.C.G.) under various g forces were observed. Marked effects were observed in a few instances on the central nervous system; chronic rigidity (decerbrate type) sometimes appeared. "Delta" brain waves were commonly aroused during centrifugation.

Hyperglycemia occurred after severe acceleratory shock; tissue glycogen levels were usually reduced by prolonged exposures. Other blood-chemical changes were noted. Autopsy findings even after severe tests (prostration, death) were not striking. (Federation Proceedings 5(1):10-11, 1946)

512

Britton, S. W., V. A. Pertzoff, C. R. French, & R. F. Kline 1947 CIRCULATORY AND CEREBRAL CHANGES AND PROTECTIVE AIDS DURING EXPOSURE TO ACCELERATORY FORCES. American J. Physiology 150(1):7-26, Jan. 1947
NOTE: Reel 7, Flash 6, Item 5

ABSTRACT: A 20-ft. diameter heavy steel centrifuge with blood pressure and other devices attached for determining effects of accelerations up to 50 g is described. Results of tests on a large number of monkeys, dogs and cats are given.

513

Britton, S.W. & V.A. Pertzoff 1947 COMPARATIVE EFFECTS OF POSITIVE AND NEGATIVE ACCELERATIONS
Fed. Proc. 6: 82

ABSTRACT: Experiments have been carried out to determine the effects on carotid and femoral arterial pressures, taken simultaneously, of positive and negative accelerative forces on dogs and monkeys. Blood flow was also investigated. Well over 700 experimental runs were made. Arterial pressure changes occur more quickly in that part of the animal towards the periphery of the centrifuge, whether positive or negative g forces be considered. That is, in the case of positive g the pressure change appears earlier in the femoral artery, while in negative g tests it occurs earlier in the carotid vessel. A reciprocal relationship between heart rate and arterial pressure is apparent only in the case of reduced supply (flow, pressure) to the head. The involved reflexes were studied. A distinct physiological advantage is possessed by the monkey over the dog (or cat) subjected to acceleratory forces. This advantage is shown in both carotid and femoral pressure values, and approximates 1 g in the different tests used. A higher degree of vascular accommodation to gravity appears to have been developed in the case of the anthropoid type. Investigations indicate that the overall effects produced on the organism by acceleratory forces should be considered on the basis of the product t x g.

514

Britton, S. W., V. A. Pertzoff, et al. PHYSIOLOGICAL STUDIES ON HIGH CENTRIFUGAL FORCES. (University of Virginia)

ABSTRACT: Work was carried out on normal young male and female Macacus rhesus monkeys which were not anesthetized. Constant and striking changes in the ECG were observed under high "g" and consisted of a fall of about 50% in the R-S potential and an increase in heart rate of 10 to 30 beats per minute. Voltage decreases are much more marked than the reciprocal frequency changes.
Complete protection against cardiac changes is afforded by a low pelvic belt pressurized to 75 mm Hg or higher.
Desoxycorticosterone and benzedrine injections give slight or partial protection against "g" effects.

The appearance of delta waves in the EEG is fairly common under "g". The potential of these delta waves is somewhat reduced by applying a cervical cuff inflated up to 75 mm Hg.

515

Britton, S. W., & C. R. French 1949 CONDITIONS MODIFYING RESISTANCE TO ACCELERATORY FORCES AND PROTECTION BY ABDOMINAL PRESSURE. American J. Physiology 156(2):137-144, Feb. 1949

ABSTRACT: In a number of commonly experienced bodily conditions responses to moderate acceleratory forces (2-3 g, 15 sec.) were considerably modified, as shown by carotid arterial pressure changes in the dog. Fatigue and trauma, inanition and adiposity decreased markedly the tolerance to g; usually the arterial pressure reductions in these cases were 50 per cent greater than in the controls. In certain cases of anoxia, following the administration of narcotics and ethyl alcohol, resistance to acceleration was also greatly reduced.

Spontaneous bursts of struggling, muscular tremors after metrazol treatment, and also breathing of CO_2 in small amounts resulted in definite improvement in tolerance; about 1 g advantage was effected in these cases. The application of cold to the body also was slightly less advantageous. Tobacco smoke and alcohol given in small amounts were definitely not deleterious by the carotid arterial pressure criterion; in the tests with light doses of alcohol, indeed, significant benefit appeared to be conferred. Application of a lower abdominal or pelvic belt inflated to 150 mm. Hg pressure gave by far the greatest protection against g stresses. Even after severly depressing conditions of fatigue, trauma, etc., had been imposed upon the animal, protection was well maintained. In these cases an advantage of 2 to 3 g was commonly observed.

Correlation of tests on applied acceleration with the effects of gravitational force on the body is discussed. (Author)

516

Britton, S. W., V. A. Pertzoff, & C. R. French 1949 COMPARATIVE EFFECTS ON THE CIRCULATORY SYSTEM OF POSITIVE AND NEGATIVE ACCELERATIONS. THE "MAREY" LAW. Amer. J. Physiol. 156(1):1-11, Jan. 1949

ABSTRACT: Inquiry has been made into the circulatory changes induced by negative as well as positive accelerations. Arterial pressure levels in both carotid and femoral vessels have been followed simultaneously and correlated venous pressure and cardiac changes have been studied. Result of tests on different animals indicate that under conditions of circulatory stress a distinct functional advantage is possessed by the primate form. (Author)

517

Broca, A., & P. Gersaux 1919 NOTE PRELIMINAIRE SUR L'ETUDE DES EFFETS DE LA FORCE CENTRIFUGE SUR L'ORGANISME. (Preliminary Note for the Study of the Effects of Centrifugal Force on the Organism)
Bull. Acad. Med. (Paris), Ser. 3, 82:75, 22 July 1919.

518

Brock, F.J. 1954 DYNAMIC RESPONSE OF RESTRAINED SUBJECT DURING ABRUPT DECELERATION. (Northrop Corp., Beverly Hills, Calif.) Rept. No. NAI-54-585, Sept. 1954.

519

Brock, F.J. 1960 ACCELERATION SHOCK EXPERIMENTS USING LIVE PIGS
Paper: 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960

ABSTRACT: Acceleration shock experiments were performed on live pigs to determine the usefulness of a proposed Mercury Space Capsule pilot support and energy absorption system. The dynamic response of live test subjects is studied through the application of the principles of theoretical mechanics to an analogous mechanical system and some effects of deceleration shock are predicted. The experimental results measured on the live subject are interpreted in terms of equivalent mechanical system behavior and additional live specimen response characteristics are predicted. Several conclusions based on the experimental data are presented and discussed.

520

Brockett, P. 1925 BIBLIOGRAPHY OF AERONAUTICS 1920 - 1921
(National Advisory Committee for Aeronautics, Washington, D. C.)

521

Broderick, M., & R.D. Turner 1961 DESIGN CRITERIA AND TECHNIQUES FOR DEPLOYMENT AND INFLATION OF AERODYNAMIC DRAG DEVICES.
(Aeronautical Systems Division, Wright-Patterson AFB, Ohio)
ASD TR 61-108, 1 May 1959-June 1961, ASTIA AD 269 368

ABSTRACT: Effort was made to determine the requirements to successfully deploy or separate supersonic deceleration devices, both trailing and attacked, and to investigate techniques which can be used to inflate devices which otherwise might not be satisfactory. Various devices were investigated; an analytical study of deployment dynamics was undertaken to establish deployment criteria;

and an investigation of the characteristics of inflatable devices was conducted to determine inflation pressure requirements. A system was developed to provide the required separation impulses. Various means of producing inflation pressures were evaluated, and an inflatable torus was investigated as a device to provide additional stiffness to a parachute canopy. Vehicle conditions at time of decelerator deployment encompass a speed range of Mach 1 to 4 at sea level, Mach 4 to 10 at 150,000 feet, and Mach 10 to 30 at 350,000 feet. (Author)

522

Brody, A. W., J. J. Connolly, Jr., and H. J Wander. 1959 INFLUENCE OF ABDOMINAL MUSCLES, MESENTERIC VISCERA AND LIVER ON RESPIRATORY MECHANICS. J. Appl. Physiol. 14: 121-128

ABSTRACT: In a group of 13 supine, anesthetized cats initial measurement was made of respiratory elastance, total resistance by sinusoidal pressure, total resistance, K1 and K2 and their ratio of change from breath to breath, the natural frequency, damping factor and mass factor or inertance, and the functional residual capacity (FRC) and tissue resistance. Comparison was then made with the value obtained by re-measurement in the same cat after a) control operation of mid-line abdominal incision, b) incisions eliminating the effects of the abdominal muscles (mid line vertical plus transverse incision extended to back; c) evisceration of gastrointestinal tract and spleen; and d) evisceration of gastrointestinal tract. The abdominal response was found to be mainly a surface wave response (at a speed of about 150cm/sec) above the natural frequency. The abdominal muscles impose a steady force, more like a weight than a spring, which decreases the FRC. The liver contributes significantly to the mass factor and natural frequency, but the viscera do not. About half the tissue resistance consists of a resistance within the abdomen to respiratory movements; since nearly half the total resistance is tissue resistance, this is nearly one fourth the total resistance to respiration.

523

Bronk, D.W. 1945 HUMAN PROBLEMS IN MILITARY AVIATION. Smithsonian Institute, Ann. Rept. 1945. (Washington, 1946) Reprint from Proc. Amer. Philosophical Society 88(3):189-195, 1944.

524

Brooks, C.E. & A.P. Webster 1954 DATA SENSING AND RECORDING TECHNIQUES ESTABLISHED FOR THE HUMAN CENTRIFUGE. (U.S. Naval Air Development Center Aviation Medical Acceleration Lab., Johnsville, Pa.) Report No. NADC-MA-5306, 29 Jan. 1954. ASTIA AD 133 235.

ABSTRACT: The Aviation Medical Acceleration Laboratory has instrumented its principle experimental device, the Human Centrifuge with a system that permits

the investigator to record, on the stationary structure, data that are sensed 50-feet away on a subject who may be undergoing accelerative forces up to 40G, and traveling at a tangential speed of 180 mph. Thorough shielding, carefully designed sliprings, adequate wiring, and patching arrangements as well as the latest type sensing and recording equipment, comprise a data recording system commensurate with the facility provided by the costly and elaborate centrifuge device.

The principle components in the over-all recording system are described and detailed descriptions of the applications of the more commonly used sensing devices are presented.

525

Brooks, G.W. & ...D. Carden 1951 A VERSATILE DROP TEST PROCEDURE FOR THE SIMULATION OF IMPACT ENVIRONMENTS.
Noise Control 7(5):4-8

526

Brooks, P. ... 1951 THE EFFECT OF PROLONGED POSITIVE ACCELERATION ON RESPIRATION IN HUMAN SUBJECTS.
(Office of Naval Research, Washington, D. C.)
March 1951 Contract Nonr177

SUMMARY: Eleven subjects in good physical condition and of the age range 21 to 33 years were exposed to accelerations of two and three G units for a period of three minutes. Each subject had five exposures for each acceleration intensity. Respiration was measured by means of the Benedict-Roth respirometer. The findings are:

(a) Tidal volume was increased.
(b) Respiratory rate was increased.
(c) Consequently respiratory minute volume was increased.
(d) Oxygen consumption was markedly decreased.
(e) There is evidence that considerable pulmonary pooling of blood occurs.
(f) The changes in tidal volume, respiratory rate, and respiratory minute volume are greater at three G units than at two, while the decrease in oxygen consumption tends to be less at three G units than at two.

527

Brooks, P. ... 1951 THE EFFECT OF ... ACCELERATION ON ... FUNCTION IN HUMAN SUBJECTS.
(Office of Naval Research, Washington, D. C.)
March 1951 Contract Nonr177

SUMMARY: Eleven subjects of an age group of 21 to 33 years of age were exposed to two and three positive G units. Each subject had a total of at least five

exposures for each G unit intensity. [illegible] three minutes each during one session with a five-minute rest [illegible] exposure, thus giving a total of six minutes of acceleration [illegible] urine sample. Urine samples were voided just prior to the acceleration [illegible] and immediately at the end. The findings were:

(a) The specific gravity was decreased with a greater decrease during the three G unit exposure than during the two G unit one.
(b) The acidity was increased with a greater increase during the two G unit exposure than the three G unit exposure.
(c) Chloride excretion was variable but was greater during the three G unit exposure than during the two G unit exposure.
(d) Inorganic phosphorus excretion was decreased with a greater decrease during the three G unit exposure than during the two G unit exposure.
(e) Ammonia excretion was decreased a greater decrease during the two G unit exposure than the three G unit exposure.
(f) No reducing substances (glucose), albumin or [illegible] in the urine of the subjects excreted during the experiment.

528

Brooks, P. H. 1951 THE EFFECT OF [illegible] RESPIRATION [illegible] Naval Services. (Office of Naval Research, Washington, D. C.) March 1951 Contract Nonr177

ABSTRACT: Eleven male subjects of the age range of 21 years [illegible] were used. The respiration was described by the Douglas bag respiration. The Tilt table positions were related to the hydrostatic height of the blood column. These heights were . . . no hydrostatic height, one third, two thirds, and full height. Three determinations were made on each subject in each position.

As the tilt was increased, the respiratory rate, tidal volume, and respiratory minute volume was increased, but the oxygen consumption was decreased. The apparent pulmonary pooling of blood increased as the tilt was increased.

529

Brooks, P. H. 1951 THE INFLUENCE OF ENTRAN-ABDOMINAL PNEUMATIC [illegible] ANTI-BLACKOUT GEAR ON RESPIRATORY CHANGES CAUSED BY EXPOSURE OF HUMAN SUBJECTS TO BACKWARD POSITIVE ACCELERATIONS. (Department of Aviation Medicine, Los Angeles, California) Contract Nonr177, Task 1, 31 March 1951

ABSTRACT: Anti-blackout suit pressures of 2.2 and 2.8 psi were used during a three-minute exposure to two G units, while 3.3 and 4.2 psi were used during exposure to the 3 G units. The findings as compared to the changes caused by acceleration exposures without anti-blackout gear are:
(a) Tidal volume was decreased, but was still greater than normal.
(b) The respiratory rate was increased.

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(c) The respiratory rate was increased.
(d) Oxygen consumption was little changed, but the tendency appeared to be a decrease. At the higher suit pressure it definitely was decreased below that without the anti-blackout gear.
(e) As the anti-blackout suit pressures were increased the changes noted above were increased.
(f) The apparent pulmonary pooling of blood occurring during acceleration exposures appeared to be unchanged by the anti-blackout gear.

530

Brooks, P. M. 1951 THE INFLUENCE OF EXTRA-ABDOMINAL PNEUMATIC PRESSURE OF ANTI-BLACKOUT GEAR ON THE EFFECTS OF TILT TABLE POSITION ON RESPIRATION IN HUMAN SUBJECTS.
(Office of Naval Research, Washington, D. C.)
March 1951 Contract N6ori77

SUMMARY: The same subjects used in the previous study were used in this one. The suit pressures used were those of 50, 100, and 150 mm of Hg. The tilt table positions were thoe outlined previously.

As the suit pressures were increased, the tidal volume was decreased, but the respiratory rate and respiratory minute volume was increased. Oxygen was decreased as the suit pressures were increased.

531

Brouwer, J.E. 1931 LE MAL DE L'AIR. (AIR SICKNESS) 5 Congr. internat. Nav. aer [illegible], 1930. Tome 2, pp. 1327-1338

532

Brouwer, J. E. 1935 DES LIMITES AEROPHYSIOLOGIQUES IMPOSEES AU PILOTE DE L'AVION DE CHASSE. (Aerophysiological Limits Imposed on Pursuit Pilot) Arch. med. belges, (Liége) 88: 307-316.

ABSTRACT: Progress in aeronautic technic has rendered unlimited the possibilities as far as construction of planes, motors, and instruments is concerned, but the human body has its physical limitations. Two of the main problems of the aviator are altitude and speed. When atmospheric pressure falls below the minimum partial oxygen pressure required for diffusion of oxygen in the blood, the pilot experiences oxygen defiency with its physical and psychological sequel even in spite of adequate oxygen supply. The speed question encompasses level speeding, angular accelerations and centrifugal accelerations. Acceleration may give rise to severe circulatory and physiological disturbances.

533

Brown, B.P., & H.I. Johnson 1959 MOVING COCKPIT SIMULATOR INVESTIGATION OF THE MINIMUM TOLERABLE LONGITUDINAL MANEUVERING STABILITY. (National Aeronautics and Space Administration, Langley Field, Va.) NASA TN D-26

534

Brown, B.P., H.I. Johnson & R.G. Mungall 1960 SIMULATOR MOTION EFFECTS ON A PILOT'S ABILITY TO PERFORM A PRECISE LONGITUDINAL FLYING TASK. (National Aeronautics and Space Administration, Washington) NASA TN D-367. May 1960. ASTIA AD 236265

SUMMARY: A program was conducted on the NASA normal acceleration and pitch (NAP) Simulator to determine the effect that body-motion cues have on the pilot's ability to perform a precision close-coupled tracking task. These tests were conducted with heavy stick-force gradient and with zero-stick-force gradient over a range of longitudinal stability conditions. Pilots controlled the simulator from both a fixed and a moving cockpit.

The results indicate that there was improvement in pilot performance due to motion cues over the stability range tested. The motion cues appreciably improved the performance of both pilots when the feel forces were absent. The pilots always preferred to be supplied with motion cues. In the absence of feel forces, confusion was exhibited by one pilot as to the proper direction to execute control when bodily-motion cues were not provided.

535

Brown, B.P., & G. Merritt Preston 1962 LAUNCH-COMPLEX CHECKOUT AND LAUNCH-VEHICLE SYSTEMS. In NASA, Results of the First U.S. Manned Orbital Space Flight, Feb. 20, 1962. Pp. 45-52.

536

Brown, B. R., and J. G. Howlett 1943 SOME ACCELEROMETER RECORDINGS IN AN AIRCRAFT (ANSON) (National Research Council, Toronto, Canada) Report from No. 1 Air Observers School & No. 6 Medical Selection Board, April 1943 Report No. C2505, June 1943.

537

Brown, C. W. 1948 SPEED AND ACCURACY OF REACHING FOR CONTROLS IN DIFFERENT AREAS FROM THE PRONE POSITION. (Air Material Command, Wright Patterson AFB, Ohio) Report No. MCREXD-694-4H, 28 Jan. 1948

ABSTRACT: It is concluded from this study that the preferred locations for control levers, switches and knobs for operation from the prone position are directly below and forward of the pilot's shoulders. Control locations become progressively less desirable as they are moved upward and to the rear. Areas to the right and to the left are approximately equal in desirability.

It is further concluded that the Aero Medical Laboratory should apply the findings and conclusions of this study to the location of accessory controls in the current B-17 prone position modification project. (DACO)

538

Brown, C. W., E. E. Ghiselli, R. F. Jarrett, E. W. Minium and R. M. U'Ren 1949 MAGNITUDE OF FORCES WHICH MAY BE APPLIED BY THE PRONE PILOT TO AIRCRAFT CONTROL DEVICES. (Aero Medical Lab., Wright-Patterson AFB, Ohio) Memorandum Report No. MCREXD-694-4J, 4 March 1949 ASTIA ATI-72377

ABSTRACT: A study was made of the forces which pilots could be expected to apply to aircraft controls operated from the prone position. These dimensions of hand movement suitable for operation of elevator, rudder, and aileron controls were tested on subjects in each of 9 prone positions and in the seated position. From the standpoint of forces which can be applied to hand operated controls, the prone position compares favorably with the seated position for application of pull forces on elevator controls, but is inferior to the seated position for the rotation movement normally used for aileron control. The push right-push left movement dimension, suitable for operation of the rudder controls, is unfavorable for application of high control forces in the prone position.

539

Brown, C. W., E. E. Ghiselli, R. F. Jarrett, E. W. Minium & R. M. U'Ren 1950 COMPARISON OF AIRCRAFT CONTROLS FOR PRONE AND SEATED POSITION IN THREE-DIMENSIONAL PURSUIT TASK.
(USAF Air Materiel Command, Wright-Patterson Air Force Base, Ohio) AF-TR-5956, March 1950. ASTIA ATI 73 414

ABSTRACT: One hundred and eleven university students were divided into four groups. Each group was tested on the same psychomotor pursuit task but utilized different controls. Two of the groups operated their controls from the seated position, and two from the prone position. One of the seated groups used the conventional stick and rudder controls, and the second seated group together with one of the prone-position groups employed a three-dimensional hand control. The second prone-position group used the Amptmann three-dimensional control.

The results indicated that for either of the positions, seated or prone, the type of control utilized made little or no difference as far as performance on the pursuit task was concerned. However, performance in the prone position was found to be significantly inferior to that in the seated position. The indications are, therefore, that for this kind of task the type of control is relatively unimportant but the position of the pilot's body may be a prime consideration. (ASTIA)

540

Brown, C. W., E. E. Ghiselli, R. F. Jarrett, et al. 1950 MAGNITUDE OF FORCES WHICH MAY BE APPLIED BY THE PRONE PILOT TO AIRCRAFT CONTROL DEVICES. III. FOOT CONTROLS. (Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio) AF TR 5955, Feb. 1950, ATI-70 936

ABSTRACT: Forces which may be applied by extension of the foot from each of five initial angular positions were determined for twenty-seven male subjects, twenty-five of whom were former pilots. The limits of practical usefulness of control by dorsi-extension of the foot seem to be about 85 degrees -105 degrees. Beyond these limits performance is erratic. The forces exerted through dorsi-extension increase steadily with increased flexion of the foot. Response is equally effective in the right and left feet. (AUTHOR)

541

Brown, C. W., E. E. Ghiselli, R. F. Jarrett, E. W. Minimum and R. M. U'Ren. 1950 MAGNITUDE OF FORCES WHICH MAY BE APPLIED BY THE PRONE PILOT TO AIRCRAFT CONTROL DEVICES. II. Two-Dimensional Hand Controls. (Air Material Command, Wright-Patterson AFB, Ohio) AF TR 5954, Feb. 1950.

ABSTRACT: The maximum forces which could be applied in the vertical direction (up and down) and in a horizontal arc were measured for the thirty-seven men in several prone position situations. Much greater forces could be applied to horizontal rotation than to the lifting or depressing movements. Averaging all bed positions the means were 114 pounds for the "up" movement, 138 pounds for "down", and 269 and 260 pounds, respectively, for right and left rotation.

When instructed to apply to a given dimension of control movement "as much pressure as you can and still keep enough reserve so that you fell you could retain control over the other movements, and be prepared to make emergency adjustments as would be necessary in the flying situation," these pilots applied about 59% of their maximum forces to the controls.

Altering the elevation of the bed and its horizontal distance from the control handles influenced the forces which could be applied.

542

Brown, C. 1960 BIBLIOGRAPHIC STUDIES OF AFOSR INFORMATION STORES (Library of Congress, Washington, D.C.) Project 9769(803), Contract CSO 680-60-4; AFOSR, DMS.

ABSTRACT: Novel techniques of indexing coding, and machine storage, search, and retrieval to be carried out elsewhere under this task (e.g., Western Reserve University, Documentation, Inc., Zator Co.) require a collection of abstracts for experimentation. This contract will provide AFOSR abstracts for this purpose by making a chronological compilation of abstracts of all AFOSR Technical Notes and Technical Reports issued between 1 January 1954 and 31 December 1958. These abstracts are to be suitably indexed by good standard methods to provide a valid basis for comparison with new techniques.

543

Brown, D. 1961 THE DIESEL-POWERED BALLISTIC CENTRIFUGE (U.S. Navy Bureau of Naval Weapons) Contract NOrd 16640, ABL/X-69, Oct. 1961. ASTIA AD 266 363

ABSTRACT: Allegany Ballistics Laboratory has designed and constructed a centrifuge for use in ballistic and physical testing of rockets and rocket either ignited or unignited. Depending upon the size of a rocket or a component, forces up to 55 g can be applied. Upon approved request, this centrifuge can be made available to outside agencies.

544

Brown, D. 1961 THE DIESEL-POWERED BALLISTIC CENTRIFUGE. (Allegany Ballistics Lab., Hercules Powder Co., Cumberland, Md.) Report no. ABL/X-69, ASTIA AD 266 363

ABSTRACT: A description is given of the Allegany Ballistics Laboratory ballistic centrifuge which is used in ballistic and physical testing of rockets and rocket components. Certain flight conditions are simulated by centrifuging a rocket either ignited or unignited. Depending upon the size of the rocket or component being tested, forces up to 55 g can be applied. (Author)

545

Brown, D. W. 1961 A RECORDING TECHNIQUE FOR KITE BALLOON YAW BEHAVIOUR AND ACCELERATIONS, AND SOME EXPERIMENTAL RESULTS. (Royal Aircraft Establishment, Farnborough, England) Tech. Note Mech. Eng. 343. ASTIA AD-275 073

SUMMARY: The continued demand for kite balloons as carriers for experimental equipment, and for other purposes, stimulated a study of balloon flight behaviour to improve stability.
This note describes methods developed for recording balloon yaw behaviour, and gives results obtained from some experimental balloons.
Photography was used to record balloon lateral displacements and sideslip angles, and balloon lateral accelerations were derived therefrom.
A second method of obtaining balloon accelerations employed an accelerometer, the attitude of which was measured by a gyroscope. This method is suitable for longer duration records where peak accelerations are required rather than a detailed history of balloon yaw behaviour. Both methods are promising and could be combined and simplified to obtain more accurate results for less effort.

546

Brown, E.L. 1960 HUMAN AND SYSTEM PERFORMANCE DURING ZERO "G" In Vistas In Astronautics (2nd symposium) (New York: Pergamon, 1960) Pp 85-90.

ABSTRACT: Research areas covered by this article include: (1) Human performance on motor and mental taska; (2) Locomotion of Individual humans inside large space vehicles; (3) Locomotion of Individual humans outside space vehicles; (4) Human perceptive orientation during zero g; (5) Behavior of liquids during zero-g; (6) Fluid transfer problems during zero g; and (7) Heat transfer problems during zero g.

547

Brown, F.W., III & R.N. Lee 1953 A BIOPHYSICAL ANALOG FOR EXPLOSIVE DECOMPRESSION STUDIES IN ANIMALS. (U.S. Navy Mine Defense Lab., Panama City, Fla.) Medical Research Report No. 3, April 1953. ASTIA AD 226 301

548

Brown, G.E., Jr., E.H. Wood & E.H. Lambert 1949 EFFECTS OF TERA-ETHYL-AMMONIUM CHLORIDE ON THE CARDIOVASCULAR REACTIONS IN MAN TO CHANGES IN POSTURE AND EXPOSURE TO CENTRIFUGAL FORCE.
J. Appl. Physiol. 2:117-132, Sept. 1949.

ABSTRACT: Studies of man's reactions to the effects of gravity produced by tilting erect to 70° from the supine position or by exposure to positive acceleration (centrifugal force) reveal that a fall in arterial blood pressure and an increase in heart rate result. These physiologic effects are quickly compensated for by reflex mechanisms mediated by the autonomic nervous system which produce an increase in arterial pressure at heart level and a subsequent slowing in heart rate.

The intravenous injection of 5.5 to 7.7 mg. of tetra-ethyl-ammonium chloride per kilogram of body weight has been found to block these reactions for periods of 5 to 15 minutes so that arterial pressure continues to fall often to levels that produce symptoms of cerebral anoxemia. The marked decreases in arterial pressure fail under these circumstances to produce compensatory alterations in heart rate. The compensatory cardiovascular reactions induced by tilting to an upright position of 70° or exposure to centrifugal force are gradually recovered in a period of from 10 to 45 minutes after injection of the drug.

Simultaneous studies of arterial pressure, heart rate, venous pressure and volume of the leg indicate that these compensatory reactions which determine man's tolerance to the upright position or positive acceleration are chiefly concerned with the arterial rather than the venous side of the circulation. The failure of reflex vasoconstriction to compensate for the increased hydrostatic pressure in the dependent parts of the body and thus to prevent an increase in blood flow through these parts, rather than reduced venous return to the heart, is the primary factor accounting for the reduction of man's tolerance to positive acceleration after the administration of tetra-ethyl-ammonium chloride.

549

Brown, G.L., B. Mcardle, & J.W. Magladery 1942 CLINICAL INVESTIGATIONS INTO AIRSICKNESS. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 410(a), Jan. 1942.

550

Brown, G.W., M.L. Brown & H.M. Hines 1951 CARDIOVASCULAR AND RESPIRATORY CHANGES ASSOCIATED WITH EXPERIMENTAL CONCUSSIONS IN DOGS.
(Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 6737 Oct. 1951.

551

Brown, G.W., M.L. Brown and H. M. Hines 1952 EFFECTS OF EXPERIMENTAL CONCUSSION ON BLOOD FLOW, ARTERIAL PRESSURE AND CARDIAC RATE. Am. J. Physiol., 170(2):294-300, Aug. 1952

ABSTRACT: These experiments sought direct and continuous measurement of blood flow, blood pressure and cardiac rate in the common carotid artery of dogs before, during and after experimental concussion.

552

Brown, J.H.U., ed. 1963 PHYSIOLOGY OF MAN IN SPACE (New York, London: Academic Press, 1963)

ABSTRACT: Contents include the following papers: "Neuromuscular Aspects of Space Travel" by G.H. Bourne; "Acceleration" by E.F. Lindberg and E.H. Wood; "Stress" by C.E. Hall; "Human Tolerances" by B. Balke; "Psychological Aspects of Space Flight" by R.M Chambers and R. Fried; "Biomedical Capsules" by C.D. Green; "Space F ight Dynamics -- Weightlessness" by W.R. Hawkins; and "Ecological Systems" by B.E. Welch.

553

Brown, J. L., H. Kuehnel, F. Nicholson, & A. Futterweit n.d. VALIDITY OF THE CENTRIFUGE AS A FLIGHT SIMULATOR (Bureau of Medicine and Surgery) Task MR005-15-1003-1, Rept. No. 4

554

Brown, J.L. 1955 ACCELERATION AND HUMAN PERFORMANCE: A SURVEY OF RESEARCH (Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.) Report No. NADC-MA-5503, 22 March 1955, ASTIA AD-59257

ABSTRACT: This report summarizes the important research which has been conducted to date on the problem of human performance under acceleration. The material has been grouped according to five major headings; the senses, simple motor behavior, complex tasks, cognitive processes, and psychological effects. Research relevant to each of these classifications is reviewed, important questions which appear to remain unanswered are raised, and suggestions are made regarding desirable lines for future research. It appears that only a very limited amount of research has been conducted relating to actual performance sequences which may be required of pilots exposed to acceleration.

555

Brown, J.L., & M. Lechner 1955 ACCELERATION AND HUMAN PERFORMANCE: A SURVEY OF RESEARCH J. Aviation Med. 27(1):32-49, Feb. 1956 See also (Naval School of Aviation Medicine, Pensacola, Fla.) NADC-MA-5503, 22 March 1955. ASTIA AD 59 257

ABSTRACT: There is growing interest in such problems as the optimum flight path to be used in establishing manmade satellites. These developments have created a need for information concerning the effects of acceleration on man's ability to perform various control functions and on his performance capabilities in general under a variety of acceleration conditions. It is, therefore, of interest to review research in this general area. There are many ways in which exposure to acceleration may interfere with a pilot's performance. For example, performance decrements may be a direct result of the effects of acceleration on the senses because it is through the medium of the senses that the pilot receives all information upon which are based his actions in controlling the aircraft. Of primary importance are the visual, vestibular, kinesthetic, and auditory senses. It is essential to consider the mechanical effects of acceleration on movement of various parts of the body. Speed of movement and the distance through which motion is possible in a given direction will vary with acceleration. Forces which the pilot is capable of exerting will also be affected by acceleration.

556

Brown, J. L., R. F. Gray, & H. N. Hunter 1955 THE EFFECTS OF MAGNITUDE AND DURATION OF ACCELERATIVE FORCES ON HUMAN PERFORMANCE. PHASE I AND II. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 111 301; 31 Dec. 1955

ABSTRACT: Problems of pilot performance requirements which may exist during, or immediately after, exposure to acceleration have been surveyed in several areas, and a literature search has been completed. It has been concluded that one of the most critical situations requiring investigation is the air-to-air combat situation. In this situation, the interceptor pilot may be required to perform a complex missile control function while, at the same time, he is exposed to relatively high acceleration in maintaining pursuit of the target. An experimental design has been formulated to investigate this problem on the AMAL centrifuge. Programming of the experimental conditions will be accomplished with analog computing equipment. A survey is being made to determine what available computer equipment is best suited to this particular experiment and to other similar ones which may be conducted on the centrifuge.

557

Brown, J.L., R.F. Gray, B. Lewis, B.F. Burgess, & M. Chianta 1955 ROD-CONE INTERACTION IN THE DARK ADAPTED EYE. (Paper, American Psychological Association Convention, Aviation Medical Acceleration Laboratory, Naval Air Development Ctr., Johnsville, Pa., Sept. 1955)

ABSTRACT: Spectral sensitivity of the dark-adapted eye is usually expressed in terms of the scotopic cuminesity curve. Although this curve affords a good descritpion of sensitivity for light detection, it is unlikely to represent sensitivity for such visual functions as recognition of complex forms when these are presented in short flashes to the dark-adapted eye. It was the purpose of this experiment to determine possible changes in the relative contributions of rods and cones to "seeing" by the dark-adapted eye with changes in the criterion of threshold. (American Psychologist 10(8):443-444. Sept. 1955)

558

Brown, J. L., R. F. Gray, B. Lewis, B. F. Burgess, & M. Chianta 1955 VISUAL FUNCTION UNDER STRESS (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 110 300; 31 Dec. 1955

ABSTRACT: A preliminary experiment has been performed on the centrifuge. It was determined that acceleration tolerance, when based on a subject's ability to respond to a visual signal, may be influenced by the luminance of the signal and the portion of the retina which is stimulated. Time required for a subject to react to a signal increases as the signal is made dimmer. For a fixed signal luminance, reaction time remains constant and shows no gradual increase with increased acceleration. Experiments are in progress in a low pressure chamber and with oxygen-poor gas mixtures, the results of which will afford quantitative data on the impairment of vision at altitude for a variety of visual tasks, from the gross detection of light to the discrimination of fine detail. A validating experiment has been completed to check the experimental procedure at normal atmospheric pressure.

559

Brown, J.L. 1956 THE STUDY OF HUMAN PERFORMANCE LIMITATIONS UNDER CONDITIONS OF ACCELERATION. In Proceedings of the Twentieth International Physiological Congress, Brussels, Belgium, 1956) Pp. 1020-1021

560

Brown, J.L. 1957 SUBJECTIVE PREFERENCE AMONG DIFFERENT MODES OF CLOSED-LOOP OPERATION OF THE CENTRIFUGE FOR FLIGHT SIMULATION. (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA 9535, 9 Dec. 1957.

ABSTRACT: Four simulations, using the three degrees of freedom capability of the human centrifuge at AMAL, were investigated. They were defined as follows: (1) counterclockwise centrifuge rotation with the subject facing in the direction of rotation and the inner gimbal position compensated for the angular acceleration of the main arm, (2) counterclockwise centrifuge rotation with the subject facing in the direction of rotation and the inner gimbal position not compensated for angular acceleration of the arm, (3) clockwise centrifuge rotation with the subject facing in the direction opposite that of rotation and the inner gimbal position not compensated for angular acceleration of the main arm, and (4) clockwise centrifuge rotation with the subject facing the direction opposite that of rotation and with the inner gimbal position compensated for angular acceleration of the arm. Four subjects were run while performing 8 maneuvers under each of the 4 conditions of centrifuge operation in a given run. Three of the subjects remarked that conditions 2 and 3 were less provocative of nausea than other conditions. All four subjects remarked that the operation of the centrifuge felt smoother under conditions 2 and 3 than under the other conditions. It is concluded that with the computer system employed in this investigation, differences in realism introduced by changing the direction of rotation of the centrifuge or altering the nature of inner gimbal motions were not clearly perceived by the subjects.

561

Brown, J.L., W.H.B. Ellis, M.G. Webb, & R.F. Gray 1957 THE EFFECT OF SIMULATED CATAPULT LAUNCHING ON PILOT PERFORMANCE. (U.S. Naval Air Development Center, Aviation Medical Acceleration Lab., Johnsville, Pa.) NADC-MA-5719, 31 Dec. 1957. ASTIA AD 156 851.

ABSTRACT: Four subjects were exposed to acceleration patterns which simulated the accelerations of catapult launchings up to 11.3G. Subjects were trained in a task which required stabilization, by manipulation of a control stick, of disturbances of a standard pitch and roll indicator. Scores for performance were obtained during a control period prior to acceleration exposure and immediately following exposure. Performance immediately following exposure showed no decrement at any level of acceleration when compared with performance prior to exposure. Some discomfort at the higher levels of acceleration was attributed to a negative component of acceleration on the subject which was proportional to the sine of the angle formed by the seat-back with the vertical.

562

Brown, J.L., & R.E. Burke 1957 THE EFFECT OF POSITIVE ACCELERATION ON VISUAL REACTION TIME. (U.S. Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5712. ASTIA AD 143 551
See also J. Aviation Med. 29(1):48-58. 1958

ABSTRACT: Reaction time to visual test signals was measured for two subjects during exposure to positive acceleration. Two test light luminances, 4560 millilamberts and 0.025 millilambert, and two regions of the retina, one close to the foveal center of the eye and the other far removed from the fovea, were investigated. When measured in terms of a visual effect, acceleration tolerance was higher for the brighter light. It was also higher when the more central region of the retina was stimulated. Reaction time is increased significantly with increases in positive acceleration below the tolerance level. Increase in reaction time does not occur until after a minimum of about 5 seconds exposure to acceleration between 3 and 6 G. (Author)

563

Brown, J.L., W.H.B. Ellis, M.G. Webb & R.F. Gray 1957 THE EFFECT OF SIMULATED CATAPULT LAUNCHING ON PILOT PERFORMANCE. (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-5719. 31 December 1957. ASTIA AD 156 851.

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564

Brown, J.L. & J.H. Hill 1957 HUMAN PERFORMANCE LIMITATIONS IN AIRCRAFT CATAPULTING AND ARRESTING
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR22 April 8, 1957

ABSTRACT: In order to study the effects of accelerations encountered in catapult launching on pilot performance immediately following launching, it is necessary to determine the nature of this performance and to select critical aspects of performance for investigation. To ascertain performance requirements, five jet pilots with considerable catapulting experience (100 launchings), eight jet pilots and four AD-5N pilots were interviewed. A summary of the findings of

these interviews is given. On the basis of information obtained, it was decided that the most important aspect of pilot performance immediately after catapult launching is that which relates to the maintenance of correct aircraft attitude. Accordingly, instrumentation for a task which required the stabilization of a pitch and roll indicator by manipulation of an aircraft control stick has been designed and constructed for tests on the AMAL centrifuge.

565

Brown, J. L. 1958 PLANS FOR DYNA SOAR I CENTRIFUGE EXPERIMENT (Naval Air Development Ctr., Johnsville, Pa.) Letter Rept. TED ADC RS-7019, Serial 01017, 10 Nov. 1958

566

Brown, J.L. 1958 AIR-TO-AIR TRACKING DURING CLOSED-LOOP CENTRIFUGE OPERATION. (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-5803, 10 March 1958. ASTIA AD 159 716

ABSTRACT: Performance was studied on the centrifuge in a simulated, air-to-air tracking situation. Centrifuge motion was controlled by manipulations of aircraft controls located in the centrifuge gondola in such a way that subjects were exposed to acceleration patterns which were appropriate to their performance in the tracking situation. It was found that performance of the tracking task showed a statistically significant decrement under experimental conditions as compared with control conditions with the centrifuge stationary. A score which represented flight coordination showed a statistically significant improvement under experimental conditions as compared with control conditions.

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Brown, J.L., & C.C. Collins 1958 AIR TO AIR TRACKING DURING CLOSED LOOP CENTRIFUGE OPERATION. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5803, 10 March 1958. ASTIA AD 159 716.
See also J. Aviation Med. 29(11):794-804

ABSTRACT: Performance was studied on the centrifuge in a simulated air-to-air tracking situation. Centrifuge motion was controlled by manipulations of aircraft controls located in the centrifuge gondola in such a way that subjects were exposed to acceleration patterns which are appropriate to their performance in the tracking situation. It was found that performance of the tracking task showed a statistically significant decrement under experimental conditions as compared with control conditions with the centrifuge stationary. A score which represented flight coordination showed a statistically significant improvement under experimental conditions as compared with control conditions.

568

Brown, J.L. & C.C. Collins 1958 AIR -TO-AIR TRACKING DURING CLOSED LOOP CENTRIFUGE OPERATION. J. Aviation Med. 29(11):794-804

ABSTRACT: The Navy centrifuge was converted to a flight simulator to provide a method for a study of the interaction between pilot performance and acceleration. Flight instruments and controls were installed in the gondola of the centrifuge which effected control of centrifuge motions (rotation of the gondola and rotation of the arm) by an analog computer. Five subjects were required to fly the simulator in a coordinated fashion (minimal lateral acceleration) while centering a moving target on a simulated radar scope. All subjects were observed to perform better in vertical tracking when the centrifuge was at rest than during acceleration up to 2.5 g, but no significant difference was observed in horizontal tracking. Direction of rotation of the centrifuge had no effect on tracking performance. Flight coordination was considerably improved when the centrifuge was in motion. It is concluded that acceleration patterns appropriate to a given flight simulation problem result in a decrement in tracking performance.

569

Brown, J.L., & R.E. Burke 1958 THE EFFECT OF POSITIVE ACCELERATION ON VISUAL REACTION TIME. J. Aviation Med. 29:48-58
See also (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5712, 12 Aug. 1957. ASTIA AD 143 551.

ABSTRACT: Reaction time to visual test signals was measured for two subjects during exposure to positive acceleration. Two test light luminances, 4560 millilamberts and 0.025 millilambert, and two regions of the retina, one close to the foveal center of the eye and the other far removed from the fovea, were investigated. When measured in terms of a visual effect, acceleration tolerance was higher for the brighter light. It was also higher when the more central region of the retina was stimulated. Reaction time is increased significantly with increases in positive acceleration below the tolerance level. Increase in reaction time does not occur until after a minimum of about 5 seconds exposure to acceleration between 3 and 6 G. (Author)

570

Brown, J.L. 1958 THE STUDY OF HUMAN PERFORMANCE LIMITATIONS IN AIRCRAFT CATAPULTING WITH A LINEAR TRACK; LETTER REPORT ON PROPOSED EXPERIMENTAL PROGRAM
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR61, August 13, 1958

ABSTRACT: It is necessary to gain more information on how high a level of acceleration a pilot can tolerate without physiological effects or injury and how high a level he can withstand and still perform those functions necessary for maintaining aircraft stability. There are several areas in which additional information

is required: (1) the effect of acceleration on more complex tests, (2) the rate of onset of acceleration must also be investigated in terms of its effect on the performance of a complex task, and (3) the possibility of vestibular effect following exposure to high linear accelerations. Apparatus requirements to perform the experiments necessary are stated along with the physiological data required. An experimental program is outlined.

571

Brown, J.L. 1958 DYNA-SOAR I CENTRIFUGE EXPERIMENT; LETTER REPORT CONCERNING PLANS FOR.
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR71 Nov. 10, 1958 Confidential

572

Brown, J.L. 1958 TRACKING PERFORMANCE DURING SIMULATED EXIT AND REENTRY FLIGHTS OF THE X-15 RESEARCH AIRCRAFT. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA 5801, 15 Jan. 1958. ASTIA AD 157 843.

573

Brown, J.L. 1959 THE BIO-DYNAMICS OF LAUNCH AND RE-ENTRY.
Military Med., 124(11):775-781.
Also in Med. Affairs, 1(2):8-10; 26-27, Autumn 1959.
See also Naval Res. Rev., May, 1959, pp. 8-15

ABSTRACT: Acceleration tolerance, effects of acceleration upon man's performance, and human adaptability to space flight are discussed briefly.

574

Brown, J.L. 1959 THE BIODYNAMICS OF LAUNCH AND REENTRY.
Naval Res. Rev., May 1959, pp. 8-15
See also Medical Affairs 1(2):8-10, 26-27, Autumn, 1959.
See also Military Medicine 124(11):775-781, 1959.

ABSTRACT: It has been demonstrated that, as a passenger, man can tolerate the acceleration and vibration stresses which may be encountered in flight to and from space if he is provided with adequate mechanical support and restraining equipment, and if adequate design and damping are employed in constructing the vehicle. Little is known about man's motor performance capabilities under the above-mentioned conditions, however. Fluctuations of acceleration will vary

the effective weight of the pilot's arms and hands and may result in inadvertent movements of the controls. With each change, the range of frequencies over which his muscles can be expected to exert control will undoubtedly change and so will the optimum characteristics of the controls he is operating. It is recommended that efforts should be increased in the systematic study of the dynamic relations between a pilot and his controls in order to determine the frequency response characteristics of his limbs in various positions under different conditions of acceleration.

575

Brown, J.L. 1959 THE BIODYNAMICS OF LAUNCH AND REENTRY
Medical Affairs 1(2):8-10, 26-27, Autumn, 1959.
See also Naval Res. Rev., May 1959, pp. 8-15
See also Military Medicine 124(11):775-781, 1959.

ABSTRACT: It has been demonstrated that, as a passenger, man can tolerate the acceleration and vibration stresses which may be encountered in flight to and from space if he is provided with adequate mechanical support and restraining equipment, and if adequate design and damping are employed in constructing the vehicle. Little is known about man's motor performance capabilities under the above-mentioned conditions, however. Fluctuations of acceleration will vary the effective weight of the pilot's arms and hands and may result in inadvertent movements of the controls. With each change, the range of frequencies over which his muscles can be expected to exert control will undoubtedly change and so will the optimum characteristics of the controls he is operating. It is recommended that efforts should be increased in the systematic study of the dynamic relations between a pilot and his controls in order to determine the frequency response characteristics of his limbs in various positions under different conditions of acceleration.

576

Brown, J.L. 1959 CENTRIFUGE SIMULATOR STUDIES OF THE EFFECTS OF FLIGHT ACCELERATION ON PILOT PERFORMANCE. (Franklin Institute Symposium on Med. Instrumentation, May 18, 1959.) p. 52.

577

Brown, J.L. 1959 CHANCE VOUGHT PROJECT FOR THE STUDY OF PILOT PERFORMANCE DURING CENTRIFUGE SIMULATION OF THE BOOST ACCELERATION OF THE DYNA-SOAR ORBITAL VEHICLE EXIT FLIGHT (Aviation Medical Acceleration Laboratory, U.S. Naval Air Development Center, Johnsville, Pa.) Report No. NADC-MA-LR 84, 22 April 1959, ASTIA (Confidential)

578

Brown, J.L. 1959 CHANCE VOUGHT PROJECT FOR THE STUDY OF PILOT PERFORMANCE DURING CENTRIFUGE SIMULATION OF THE BOOST ACCELERATIONS OF THE DYNA SOAR ORBITAL VEHICLE EXIT FLIGHT. (US Naval Air Dev. Ctr., Johnsville, Pa.) Letter Rept. No. TED-ADC-RS-7019, Serial 0365, 22 April 1959.

579

Brown, J.L., H. Juehnel et al. 1960 COMPARISON OF TRACKING PERFORMANCE IN THE TV-2 AIRCRAFT AND THE ACL COMPUTER/AMAL HUMAN CENTRIFUGE SIMULATION OF AIRCRAFT. (Naval Air Development Center, Johnsville, Pa.) NADC-MA-6016, Nov. 1960. ASTIA AD 250 129.

ABSTRACT: A tracking task was performed by each of six subjects in a TV-2 aircraft, in a static simulation of the aircraft and in each of two centrifuge modes of simulation which provided acceleration forces similar to those encountered in the aircraft. Centrifuge accelerations were controlled by pilot performance in the simulation. A preliminary analysis of tracking performance was conducted based on absolute error. In order to perform this analysis it was necessary to filter out low frequency biases which affected data in the aircraft but not in the centrifuge. Conclusions from the analysis must be qualified accordingly. Tracking performance on the centrifuge was inferior to performance under static conditions. In the case of four subjects who are qualified pilots, performance in the aircraft was consistently superior to performance on the centrifuge and frequently superior to performance under static conditions. The subject, a nonpilot, who had the best performance on the centrifuge, had the poorest performance in the aircraft. A spectral density analysis of results of the experiment will be presented in a subsequent report.

580

Brown, J.L., H. Kuehnel, F.T. Nicholson & A. Futterweit 1960 COMPARISON OF TRACKING PERFORMANCE IN THE TV-2 AIRCRAFT AND THE ACL COMPUTER/AMAL HUMAN CENTRIFUGE SIMULATION OF THIS AIRCRAFT. (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-6016/NADC-AC-6008, 7 Nov. 1960. ASTIA AD 250 129.

ABSTRACT: The analysis of this experiment does not indicate any advantage in the use of the centrifuge for the study of pilot tracking performance in a maneuvering aircraft when the maximum linear accelerations are on the order of 5 G. Anomalous angular motions of the centrifuge, which in this experiment caused disorientation and nausea of the subject pilots, probably served to offset any advantage gained by the inclusion of the acceleration forces in the simulation. For the tracking tasks employed in the present experiment, the results of work with a static, or fixed-base, simulator provided just as good a basis for prediction of the way in which pilots would perform a specific task in the aircraft as did work performed on the centrifuge.

It is probable that the primary advantage of a centrifuge simulation lies

in situations in which linear acceleration forces are sufficiently high to have an appreciable mechanical effect on a pilot, are sustained for relatively long durations, and are introduced primarily as a result of action of longitudinal thrust or longitudinal drag and not by angular motions. These are the conditions which will prevail in space flight. Although the validity of centrifuge simulations of space vehicles cannot be assessed until space missions are flown, the centrifuge provides the only way in which effects of acceleration encountered in rocket vehicles such as the X-15 and the Mercury capsules can be studied at all in advance of actual missions into space.

581

Brown, J. L. 1961 ACCELERATION AND MOTOR PERFORMANCE. Human Factors, 2(4):175-185, Jan. 1961

ABSTRACT: Experiments concerning the effects of acceleration on motor performance are discussed in a sequence which illustrates the evolution of research techniques in recent years. In the simplest of these techniques, performance is evaluated during or immediately following exposure to pre-programmed acceleration time histories. A more complex technique involves the study of interaction of subject performance with the pattern of acceleration experienced. Accelerations are actually controlled by subject performance by means of an analog computer control system. Certain limitations of centrifuge simulations are discussed.

582

Brown, J.L., & H. Tremblay 1961 COMPARISON OF TRACKING PERFORMANCE IN THE TV-2 AIRCRAFT AND THE ACL COMPUTER/AML HUMAN CENTRIFUGE SIMULATION OF THIS AIRCRAFT. (Paper, Panel on Acceleration Stress of the Armed Forces-NRC Committee on Bio-Astronautics, 6-11 March 1961, NASA Ames Research Ctr., Moffett Field, Calif.)
See also (Naval Air Development Ctr., Johnsville, Pa.) NADC MA 6016/AC-6008, 7 Nov. 1960.

583

Brown, J. L. 1961 ORIENTATION TO THE VERTICAL DURING WATER IMMERSION Aerospace Medicine 32(3):209-217, March 1961.

ABSTRACT: To determine the extent of possible disorientation in a liquid environment when visual, tactual, kinesthetic, and buoyancy cues are largely eliminated, Ss were immersed in water at 18 or 25 ft. and then rotated in a tucked position on a rod through 3, 4, or 5, revolutions. Rotation was

terminated with the head in one of four positions: upright, forward, down, or back. Ss then attempted to point in the up direction, then to nod the head and correct the direction of pointing if necessary, and, finally, to swim slowly toward the surface. The results (errors in pointing, correction after head movement, etc.) were interpreted with respect to the function of the utricles as g sensors. Suggestions were made about procedures for simulation of zero-g. (Tufts)

584

Brown, J. L., ed. 1961 SENSORY AND PERCEPTUAL PROBLEMS RELATED TO SPACE FLIGHT. REPORT OF A WORKING GROUP OF THE PANEL ON PSYCHOLOGY ARMED FORCES--NRC COMMITTEE ON BIO-ASTRONAUTICS. (National Research Council, Wash., D.C.) Publication No. 872. ASTIA AD-257 215

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(3) Empty field myopia; and
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Suggested areas of research:
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(4) Visual orientations in environments having unique geometry
Non-Visual sensory and perceptual problems
The relevance of theories of sensation and perception to problems in space flight
(ASTIA)

585

Brown, J. L., H. Tremblay, G. H. Byford, et al 1961 ABSTRACTS OF PAPERS TO BE PRESENTED AT THE MEETING OF THE PANEL ON ACCELERATION STRESS OF THE ARMED FORCES-NRC COMMITTEE ON BIO-ASTRONAUTICS, 6-11 MARCH 1961, NASA AMES RESEARCH CENTER, MOFFETT FIELD, CALIFORNIA.

586

Brown, R.B., J.R. Brett, & J.G. Howlett 1943 SWING SICKNESS AND A HISTORY OF MOTION SICKNESS IN RELATION TO AIRSICKNESS. (NRC, Canada, Com. Avn. Med.) May, 1943

587

Brown, Robert H. et al. 1949 THE RELATIONSHIP BETWEEN APPARENT DISPLACEMENT AND MOTION IN THE OCULOGYRAL ILLUSION (Joint project Rept. No. 1, (Tulane University in cooperation with Naval School of Aviation Medicine and Research, Pensacola, Proj. NM 001 002) May 1949. ASTIA TIP U7477.

ABSTRACT: Under the proper conditions, angular acceleration gives rise to a well defined apparent movement which has been termed the oculogyral illusion. This illusion comprises apparent displacement of a visual target as well as apparent motion. In the case of an object in actual motion, real displacement, that is, change in position, has a very definite relationship in duration and magnitude to the causal motion. On the other hand, the illusory displacement reported here, as observed during apparent motion, does not obey such precise or meaningful laws. The relationship between these two characteristics was studied by rotating 12 subjects in a Link Trainer at 26 rpm for one minute. They were then decelerated to 0 rpm rapidly. During and after rotation the subject's head was maintained at a fixed 15 degree forward inclination. The target was observed only during the last 15 seconds of rotation and until the illusory effects subsided; the eyes were closed during the initial 45 seconds of rotation. Each subject was given 5 trials at 7 minute intervals per day and 10 daily sessions. One half of the subjects reported on motion phenomena in the first 5 sessions and displacement phenomena in the second five sessions.

588

Brown, R. H., H. Imus, J. I. Niven, & A. Graybiel 1950 APPARENT DISPLACEMENT AND MOTION IN THE OCULOGYRAL ILLUSION. ONR Monthly Research Report, Sept. 1950, 14-16.

589

Brown, R.H. & F.E. Guedry 1951 INFLUENCE OF VISUAL STIMULATION ON HABITUATION TO ROTATION. J. General Psychol. 45:151-161
See also (USN School of Aviation Med., Pensacola, Fla.) Joint Proj. Rept. No. 11, Jan. 10 1950. ASTIA AD 72417.

ABSTRACT: One indication of habituation to rotation is a systematic decrement in the duration of post-rotational apparent motion of visual objects with repeated rotation. However, the success of some investigators in obtaining habituation where others have failed with rotation series of comparable length indicates that some conditions are more favorable for its occurrence than others. The hypothesis is advanced that habituation is a function of the extent of visual stimulation present to reinforce still fixation. The general plan is to compare three groups of individuals which have different opportunities for fixating a target light during series of 20 rotation periods to determine whether the groups differ in the extent and rate of habituation. Stimuli for still fixation are varied from no illumination to full room illumination following rotation on occasional trials. Whereas one group of 12 subjects with little opportunity for reinforcement of still fixation exhibit significant amounts of habituation: (1) Individuals subjected to a series of rotations in the dark do not exhibit habituation to rotation within the limits of this experiment. (2) Individuals provided with a faint object to fixate during and after rotation and subjected to a series of these rotations exhibit habituation. (3, Individuals who observe a faint fixation object throughout every trial with a brief illumination of the visual environment interposed during the post-rotation period of nystagmus on occasional trials exhibit a rapid rate and relatively great amount of habituation. (4) The results support the hypothesis that habituation is a function of the extent of visual stimulation present to reinforce still fixation.

590

Brown, R. H. 1955 VELOCITY DISCRIMINATION AND THE INTENSITY-TIME RELATION. J. Opt. Soc. Amer. 45:189-192.

ABSTRACT: The visual discrimination of velocity is considered in terms of an observer's response to its direction at different speeds. The hypothesis is advanced that the direct perception of motion in a middle range of speeds involves a single sensory event dependent on the intensity-time relation. To test this hypothesis, four subjects discriminated velocity at different speeds for each of eight durations of exposure. The minimal luminance required for correct judgements of direction was measured by the method of limits.

The data indicate that velocity discrimination occurs at intermedicate speeds when the energy of the stimulating flash is constant (It = C). The reciprocity relation does not hold for exposures longer than a critical duration on 0.1 sec. The luminance of the flash tends to be the sole limiting factor on velocity discriminations at longer durations of exposure (I = K). Implications of these results are discussed with reference to other experiments.

591

Brown, R. H. 1961 VISUAL SENSITIVITY TO DIFFERENCES IN VELOCITY
Psychol. Bull. 58(2):89-103, March 1961.

ABSTRACT: An analysis of data available in the literature on thresholds for visual sensitivity to differences in velocity is presented. A consideration of angular speed leads to the conclusion that it is the basic unit of measurement involved in studies of differential threshold. Stimulus conditions and methodology used in measuring the threshold in ten major studies are carefully considered. The differential thresholds are then plotted as a function of angular speed. Sensitivity is calculated and expressed in terms of the ratio of the threshold to the speed. This Weber ratio for velocity is applied to tracking and other predicitive behavior. (Tufts)

592

Brown, W.L. 1959 PRIMATES IN SPACE.
In Bioastronautics, Advances in Research.
(USAF School of Aviation Medicine, Randolph Field, Texas) March 1959

593

Brown, W. R. J. 1949 EYE MOVEMENTS AND THE VARIATION OF VISUAL ACUITY WITH TEST OBJECT ORIENTATION.
J. Opt. Soc. Amer. 39:1057

ABSTRACT: A possible explanation is given for the phenomenon of higher visual acuity as measured with a parallel line test object when the lines are vertical or horizontal than when the lines are at forty-five degrees. This explanation is based on a dynamic theory of visual acuity. The difficulties in explaining the effect by astigmatism of the observers, the structure of the retina, or by continuously driven small oscillations of the eye are discussed. An explanation of the effect is provided by assuming that the eye acts as a sphere held in orientation by two pairs of elastic muscles and that its movements are damped by viscous friction. This hypothesis explains the phenomenon if the average time between the involuntary "jumps" of the eye, which initiate the vibrations, is greater than the time required for the oscillations to decay to forty percent of their initial value. Since the average time between jumps is relatively long (0.5 - 0.6 sec.) the hypothesis seems reasonable. Therefore, the observed variation of visual acuity with angle appears to substantiate the dynamic theo of visual acuity.

594

Browne, B.C. and E.C. Bullard 1940 COMPARISON OF THE ACCELERATION DUE TO GRAVITY AT THE NATIONAL PHYSICAL LABORATORY, TEDDINGTON, AND BUREAU OF STANDARDS, WASHINGTON, D.C.
Royal Society of London, Proceedings, Series A, 175:110-117

595

Browne, M.K. 1956 PHYSIOLOGICAL ASPECTS OF A MULTI-GRADIENT ANTI-G VALVE (RAF Inst. of Av. Med., Farnborough) FPRC No. 991

ABSTRACT: Many workers, British and American, have shown that man's tolerance to positive g is subject to side individual variations. These are still present when anti-g equipment is used. It seemed possible, therefore, that in some subjects increased g tolerance might be obtained with new equipment.

596

Browne, M.K. 1957 ACCELERATIONS IN SPACE MEDICINE. Spaceflight (London), 1(4): 139-142. July 1957

ABSTRACT: The physical aspects of acceleration as well as the physiological effects of positive, negative, and transverse g are discussed. The two extremes of acceleration involved in space flight are also discussed. The first is encountered in take-off and ascent where high peak accelerations occur. The second involves the weightless state created in space or coasting freely in an orbit around the earth. The known physiological consequences of these two extremes are described as they relate to the g/time patterns in the first situation and to eating and drinking, the otoliths, and muscular movements in the weightless state. Angular acceleration is also discussed with regard to its physiological effects and rocket design. These main acceleratory problems affecting man in his conquest of space do not present an insurmountable barrier. It appears that other medical problems and those of design will be the factors delaying the take-off of the first space traveler. The limits of human tolerance with regard to intensity and duration of acceleration and the position of the body axes are tabulated.

597

Browne, M.K. 1957 METHOD OF THRESHOLD DETERMINATION IN THE HUMAN CENTRIFUGE. (RAF Royal Institute of Aviation Medicine, Farnborough) FPRC 1029, Dec. 1957. ASTIA AD 209 986.

ABSTRACT: A method of threshold determination is described which utilizes visual blackout as the end point. Thresholds can be varied at will by the use of suitable filters. The method is capable of precise specification and is easily performed. A plea is made for the use of rates of application having a linear g/t relation. These, when of low value, allow cardiac compensation during the rise and obviate the use of repeated plateau runs with their concomitant fatigue.

598

Browne, M. K. 1957 THRESHOLD DETERMINATION TECHNIQUE IN THE HUMAN CENTRIFUGE. (RAF Institt. of Aviat. Med., Farnborough, Eng.) FPRC Memo. 75.

599

Browne, M.K. and J.T. Fitzsimons 1957 ALTERATIONS IN THRESHOLD WITH VARYING RATES OF APPLICATION OF POSITIVE ACCELERATION. (RAF Inst. Av. Med., Farnborough). FPRC Memo 80, Mar. 1957.

600

Browne, M.K., & J.T. Fitzsimons 1957 ELECTROCARDIOGRAPHIC CHANGES DURING POSITIVE ACCELERATION WITH A NOTE ON VECTOR-CARDIOGRAPHY (RAF, Institute of Aviation Medicine, Farnborough) FPRC 1009, June 1957. ASTIA AD 141 045.

ABSTRACT: In the human centrifuge 53 subjects have carried out 366 fully instrumented runs under positive accelerations of 3-5 g. The results were analysed for pulse rates, pulse rate intervals, and changes in the electrical axis. Some vector-cardiograms were also recorded.

No abnormal rhythms have been found and the only abnormal pattern was in a subject who lost consciousness at 4 g. Differences in cardiovascular response to g were found between experienced and inexperienced subjects, these were maximal at low g values and disappeared as the g level increased. Unconsciousness causes muscle artefacts in the limb leads and T-wave changes which, however, require cautious interpretation.

Analysis of the electrical axis has been carried out. There are definite trends under g but these are overshadowed by the effect of respiration. Positional changes are complex and cannot be dissociated from respiration. Vector-cardiograms were easily carried out and gave reproducible results but were of little value in studying the heart during positive acceleration.

601

Browne, M. K., & J. T. Fitzsimons 1957 ELECTROCARDIOGRAPHIC CHANGES DURING POSITIVE ACCELERATION, WITH A NOTE ON VECTOR-CARDIOGRAPHY. (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. 1009; ASTIA AD-141 045
Also Brit. Heart J. 21(1):23-30. January 1959.

ABSTRACT: In the human centrifuge 53 subjects have carried out 366 fully instrumented runs under positive accelerations of 3-5 g. The results were analyzed for pulse rates, pulse rate intervals, and changes in the electrical axis. Some vector-cardiograms were also recorded. No abnormal rhythms have been found and

the only abnormal pattern was in a subject who lost consciousness at 4 g. Differences in cardiovascular response to g were found between experienced and inexperienced subjects, these were maximal at low g values and disappeared as the g level increased. Unconsciousness caused muscle artefacts in the limb leads and T-wave changes which, however, require cautious interpretation. Analysis of the electrical axis has been carried out. There are definite trends under g but these are overshadowed by the effect of respiration. Positional changes are complex and cannot be dissociated from respiration. Vector-cardiograms were easily carried out and gave reproducible results but were of little value in studying the heart during positive acceleration. (AUTHOR)

602

Browne, M.K. 1958 STRESS SUMMATION IN FLIGHT. III. EFFECT OF BREATHING PURE OXYGEN AT ATMOSPHERIC PRESSURE ON TOLERANCE TO ACCELERATION. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 1043, April 1958. ASTIA AD 201 164.

ABSTRACT: The effect of breathing pure oxygen at atmospheric pressure on the blackout threshold was measured using a method involving dark adaptation. Respiratory rates and pulse rates were also measured during the course of the experiments.

Breathing pure oxygen did not significantly alter the resting pulse rate or respiratory rate, nor was the effect of g modified by oxygen. The respiratory rate increased during g by 24-28%.

The threshold was raised by 0.5 g after 10 minutes breathing oxygen but had returned to base line levels after 20 minutes. A theory to account for these line levels arter 20 minutes. A theory to account for these changes is discussed in terms of the mechanism of blackout under the present experimental conditions. (Author)

603

Browne, M.K. & J.T. Fitzsimons 1958 STRESS SUMMATION IN FLIGHT: THE EFFECT OF HEAT ON TOLERANCE TO ACCELERATION. (Inst. of Aviation Med., Ro yal Air Force, Farnborough) FPRC 1045 v.

ABSTRACT:

1. The influence of insulin hypoglycaemia on tolerance to acceleration has been studied in six subjects. The end point was central light loss with the dark adapted eye.
2. Hypoglycaemia in the pre-reaction phase is associated with a mean fall in threshold of 0.6 g.
3. During the reaction the threshold rises above the control value. The mean rise is 0.5 g above the control and 1.1 g above the pre-reaction thresh-hold.
4. The possible mechanisms of these changes are discussed.

604

Browne, M.K. & J.T. Fitzsimons 1958 STRESS SUMMATION IN FLIGHT: THE EFFECT OF ALCOHOL ON TOLERANCE TO ACCELERATION. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 1046 vi.

605

Browne, M. K. & J. T. Fitzsimons 1958 STRESS SUMMATION IN FLIGHT III. Effect of Breathing Pure Oxygen at Atmospheric Pressure on Tolerance to Acceleration. (RAF Inst. Av. Med, Farnborough). FPRC 1043. ASTIA AD 201 164

The effect of breathing pure oxygen at atmospheric pressure on the blackout threshold was measured using a method involving dark adaptation. Respiratory rates & pulse rates were also measured during the course of the experiments. Breathing pure O_2 did not significantly alter the resting pulse rate or respiratory rate nor was the effect of g modified by O_2. The respiratory rate increased during g by 24-28%. The threshold was raised by 0.5 after 10 minutes breathing O_2 but had returned to base line levels after 20 min. A theory to account for these changes is discussed in terms of the mechanism of blackout under the present experimental conditions. (Author)

606

Browne, M.K. 1958 STRESS SUMMATION IN FLIGHT. IV. THE EFFECT OF HYPERGLYCAEMIA ON TOLERANCE TO ACCELERATION. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 1041 March 1958. ASTIA AD 209 985

ABSTRACT: The influence of a raised blood sugar on g tolerance has been studied. Hyperglycaemia was produced by the ingestion of 100G glucose in 250 ml. of water, which raised the blood sugar level by about 50%.

There is a large subject variation in response (from minus 0.05g to +0.65g) the mean being an increase of 0.2g in blackout threshold, which is not statistically significant. It is therefore unlikely that the g protection afforded by a meal is due to an in rease in blood sugar level. (Author)

607

Browne, M. K. 1958 STRESS SUMMATION IN FLIGHT. V. THE EFFECT OF INSULIN HYPOGLYCAEMIA ON TOLERANCE TO ACCELERATION. (RAF, Institute of Aviation Medicine, Farnborough) Rept. FPRC-1044; ASTIA AD-201 168

ABSTRACT: The influence of insulin hypoglycaemia on tolerance to acceleration has been studied in six subjects. The end point was central light loss with the dark adapted eye. Hypoglycaemia in the pre-reaction phase is associated with a mean fall in threshold of 0.6 g. During the reaction the threshold rises above the control value. The mean rise is 0.5 g above the control and 1.1 g above the pre-reaction threshold. The possible mechanisms of these changes are discussed. (AUTHOR)

608

Browne, M.K. 1958 STRESS SUMMATION IN FLIGHT. VII. EFFECT OF THE DEGREE OF FILLING OF THE STOMACH ON TOLERANCE TO ACCELERATION. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 1057, Sept. 1958. ASTIA AD 216 281.

ABSTRACT: Distension of the stomach by ingestion of water produces an increase in g tolerance of 0.7 g, the range being 0.3-1.2 g.

There is a significant linear relationship between the quantity of water ingested and the rise in threshold.

Intra-abdominal pressure increases linearly with g and shows an increase with water ingestion. This increase is inadequate to explain the rise in threshold produced.

609

Browne, M. K. 1959 THE EFFECT OF INSULIN HYPOGLYCAEMIA ON TOLERANCE TO POSITIVE ACCELERATION.
Scot. Med. J. 4:438-445, August 1959.

SUMMARY: The influence of insulin hypoglycaemia on tolerance to acceleration has been studied in six subjects. The end point was central light loss with the dark adapted eye.

Hypoglycaemia in the pre-reaction phase is associated with a mean fall in threshold of 0.6g.

During the reaction the threshold rises above this control value. The mean rise is 0.5g above the control and 1.1g above the pre-reaction threshold.

The possible mechanism of these changes is discussed in relation to spontaneously occurring hypoglycaemia.

610

Browne, M. K., & J. T. Fitzsimons 1959 ELECTROCARDIOGRAPHIC CHANGES DURING POSITIVE ACCELERATION. British Heart J. 21:23-30

SUMMARY: Electrocardiographic changes under positive accelerative forces have been studies in the human centrifuge.

During g the pulse rate increases. Subjects who are not used to riding on the centrifuge show greater increases in rate at 3 g compared with experienced subjects. At higher g this difference disappears. The reasons for this are discussed.

No characteristic cardiographic abnormalities were observed and the evidence for ventricular strain is very slender.

Analysis of the electrical axis showed changes under g, but these were little different in magnitude from the changes occurring during respiration. In three subjects no correlation between electrical and anatomical axes was found. (Author)

611

Browne, M.K. & P. Howard 1959 SOME OBSERVATIONS ON THE E.E.G. DURING CENTRIFUGAL ACCELERATION. (Paper, International E.E.G. Congress, Marseilles, 1959)

612

Browne, R. C. 1954 DISORIENTATION IN FLIGHT. (RAF Institute of Aviation Medicine, Farnborough) Report no. FPRC 862; Jan. 1954 ASTIA AD-39 216.

ABSTRACT: Consideration is given to a number of the causes of disorientation which lie on the boundary line of physiology and psychology. The solution of this problem of disorientation was considered to require a combination of indoctrination, training, and clear display of attitude in aircraft.

613

Brubaker, R.E. 1945 AIR BLAST INJURY, CASES Bull U.S. Army Med. Dept. pp. 110-114.

614

Bruggink, G. M., J. Carroll, & W. R. Knowles 1960 CRASH INJURY EVALUATION: U. S. ARMY AC-1 DE HAVILLAND CARIBOU, FT. RUCKER, ALABAMA, 21 JANUARY 1960. (Aviation Crash Injury Research, Phoenix, Arizona) AvCIR-14-PV-121; TREC Tech. Rept. 60-62, October 1960

SUMMARY: The crash injury evaluation of the U. S. Army AC-1 SH "Caribou" disclosed several desirable crash safety features including a limit landing gear strength which permits a vertical rate of descent of 14 feet per second; the location of the fuel cells outboard of the engine nacelles; troop seat belt anchorages which are directly secured to basic aircraft structure.

The evaluation also revealed a number of crash safety deficiencies in the crew and troop seats, litter installation, number and location of emergency exits in the main cabin, and the related Military Specification. (Author)

615

Bruggink, G. M. 1961 IMPACT SURVIVAL IN AIR TRANSPORT ACCIDENTS. (Aviation Crash Injury Research, Phoenix, Arizona) AvDIR-8CSS-129, 29 January 1961

ABSTRACT: Three air transport accidents are analyzed to determine the effects of occupant restraint and occupant environment on impact survival. The results of this study indicate that the current occupant protection criteria do not fully utilize the apparent crash resistance of modern fuselage structure. (Author)

616

Bruggink, G. M., D. J. Schneider & L. E. Spencer 1961 CRASH INJURY INVESTIGATION: U.S. ARMY HU 1A BELL IROQUOIS HELICOPTER ACCIDENT, FORT CARSON, COLORADO, 10 AUGUST 1961. (Aviation Crash Injury Research, Phoenix, Arizona) AvCIR 61 13; TREC Tech. Rept. 62 10, September 1961. ASTIA AD 274 905L.

ABSTRACT: Report is made of crash injury investigation involving a U.S. Army HU 1A aircraft to determine cause of fatalities and extent of aircreft damage. Wreckage was examined at the crash site, photographs obtained, and reconstruction of the approximate kinematics of the crash sequence made. Although the accident was considered nonsurvivable with respect to impact conditions and resulting cabin/cockpit destruction, the investigation revealed a significant trend in the failures of the cast structures in the crew and passenger restraint systems. It was recommended that the use of cast structures in occupant restraint systems be discontinued. (Author)

617

Bruggink, G. M. & D. J. Schneider 1961 LIMITS OF SEAT-BELT PROTECTION DURING CRASH DECELERATIONS.
Rev. Med. Aero (Paris) 2:204-209, Dec. 1961

618

Bruggink, G. M., and Daniel J. Schneider 1961
LIMITS OF SEAT_BELT PROTECTION DURING CRASH DEC ELERATIONS
(Aviation Crash Injury Research, Phoenix, Arizona)
Rept. no. AvCIR 61-8. TREC TR 61-115 September
ASTIA AD 265 868L

ABSTRACT: The protective limits of aircraft seat-belt protection, as discussed in the available literature, are compared with recent crash injury experience. To insure maximum survivability under the most adverse conditions, the strength of a seat-belt restraint system should be based on the threshold between the injurious and fatal limits of seat-belt restraint. The study indicates that an aircraft seat-belt restraint with an energy absorbing capability of 25 G's (occupant weight, 200 pounds) for a duration of at least .2 second may form a realistic compromise between the ideal and the practicable strength of such a system. (Author)

619

Bruggink, G. M. & D. J. Schneider 1963 LIMITS OF SEAT-BELT PROTECTION DURING CRASH DECELERATIONS.
Industr. Med. Surg. 32:33-37, Jan. 1963

620

Bruggink, G. M. 1962 FORCED LANDING TECHNIQUES IN GENERAL AVIATION TYPE AIRCRAFT. (Paper, 7th Annual Business Aircraft Safety Seminar, San Francisco, Calif., 3-4 April 1962)

621

Bruggink, G. M. 1962 CRASH INJURY RESEARCH AND ITS APPLICATION TO ARMY AIRCRAFT. (Paper, presented in the Principles of Aviation Medicine and Aeromedical Evacuation Course at the Medical Field Service School, Brooke Army Medical Center, Fort Sam Houston, Texas, June 11-15, 1962) (Aviation Crash Injury Research, Phoenix, Arizona) AvCIR 62-8, June 1962

ABSTRACT: This report contains a brief review of the background, the development, and the activities of Aviation Crash Injury Research, especially with respect to Army aviation.

622

Bruner, J. M. 1955 SEASICKNESS IN A DESTROYER ESCORT SQUADRON.
U.S. Armed Forces Med. J. 6(1):469-490.

SUMMARY: Data obtained from a questionnaire answered by 699 men aboard an escort squardron revealed that about 13 percent of the men were habitually seasick, while 40 percent were never seasick. It appears that increasing sea experience is associated with a decrease in incidence of chronic seasickness. Most of the affected subjects had had a history of air or car sickness.

The increased tendency for the malady to appear aboard smaller vessels may be due to their short length and small moment of inertia.

The potential value of drug therapy is not realized in the naval activity examined. Drawing upon previous reports and upon observations within the Squadron, the natural history of motion sickness is discussed. It is believed that military seasickness is an important problem, rather neglected at the practical level. The problem is open to attack through improved application of existing knowledge and therapeutic agents.

623

Bryan, G.L., N.D. Warren, R.C. Wilson, N.E. Willmorth, & D. Svenson 1949 PSYCHOLOGICAL STUDIES ON THE HUMAN CENTRIFUGE: IX. THE EFFECT OF INCREASED POSITIVE RADIAL ACCELERATION UPON THE ABILITY TO MANIPULATE TOGGLE SWITCHES. Rep. Psychol. Lab. Univ. Southern, Calif., 1951, No. 5

ABSTRACT: 30 male subjects were exposed to 1, 2.5, and 4.0 G of positive radial acceleration on the human centrifuge during which their reactions in operating toggle switches were tested. Toggle switches were located at the level of the subjects' shoulder, and above, below, right, and left of this reference point. Each switch was operated up, down, right, or left. Two time measures were taken: Reaction Time was the time between onset of the signal and release of the starting key, and Movement Time was the interval from release of the reaction key to completion of toggle switch operation. It was found that increase in G force increased both Reaction Time and Movement Time. The effects differed for the different switch positions and switch motions.

624

Brunner, H.J. 1943 LABYRINTH IN AVIATION. J. Aviation Med. 14:132-150, June 1943

ABSTRACT: In flying, the labyrinth may be stimulated by (2) rotating motions of the airplane, (b) inclination, and (c) straight-away acceleration and deceleration in either horizontal or vertical phases or through a combination of both directions. These stimulii upon the labyrinth produce sensations and reflexes. It was found through experiments that the function of the normal labyrinth is of little help to the aviator.

625

Bryan, G. L. 1950 AN INVESTIGATION OF CERTAIN AFTER EFFECTS OF PROLONGED EXPOSURE TO POSITIVE RADIAL ACCELERATION. (Paper presented at 30th annual meeting of the Western Psychological Assoc., 27-29 April 1950, Santa Barbara, Calif.)

ABSTRACT: An investigation of relatively long-lasting after-effects of prolonged exposure to moderate g intensities. A test battery was constructed on the basis of interviews with flight personnel. This battery was administered to a control group (1.5g) and an experimental group (3 g) immediately before and after rotation.

Results: No significant differences, attributable to g, between groups or between prior- and post-exposure scores. (Am. Psychologist, 5(9):465, Sept. 1950)

626

Bryan, G. L., R. C. Wilson, et al. 1951 PSYCHOLOGICAL RESEARCH ON THE HUMAN CENTRIFUGE. (Dept. of Psychology, Univ. of Southern Calif., Los Angeles) Contract N6ori77, Task Order III; ASTIA AD-159 432

CONTENTS:

Stick force estimation;
Maximum pull;
Spatial orientation;
Maximum forces upon elevator and aileron controls;
Perceptual speed;
Simple reaction time;
Discrimination reaction time;
Pupilary reflex;
Speed and accuracy of target striking;
After-effects of radial acceleration;
Toggle switch manipulation;
Adjustive reactions

627

Bryan, G.L. 1952 THE EFFECTS OF INCREASED POSITIVE RADIAL ACCELERATION ON MANIPULATING TOGGLE SWITCHES. (Ph.D. Dissertation, The University of Southern California, 1952)

628

Bryan, G. L., R. C. Wilson, N. E. Willmorth, D. W. Svenson, G. A. Green, & N. D. Warren June 1952 THE EFFECTS OF INCREASED POSITIVE RADIAL ACCELERATION ON REACHING AND MANIPULATING TOGGLE SWITCHES. (Psychological Laboratory, University of Southern Calif.) Conts. No. N6ori 77 Task Order 3, Rept. No. 5.

ABSTRACT: Healthy young male students were employed as subjects in an attempt to determine their ability to react to, reach and manipulate toggle switches mounted in five locations before them, using either hand, under conditions of three g-levels and four directions of switch action. The following gereral conclusions were reached: (a) both Reaction Time and Movement Time are lengthened as additional g-forces are imposed. (b) the time taken to react to, and to reach a switch varies with its location, and with the amount of g imposed. (c) in general, the results from the analysis of the direction of Switch Action variable are insignificant, but there are tendencies that indicate that: (1) forehand movements are quicker than backhand movements in the right-left directions. (2) outward movements are quicker than inward movements on the Top and Bottom Switch Locations. (3) in terms of Reaction Time, the Down Switch Action is shortest. (e) the time required to react to, reach, and manipulate toggle switches is roughly equal for either hand.

629

Bryson, A.E., W.F Denham, F.J. Carroll and K. Mikami, 1961 DETERMINATION OF THE LIFT & DRAG PROGRAM THAT MINIMIZES RE-ENTRY HEATING WITH ACCELERATION OR RANGE CONSTRAINTS USING A STEEPEST DESCENT COMPUTATION PROCEDURE. (Paper presented at IAS 29th annual meeting, 23-25 Jan 1961, New York), Paper no. 61-6

ABSTRACT: This procedure has been used to determine the α program that minimizes total heating for a representative hypersonic glider injected into a low satellite orbit at 26,000 ft. sec-1, subjected to the constraint that the vehicle travel once around the earth; to determine α programs that minimize total heating for a representative hypersonic glider entering the earth's atmosphere at 35,000 ft. sec-1, subject to a pilot acceleration tolerance constraint; and to determine drag modulation programs that minimize total heating for a representative non-lifting vehicle entering the earth's atmosphere at 35,000 ft. sec-1 subject to a pilot acceleration tolerance constraint.

630

Buchheim, R. W. 1957 A DISCUSSION OF SPACE FLIGHT. (Rand Corp., Santa Monica, Calif.) Contract No. AF18(600)-1600, Rept. No. S-53-1; ASTIA AD-151 526; 2 May 1957, rev. 23 July 1957

631

Buchheim, R. W. 1957 A DISCUSSION OF THE RAND SPACE FLIGHT PROGRAM (The RAND Corporation, Santa Monica, Calif.) S-59, July 29, 1957 ASTIA AD 133 038

ABSTRACT: A collection of five papers on the RAND space-flight program presented to the Air Force Scientific Advisory Board of Advanced Weapons Technology and Environment. Such topics are discussed as the Lunar Instrument Carriers, experiments on the moon from the moon's surface, an interplanetary system experiments with interplanetary instrument carriers, and Soviet space-flight activities.

632

Buchheim, R. W. 1957 OUTLINE OF A STUDY OF MANNED SPACE FLIGHT (The RAND Corporation, Santa Monica, Calif.) RM-2005, Sept. 27, 1957, ASTIA AD 144 296.

ABSTRACT: An outline of a study program for manned space flight. The program is presented in terms of the characteristic phases of any space-flight mission, from primary propulsion to the final recovery phase, and of the nature of early manned space-flight missions. The author discusses the problems affecting the human component of a space-flight system, the various considerations influencing vehicle design and operation, the required ground facilities and operations, and the problem of space-flight terminology. A listing of specific study topics for a research program is included.

633

Buchheim, R.W., & H.A. Lieske 1958 LUNAR FLIGHT DYNAMICS
(The Rand Corporation, Santa Monica, Calif.) P-1453, Aug. 6, 1958.
ASTIA AD 244 721

ABSTRACT: This paper presents a brief survey of the general subject of lunar flight with particular reference to flight trajectories, including discussion of the general nature of the trajectory problem, classes of trajectories, initial conditions, and sensitivities to initial conditions. The associated subjects of orientation control and launching requirements are also introduced.

634

Buchheim, R. W. et. al. 1958 SOME ASPECTS OF ASTRONAUTICS
(The RAND Corporation, Santa Monica, Calif.) P-1442, July 23, 1958.

ABSTRACT: A discussion of some aspects of astronautics, including space environment, basic laws of celestial mechanics, orbital elements, perturbations and precision, lunar and interplanetary flights, and experimentation in space.

635

Buchheim, R. W. 1958 LUNAR FLIGHT
(Rand Corp., Santa Monica, Calif.) Rept. No. P-1248; 7 Jan. 1958

ABSTRACT: A summary outline of a lecture on the basic mechanics of lunar flight to be presented to a class on Space Technology held at UCLA Extension. The study of lunar flight is presented in a discussion of factors relating to: 1) the earth-moon system; 2) qualitative characteristics of motion in earth-moon space; 3) types of lunar flights; and 4) flight requirements.

636

Buchheim, R. W. 1958 TYPES OF SPACE FLIGHTS
(Rand Corp., Santa Monica, Calif.)
Pept. No. P-1428; 24 Feb. 1958

637

Buchheim, R. W., & H. A. Lieske 1958 LUNAR FLIGHT DYNAMICS.
(Rand Corp., Santa Monica, Calif.) Rept. No. P-1453; ASTIA AD-244 721

ABSTRACT: A brief survey of the general subject of lunar flight is presented with particular reference to flight trajectories, including discussion of the general nature of the trajectory problem, classes of trajectories, initial conditions, and sensitivities to initial conditions. The associated subjects of orientation control and launching requirements are also introduced.

638

Buchheim, R. W. and RAND Corp. Staff 1959 SPACE HANDBOOK: ASTRONAUTICS AND ITS APPLICATIONS
(New York, N. Y., Random House, 1959).

ABSTRACT: Chapter 15 entitled "Environment of Manned Systems" includes a short section on weightlessness.

639

Buchanan, D. W. 1959 TRIALS WITH AN EMERGENCY BARRIER TYPE S. 1 FOR USE WITH "SCIMITAR" AIRCRAFT.
(Royal Aircraft Establishment, Farnborough) June 1959
Tech note n. Naval 37

640

Buchner, F., H. W. Altmann et al 1948 SPECIAL PATHOLOGY. PART I.
(Office of Military Government for Germany, Field Information Agencies Technical, Wiesbaden). ASTIA ATI 107 089.

641

Buckhout, R. 1962 A BIBLIOGRAPHY ON AIRCREW PROFICIENCY MEASUREMENT
(6570th Aerospace Medical Research Labs, Wright-Patterson Air Force Base, Ohio). Technical Documentary Report No. MRL-TDR-62-49, May 1962.

ABSTRACT: Reports on aircrew proficiency measurement are compiled in the interest of research on the problem of assessing the performance of combat aircrew members. Particular emphasis has been placed on material related to the potential use of groundbased flight simulators as sophisticated, objective

642

Buckhout 1962 A WORKING BIBLIOGRAPHY ON THE EFFECTS OF MOTION ON HUMAN PERFORMANCE (Aerospace Medical Division, 6570th Aerospace Medical Research Lab., Wright-Patterson AFB, Ohio) Rept. No. MRL-TDR-62-77, July 1962. ASTIA AD 287 530

ABSTRACT: In this bibliography a list of reports is compiled from a number of disciplines which bear on the problem of motion and its effects on human performance. Psychophysiological reports in the area of spatial orientation, perception, and receptor mechanisms provide background on the human organism in relation to motion stimuli. The effects of aerospace vehicle motion are represented by a compilation of studies of performance under acceleration, vibration and buffeting, tumbling, and weightlessness. Finally reports on training and motion simulation, equipment and methodology, and general analyses of the whole problem area are presented.

643

Buddenhagen, T. F. & M. P. Wolpin 1961 A STUDY OF VISUAL SIMULATION TECHNIQUES FOR ASTRONAUTICAL FLIGHT TRAINING (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 60-756 March 1961

ABSTRACT: A study was made of the engineering requirements for visual simulation in astronautical flight training and of the basic techniques available to accomplish such simulation. An evaluation of the potentialities of the various techniques led to the choice of closed circuit television as an image transfer technique. A preliminary design concept using this technique was formulated to determine the areas in which development work will be required prior to the design of a complete simulator. This report includes a compilation of applicable techniques, a determination of the probable visual environment of space, and an investigation of a method to predict the perceptual fidelity achieved by various simulation techniques as an aid in optimizing the training value of a simulator.

644

Buechner, Franz, H. W. Altmann, W. Giese et al 1948 SPECIAL PATHOLOGY - PART I (Spezielle Pathologie, Teil 1). FIAT Feview of German Sciences 1939-1946. ASTIA ATI 197 089

ABSTRACT: Military Government of the British, French and US Zones of Termany by means of their respective FIATs (Field Information Agency, Technical) present this volume of the "FIAT Review of German Science" in the hope that it will assist in informing international science of research done in Germany throuhg the war years. It is believed this and its companion volumes will present a complete and concise account of the investigations and advances of a fundamental scientific nature made by German scientists in the fields of biology, chemistry, mathematics, medicine, physics and sciences of the earth during the period May 1939 to May 1946.

645

Buechner, F., H.W. Altmann, W. Buengeler ec al. 1948 GENERAL PATHOLOGY (PART II). (Allgemeine Pathologie Teil III). FIAT Review of German Sciences 193901946. ASTIA ATI 54 661.

ABSTRACT: A condensed review is presented of scientific advances made by the Germans during 1939 to 1946 in the field of general medical pathology, with special reference to the pathology of tumors and malformations, and the general pathology of environment. In addition, various inflammatory processes and endocrinal pathology are discussed. An author and subject index is appended.

646

Buettner, K. 1951 BIOCLIMATOLOGY OF MANNED ROCKET FLIGHT. In Marburger, G. P., ed., Space Medicine (Urbana, Illinois: University of Illinois Press, 1951) Chapter 6

647

Buettner, K. J. K., & H. Haber 1952 THE AEROPAUSE
Science 115(2998):656-657, June 13, 1952

ABSTRACT: "Aeropause" is a term designating that atmospheric region in which space-equivalent conditions are being approached with respect to physiological and mechanical effects (between altitudes of 20 and 200 km).
Such a functional concept should likewise be applied to zones within the aeropause. Among the functions in question are the following: boiling of body fluids sustaining combustion of fuel, supply of diffuse daylight, and thermal interaction with the craft. The solution of the problems that arise in navigating through these zones requires the co-operation between meteorologists, geophysicists, astronomers, radiobiologists, physiologists, flight surgeons, bioclimatologists, and human engineers. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space Medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903; ASTIA AD-227 817

648

Buettner, K. J. K. 1959 SPACE MEDICINE OF THE NEXT DECADE AS VIEWED BY AN ENVIRONMENT PHYSICIST.
U. S. Armed Forces Med. J. 10(4):416-426

ABSTRACT: The author predicts the state of the art ten years hence with respect to man's environment in space flight. This environment will be a capsule protecting him from outer atmosphere or the lack of it, cosmic missiles and rays, and heat and cold, and providing him with a frame to cope with high G and no G. Besides providing food, water, air, and waste disposal, the capsule has to function as an observatory, as a communication center and, probably, as a control center for the ship.

649

Bugrov, B. G., O. G. Gorlov, A. V. Petrov, A. D. Serov, Ye. M. Yogov, & V. I. Yakovlev 1958 PRELIMINARY RESULTS OF SCIENTIFIC INVESTIGATIONS CARRIED OUT WITH THE AID OF THE FIRST SOVIET ARTIFICIAL EARTH SATELLITES AND ROCKETS. PART III. MEDICO-BIOLOGICAL INVESTIGATIONS WITH ROCKETS. Sbornik Statei (USSR)

Report includes: Galkin, A. M., O. G. Gorlov, A. R. Kotova, I. I. Iosov, A. V. Petrov, A. F. Serov, V. N. Chernov, & V. I. Yakovlev, Investigations of the Vital Acticity of Animals During Flights in Hermetically-Sealed Cabins to an Altitude of 212 Kilometers.

ABSTRACT: The aims of this work were to determine: (1) the effectiveness of using a pressure suit for sustaining life in the case of dehermetization of the cabin under conditions following an extended (up to one hour) stay at 110-k, altitudes, (2) the possibility of releasing the cabin by means of a catapult with velocities of more than 100 m/sec at altitudes of 80-90 km, (3) the character and degree of the effects of specific factors of flight on a living organism while in the upper atmosphere. Subjects were 12 dogs, weighing four to five kilograms. Six of them flew twice. To study the direct effect of flights upon the subjects during the entire time from rocket launch to animal landing, automatically recorded were maximum and minimum blood pressure, pulse rate, respiratory rate, and body temperature. For studying the more remote aftereffects offlights, particularly to determine their effect on the hemopoietic system and heart activity, pre- and post-flight tests consisted of EKGs and clinical blood analyses. Essential conslusions were: maskless pressure suits ensured safe flight, and catapulting and parachute systems ensured safe recovery of the animal; failure of certain registration systems occureed as a function of strong vibrational in the initial moment of launching; it was not possible to note any regular pattern in the arterial pressure change during the free-fall period-arterial pressure rose in some cases and dropped in others; pulse-rate variations observed during active flight seem to be determined by individual nervous-system characteristics of each animal; in a number of cases changes in cardiovascular and respiratory function were accompanied by passive-defensive (urination-defecation) reactions; there were no notable differences between pre- and post-flight blood analyses; the results of the ESR index variation prevented well-founded conclusions as yet from the relatively limited material; no changes in the animals' general, skin, or hair pigmentation which might be related to cosmic radiation could be found; six to seven months' postflight observations revealed no notable changes in the behavior of the animals; the need for improved registration apparatus was made clear.

650

Bugrov, B. G. A. V. Petrov, Ye. M. Yugov, O. C. Gurlov, A. D. Serov, & V. I. Yakovlev 1958 INVESTIGATIONS OF THE VITAL ACTIVITY OF ANIMALS DURING FLIGHTS IN A NON-HERMETICALLY SEALED ROCKET CABIN TO AN ALTITUDE OF 110 KILOMETERS. In Sbornik Statey No. 1

651

Bugrov, B. G., et al. 1958 ISSLEDOVANIIA ZHIZNEDEIATEL'NOSTI ZHIVOTNYKH PRI POLETAKH V NEGERMETICHESKOI KABINE RAKET DO VYSOTY 110 KM. (STUDIES ON VITAL FUNCTIONS IN ANIMALS DURING FLIGHT IN NON-HERMETIC CABINS IN ROCKETS UP TO 110 KM) In Preliminary Results of Scientific Researches on the First Soviet Artificial Earth Satellites and Rockets, Articles XIth, Section of I G Y Program (Rockets and Satellites), No. 1 (Moscow, Academy of Sciences, 1958) pp. 130-149

652

Bührlen, L. 1937 VERSUCHE ÜBER DIE BEDEUTUNG DER RICHTUNG BEIM EINWIRKEN VON KLIEHKRÄFTEN AUF DEN MENSCHLICHEN KORPER. (Experiments On The Significance Of Directior In The Effect Of Centrifugal Force On The Human Body). Luftfahrtmed., 1:307-325, 1937

ABSTRACT: Centrifugal force experiments were performed on persons in the sitting and recumbent positions at the Aviation Institute in Berlin. The centrifugal force was measured by optic record of the convolutions to within a small precentage. In the sitting position (centrifugal force direction: vertical) the same symptoms were noted as those seen in aviation. Prolonged acceleration beyond 5 g. produced visual distrubance. In the recumbent position (centrifugal force direction: horizontal chest-to-back) up to 10 g. no significant disturbances other than slight respiratory constriction were noted. Beyond 10 g. respiration was markedly affected, and at 15 g. became almost impossible. At 14-15 g. also visual distrubances developed although the brain and consciousness were not affected. To obtain information of practical value it is suggested that practical experiments in planes with adjustable seats be attempted. (J. Aviation Med. 8(3):150-151).

653

Bulmer, M.G., & C.I. Howarth 1957 A MODEL OF NON-RANDOMNESS IN THRESHOLD EXPERIMENTS. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 974(a). June 1957. ASTIA AD 209 987

ABSTRACT: A model is put forward which accounts quantitatively for the tendency of responses to be repeated in visual threshold experiments. It is supposed that the subject's threshold changes between each response. After saying "Yes", the threshold is lowered by an amount proportional to the distance of the threshold from a lower limiting threshold, T_L, thus making the subject more likely to say "Yes" the next time; after saying "No", the threshold is raised by an amount proportional to its distance from an upper limiting threshold, T_U. Predictions from this model agree well with experimental results reported elsewhere.

654

Buning, H. 1961 FLIGHT SIMULATION OF ORBITAL AND REENTRY VEHICLES PART III. AERODYNAMICS INFORMATION REQUIRED FOR SIX DEGREES OF FREEDOM SIMULATION. (Aeronautical Systems Division, Air Force Systems Command, Wright-Patterson AFB, Ohio) ASD TR 61-171 (III). Dec. 1961. ASTIA AD 282 995

ABSTRACT: A survey of the aerodynamic information required for a simulator for a glide reentry vehicle is presented. Various phases of the flight are considered: hypersonic reentry, hypersonic-supersonic glide, and supersonic-transonic-subsonic approach and landing. Accuracy requirements and origin of aerodynamic information are briefly discussed. Aerodynamic parameters are defined, and the dependence of aerodynamic coefficients on these parameters is outlined. Special emphasis is placed on a technique for generating functions of two or three independent variables and some sample calculations are presented.

655

Burgess, B.F. 1955 EFFECTS OF G-FORCES ON AIRCRAFT OXYGEN SYSTEMS; FINAL REPORT ON EVALUATION OF
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR12, Sept. 1, 1955

ABSTRACT: A mockup of the F9F oxygen system was subjected to acceleration stress patterns varying in magnitude and direction. The direction of stress was varied through the three axes of the installation and up to 15 G. The oxygen equipment remained on the centrifuge for 4 months. The oxygen regulator continued to perform satisfactorily.

656

Burgess, B. F., J. L. Brown, & R. M. Herrick 1955 THE EFFECT OF HYPOXIA ON HUMAN TOLERANCE TO ACCELERATION (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 320, 31 Dec. 1955

ABSTRACT: Preliminary investigations on the centrifuge gondola evacuations have been conducted to test the mechanical capabilities of the vacuum system to simulate various altitudes.

657

Burgess, B. F., & H. N. Hunter 1955 THE G-PROTECTION PROVIDED BY THE FULL PRESSURE HALF SUIT. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5511, 23 Sept. 1955

658

Burgess, B.F. & H.N. Hunter 1955 TEST AND DEVELOPMENT OF ANTI-BLACKOUT EQUIPMENT
(Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 310; TED ADC AE-5201, 31 Dec. 1955

ABSTRACT: A study of G tolerances has been made on trained centrifuge subjects wearing various types of anti-G suits. (1) An experimental full-pressure half suit, due to severe discomfort, was found to limit the protection to no more than that provided by the standard Z-2 suit plus straining. (2) An integrated anti-blackout suit (basically a Z-2 suit with built-in parachute and restraint harness) was evaluated and found to be very comfortable and to provide the same protection as the standard Z-2 suit.

659

Burgess, B. F., B. D. Polis, & C. F. Gell 1955 A STUDY OF ANATOMICAL DISTORTIONS, FLUID TRANSLOCATION, AND ELECTROLYTE CHANGES IN ANIMALS UNDER ACCELERATION STRESS, UTILIZING SPECTROPHOTOMETRIC, RADIOBIOLOGIC, AND QUICK FREEZE TECHNIQUES. PHASES II AND III. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 312; 31 Dec. 1955

ABSTRACT: It has been shown that brain and muscle tissue of rats lose potassium and gain sodium due to the stress of acceleration. It was also shown that the muscle and brain tissue electrolytes were affected in opposite directions when the animals were subjected to acceleration stress patterns.

660

Burgess, B.F. 1956 INTEGRATED ANTI-BLACKOUT SUIT
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR15, Feb. 6, 1956

ABSTRACT: In a total of 75 runs on the centrifuge, 4 subjects were used to evaluate the characteristics of the integrated anti-blackout suit. G protection with the suit ranged from 0.7 to 1.8 G with a mean protection of 1.1 G. The MA-1 parachute/safety harness integration did not interfere with, or reduce, the efficiency of these features. All subjects wearing this suit during the test found it more comfortable than the standard Z-2 suit with the parachute harness worn over the suit.

661

Burgess, B. F. 1957 SOME PHYSIOLOGICAL AND PATHOLOGICAL EFFECTS OF ACCELERATION STRESS (A symposium sponsored by the Office of Naval Research as part of its decennial year. (March 1957) pp. 98-108)

ABSTRACT: Current emphasis in effects of acceleration upon speed and maneuverability have increased the significance of the effects of gravitational forces. Comprehensive studies of the five most frequently encountered acceleration patterns have been conducted at this laboratory. These five types of G forces are: (1) positive (head to foot), (2) negative (foot to head), (3) transverse (chest to back), (4) fluctuating positive, and (5) cyclic (alternating positive and negative).

Animal studies have provided information from which it is possible to extrapolate and predict the maximum human tolerance and the ultimate rupture points for the various mechanical systems of the body.

Data obtained from both human and animal experimentation have added much to our knowledge of the sequence of physiological events which ultimately terminate in either disorientation or unconsciousness of the subject exposed to acceleration stress. From the information obtained on the centrifuge, we are able to estimate intelligently the physiological limits of acceleration stress to which man can be exposed without producing permanent damage. (Literatuuroverzicht Ruimtevaartgeneeskunde) (Space Medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903; ASTIA AD-227 817; Feb. 1959.

662

Burgess, B. F. 1958 TEST AND EVALUATION OF U.S. AIR FORCE EXPERIMENTAL CUT-AWAY TYPE ANTI-BLACKOUT SUITS, DESIGNATED MA-1 (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR51 April 30, 1958

ABSTRACT: The Air Force MA-1 suit and the standard Navy Z-3 suit were compared through tests conducted on the human centrifuge. Six experienced centrifuge subjects were exposed to acceleration stress while seated in a mocked-up cockpit seat with lap belt and shoulder harness. Each series of runs began at the 2.5 G level and subsequent runs were increased by 0.25 G increments until the end point was reached. The runs were 40 seconds in duration with peak G maintained for 15 seconds or until the subject noted peripheral light loss and stopped the run himself. It was concluded that there is no significant difference between the G protection provided by the Air Force MA-1 suit and the Z-3 suit. In general, the subjects found the Z-3 suit more comfortable while under acceleration. The major complaint against the MA-1 suit was that the larger abdominal bladder tended to produce slight nausea due to pressure in the "pit of the stomach". Because of this factor and the fact that both suits provided equal G protection it was concluded that the Z-3 suit was the more desirable of the two suits.

663

Burgess, B. F., Jr. 1958 THE EFFECT OF HYPOXIA ON TOLERANCE TO POSITIVE ACCELERATION
J. of Aviation Medicine 29(10):754-757, October 1958

ABSTRACT: Low oxygen partial pressures caused centrifuge subjects to show a decreased tolerance to acceleration stress. Not all subjects however, were equally affected by the induced hypoxia. The general symptoms of hypoxia in conjunction with acceleration stress are very characteristic and, although they are more pronounced, are similar to those produced in the low pressure chamber. The data emphasize the hazard to which a pilot subjects himself when he fails to use supplemental oxygen under conditions producing a relatively mild hypoxia state. (Author)

664

Burgess, B.F., Jr. 1958 THE EFFECT OF HYPOXIA ON TOLERANCE TO POSITIVE ACCELERATION. (U.S. Naval Air Development Center, Aviation Medical Acceleration Lab., Johnsville, Pa.) NADC-MA-5804, 12 March 1958. ASTIA AD-209 174

ABSTRACT: Low oxygen partial pressures caused centrifuge subjects to show a decreased tolerance to acceleration stress. Not all subjects however, were equally affected by the induced hypoxia. The general symptoms of hypoxia in conjunction with acceleration stress are very characteristic and, although they are more pronounced, are very similar to those produced in the low pressure chamber. The data emphasizes the hazard to which a pilot subjects himself when he fails to use supplemental oxygen under conditions producing a relatively mild hypoxic state. (Author)

665

Burgess, B.F., Jr. 1959 THE EFFECT OF TEMPERATURE ON TOLERANCE TO POSITIVE ACCELERATION. (Presented on April 27, 1959 at the 30th annual meeting of the Aero Medical Association, Los Angeles, Calif.)

ABSTRACT:With the advent of space flight, the problems associated with the physiological effects of extreme temperatures may become a critical factor relating to pilot performance under conditions of high acceleration. In order to determine the effects of high environmental temperatures on G tolerance, six trained centrifuge subjects were exposed to positive acceleration in the heated gondola of the Johnsville centrifuge. Seven thermocouples were located at strategic places over the body surface in order to obtain an accurate recording of skin temperature. Although humidity was not controlled, it was recorded during all centrifuge runs. The environmental temperatures studied to date range from 75° F. to 115° F. where a decrement in G tolerance of ½G has been obtained at the upper temperature range.Further studies will be made at higher temperatures approaching conditions of heat exhaustion.

666

Burgess, B.F., Jr. 1959 THE EFFECT OF TEMPERATURE ON TOLERANCE TO POSITIVE ACCELERATION. (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-5905, 26 May 1959. ASTIA AD 218 957.

ABSTRACT: Six trained centrifuge subjects received positive acceleration in an environmental temperature that ranged from 75° to 160° F. The relative humidity, which was not controlled, ranged from 55% at the lowest temperature to 90% at the highest temperature. The results obtained from this investigation were not unexpected. Previous studies showed that high environmental temperatures produced lowering in tolerance to acceleration in both man and animal. It was found that the elevated temperatures produced no significant change in the time required to respond to visual stimuli until we reached the level of impending heat exhaustion. On several occasions at the 160° F level the subjects failed to answer the lights although they reported the lights as appearing bright and clear. Coordination at this temperature level became poor and the capacity for concentration became very limited.

667

Burgess, B. F. 1959 THE EFFECT OF TEMPERATURE ON TOLERANCE TO POSITIVE ACCELERATION. Aerospace Medicine 30(8):567-571, Aug. 1959
See also (Naval Air Development Ctr., Johnsville, Pa.) NADC MA-5905. ASTIA AD-218 957

ABSTRACT: With the advent of space flight, the problems associated with the physiological effects of extreme temperatures may become a critical factor relating to pilot performance under conditions of high acceleration. In order to determine the effects of high environmental temperatures on G tolerance, six trained centrifuge subjects were exposed to positive acceleration in the heated gondola of the Johnsville centrifuge. Seven thermocouples were located at strategic places over the body surface in order to obtain an accurate recording of skin temperature. Although humidity was not controlled, it was recorded during all centrifuge runs. The environmental temperatures studied ranged from 75°F to 160°F where a decrement in G tolerance of 1 G has been obtained at the upper temperature range. (AUTHOR)

668

Burgess, B. F. June 1960 TOLERANCE TO ACCELERATION. Mechanical Engineering Magazine. 82(6):62-63. See also "The Effect of Temperature on Tolerance to Positive Acceleration," ASME Paper n. 59-A-212

ABSTRACT: Experiments were used to establish a realistic maximum temperature that can be tolerated with only ordinary clothing, during intermittent positive acceleration for periods of 1 hour or longer. The change in tolerance to acceleration was used as criterion for determining the efficiency of the com-

pensatory mechanisms of the body in combating the stress imposed by the high environmental temperature. The physiologic end-point used was peripheral light loss. Six trained centrifuge subjects received positive acceleration in an environmental temperature that ranged from 75° to 160° F. The experiment was terminated at the 160° F. level because the skin temperature had reached 102° F., and symptoms of impending heat exhaustion were prevalent. The lowest temperature to produce a degradation in g tolerance was 100° F., were a decrement of approximately 0.2 g units was observed. At 160° F., there was an average decrease of 1.0 per cent. The average time required for subjects to lose peripheral vision at their maximum g levels was 3.0 seconds after peak g was attained. Temperature had no apparent effect on this time nor on the time necessary for subjects to regain peripheral vision.

669

Burgess, Eric 1958 SATELLITES AND SPACEFLIGHT
(New York: MacMillan, 1958)

ABSTRACT: A factual survey of developments in the field of rocket propulsion, interplanetary travel and the establishment of satellite bodies.

670

Lewis, N. M. & K. L. Burdick 1961 EFFECTS OF PRESSURE SUIT INFLATION AND REACTION TIMES OF PROJECT MERCURY ASTRONAUTS.
Aerospace Med. 32(9):849-852.

SUMMARY: The reaction times of the Project Mercury astronauts were tested under two conditions of pressure suit inflation: 0 psi and 5 psi. Under the 5 psi condition, reaction times increased significantly as did the frequency of inadvertent actuation.

671

Barton, Ralph 1958 VIBRATION AND IMPACT
(Reading, Mass.: Addison-Wesley Publishing Co., Inc., 1958) Lib Cong. Card No. 58-9655

ABSTRACT: Contents include chapters on the following subjects:
1. Introduction
2. Classification
3. Vibratory Systems Commonly Found in Machinery
4. Impact
5. Free and Forced Vibration

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6. Impact
7. Nonlinear Vibration
8. Measurement: Instruments and Analogs.
9. Systems with Two Degrees of Freedom
10. Numerical Computation of Natural Frequencies for Systems with Many Degrees of Freedom.
11. Waves
12. Vibrating Beams and Related Subjects
13. Analysis of Control Systems
14. Fatigue

672

Burkhardt, W. 1939 STURZ AUS DER HÖHE (Dives from High Altitude)
Deutsch. z. Ges. Gerichtl. Med. (Berlin) 30: 334-341

673

Burmeister, H. 1939 UNTERSUCHUNGEN UBER ANDERUNGEN DER OPTISCHEN REAKTIONSZEIT DES MENSCHEN BEIM EINWIRKEN HOHER FLIEHKRAFTE (Investigations of Changes of the Optical Reaction Time of the Human under the Influence of Higher Acceleration)
Luftfahrtmedizin 3: 277-284

ABSTRACT: In centrifugal tests at the Institute for Research in Aviation Medicine in Berlin, it was observed that subjects exposed to high flying power seemed transitorily apathetic and that their reaction to external stimuli seemed inhibited for a time. Often it seemed as if the person had lost control over his movements. The rate of reaction and the mental process appeared disturbed and retarded. An attempt is made to find an explanation for this phenomenon by a study of eight test subjects. The change in optic reaction was recorded in 17 tests in the centrifuge. Focus in the chest-back direction produced a slight prolongation of the reaction time and a slightly increased dissemination in five persons at 4 g. Forces in the head-seat direction caused a prolonged reaction time and increased dissemination at three g. At 4.5 g, these changes were more evident and the resulting visual disturbances frequently led to failure of reaction.

674

Burns, Neal M., Ralph B. Zirgler, Rosalie Noble, and Edmund C. Gifford 1960 A BIBLIOGRAPHY OF PSYCHOPHYSIOLOGICAL STUDIES RELEVANT TO SPACE AND ORBITAL FLIGHT
(U.S. Naval Air Material Center, Philadelphia 12, Pa.) Weptask Assignment No. RAE 20C 030/2001/R005 01 002, Problem Assignment No. C04AE13-1. ASTIA AD 246 414

ABSTRACT: This report is a listing of psychological, physiological, and environmental reports pertinent to man's role in space and orbital flight. Five hundred and eight-two entries are provided on 3 x 5 inch file card forms with the content of the report indicated by the category into which it is placed. The literature review for this bibliography was completed in April 1960.

675

Burns, N.M. and R.L. Burdick 1961 COCKPIT DESIGN STUDIES: STANDARD COCKPIT MOCKUP, PRESSURE SUIT MOBILITY. II. THE PROJECT MERCURY SUIT.
(Naval Air Material Center, Philadelphia, Pa.) NAMC-ACEL-443, 21 Feb. 1961.

676

Burns, O. 1926 WESEN UND BEKAMPFUNG DER SEE- UND LUFTKRANKHEIT (Cause and Treatment of Sea and Air Sickness)
Münchener medizinische Wochenschrift (Munich) 73(24):977-979.

ABSTRACT: The writer bears out his contention that the essential disturbance of the physiological equilibrium which occurs in the production of sea and air sickness is abnormal vestibular stimulation. By turning the individual experimented with to right and left about a vertical axis on Bárány's chair with his head upwards, bent backwards or inclined towards the shoulder, he has succeeded in accurately simulating the various gyrations of a ship at sea. It was found that those who rapidly became sick at sea soon echibited pallor, perspiration, and sickness, whereas in those who were "good sailors" these disagreeable phenomena remained absent.

This method supplied the important possibility of undertaking therapeutic experiments against sea sickness.

Sea sickness is the result of an abnormal reflex. The sensory limb of the reflex arc is formed by the kinaesthetic, vestibular and optical paths. These are in close alliance and, in conjunction iwth the coOordination centre, constitute physiological equilibrium.

With this process there is a corresponding subconscious realisation in the cerebral cortex of the attitude of the body in space. The vago-sympathetic centres, with their afferent branches especially those in the blood-vessels and stomach, form the motor segment of the arc. This reflex arc can be influenced by therapeutic measures at five places:

1. At the sensory part.
2. At the reflex centre.
3. At the motor, that is to say the vaso-motor nucleus.
4. At the afferent branch of the vagus to the stomach.
5. At the stomach itself.

(J. Laryng. & Otol. 42:127-128 (1927)

677

Burnett, Hal A. 1948 EARLY EVALUATION OF BLAST INJURY
The Military Surgeon 103:275-278, Oct. 1948.

ABSTRACT: Blasts from high caliber missiles produce bizarre symptoms and signs in a surprising number of instances. Careful evaluation of each case will prevent mishandling and contribute to the welfare of the patient.

678

Burns, W. 1960 REPORT OF THE ANNUAL MEETING OF THE UNITED STATES ARMED FORCES - NATIONAL RESEARCH COUNCIL COMMITTEE ON HEARING AND BIO-ACOUSTICS HELD IN WASHINGTON, 15-16 NOVEMBER, 1960.
(Royal Naval Personnel Research Committee, MRC, London, England.)
RNP 61/1003, HES 41, April 1961.

ABSTRACT: A summary report of the annual meeting of the Council of the Armed Forces-National Research Council Committee on Hearing and Bioacoustics is presented. Major topics considered at this meeting are: 1) community noise problems resulting from turbojet transport aircraft, the psycho-acoustic problems following the wide incidence of noise peculiar to these engines, and criteria for acceptable maxima of jet noise exposure for tolerability in residential areas; 2) assessment of noise exposure for avoidance of hearing loss; 3) acoustic implications of space travel; and 4) problems of vibration as an environmental factor. (Tufts)

679

Burnstine, Murray 1962 STEERING WHEEL IMPACT
In: Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, pp. 135-140

ABSTRACT: This paper deals with the manner in which automobile steering wheels have been observed to deform when impacted by occupants. The steering wheel assemblies discussed were removed from automobiles involved in fatal high collisions. Reconstruction of the collision events utilizing body vehicle and injured occupant measurements indicates that the steering wheel-mast jacket assembly is often forced from its design position and later impacted by occupants at unfavorable angles. Examples of the various modes with which occupants strike the wheel are given. The deformation observed indicates that static testing of design prototypes is not realistic. The need for radial energy absorption characteristics is demonstrated. Bruising observed, due to local high unit bearing or contact pressures, can be reduced by increasing the projected area of the steering-wheel rim.

680

Burt, A. S. 1945 ANNOTATED BIBLIOGRAPHY ON THE PHYSIOLOGICAL EFFECTS OF ACCELERATION IN AIRCRAFT (U.S. Naval School of Aviation Medicine, Pensacola, Fla.) Project No. X-610 (Av-312-h) Rept. No. 1, 1 Sept. 1945. ASTIA ATI 173 271

ABSTRACT: This bibliography was compiled from the literature available in the Bureau of Medicine and Surgery, Washington, D. C., the Technical Information Section of the Bureau of Aeronautics, and the files of the medical department, NAS, Pensacola. For the most part, it includes only the classified reports which have been issued on the subject, no attempt having been made to cover the open literature which has already been very adequately listed in "A Bibliography of Aviation Medicine" by E. C. Hoff and J. F. Fulton, Chas. C. Thomas, Springfield, Ill., 1942, and in the supplemental bibliography by P. M. Hoff, E. C. Hoff,and J. F. Fulton, ibid., 1944, and reviewed by Ham (2).

The papers are so arranged as to present a logical development of the subject matter rather than by author or chronology. A subject and an author index are included to aid in locating individual references, also an index by issuing agency. While many of the sections, particularly the one on decelerative forces in crashes, are known to be very incomplete and some of the classifications are admittedly arbitrary, it is hoped that this compilation of material, which has for the most part not been previously reviewed, will be of aid in further research on acceleration.

681

Burton, A.C. 1944 RATES OF FREE-FALL AND OF OPEN PARACHUTE DESCENT FROM HIGH ALTITUDES.
Proc. Assoc. Comm. Aviation Med. Research, Appendix G, 14 July 1944

682

Burton, R.R., W.P.C. Richards and A.H. Smith. 1963 PATHOLOGY OF CHRONIC ACCELERATION. (Paper, Aerospace Medical Association 34th Annual Meeting April 29-May 2, 1963, Statler Hilton Hotel, Los Angeles, Calif.)

ABSTRACT: Chronic acceleration produced by centrifugation is a highly lethal treatment. When growing chickens are exposed to an accelerative force of 2.5 G, about half of them die in eleven days -however, the mortality curve is not a smooth exponential relationship. Resistance to chronic acceleration require a true physiological adaptation, and the factors involved in that adaptation are heritable. After five generations of selection (on the basis of survival) for resistance to chronic acceleration, the exposure to 2.5 G leading to a 50 per cent mortality is increased to 60 days.

When animals dying during chronic acceleration are examined post-mortem, a variety of pathological changes are evident-however, none is present systematically. It seems likely that several pathologies are involved in chronic acceleration death. Recent routing examination of centrifuged birds has indicated about 25 externally observable items which change in some birds during chronic acceleration, including: general appearance; evidence of normal nutrition; posture and locomotion; and reflexes. When these were graded on a + (normal), or - (abnormal) basis, a score varying from +20 to -20 was obtained. On the basis of rate of development of symptoms (zero-time being the onset of symptoms, rather than start of centrifugation) the birds can be divided into five groups. Aerospace Med. 34(3):249, March 1963.

683

Bushnell, D. 1949-1956 ORIGIN AND OPERATION OF THE FIRST HOLLOMAN TRACK. VOLUME I. HISTORY OF TRACKS AND TRACK TESTING AT THE AIR FORCE MISSILE DEVELOPMENT CENTER, HOLLOMAN AIR FORCE BASE, NEW MEXICO, 1949-1956 (Air Force Missile Development Center, Holloman Air Force Base, N. Mex.) ASTIA AD-231 907

CONTENTS:
Origin of the Holloman high-speed track
Beginnings of track testing
Planning and construction of the original Holloman track
Aeromedical experiments on the Holloman track: 1953-1956
Track administration and development
Administration of the Holloman high-speed track
The development of Sleran
Project 6876, track facility development

Military hardware on the 3550 ft track, 1950-1956
The Snark program on the Holloman track (June 1950-March 1952
Project Sleighride (March 1952-February 1954)
Q-2 acceleration tests (September-October 1952)
OQ-19 launchings (December 1952-February 1955)
MX-1601, Jet vane control tests (February 1953-September 1954)
Matador recovery system tests (July 1953-March 1956)
B-58 flutter model testing (July 1954-March 1955)
Acceleration tests, flight control components (January -March 1955)

684

Bushnell, D. 1958 HISTORY OF RESEARCH IN SPACE BIOLOBY & BIODYNAMICS AT AIR FORCE MISSILE DEVELOPMENT CENTER, HOLLOMAN AFB, 1946-1957. (Air Force Missile Development Center, Holloman AFB, New Mexico). Dec. 1958.

ABSTRACT: Subjects discussed include: Subgravity studies, deceleration and windblast experiments, Daisy track tests, Project Man High, cosmic radiation studies, aircraft crash forces, and tolerance to total pressure changes.

685

Bushnell, David 1958 RESEARCH ACCOMPLISHMENTS IN BIODYNAMICS: DECELERATION AND IMPACT AT THE AIR FORCE MISSILE DEVELOPMENT CENTER, 1955-1958 (Air Force Missile Development Center, Holloman AFB, New Mexico) Oct. 1958 ASTIA AD 208 015

ABSTRACT: Dr. David Bushnell, of the Air Force Missile Development Center's Historical Office, presents a carefully documented account of the successes and failures encountered in biodynamics research programs other than escape physiology. He has endeavored to place these accomplishments within the larger context of such work undertaken elsewhere by the United States Air Force, the United States Navy, industrial corporations and academic institutions of the United States, plus some consideration of related efforts in Canada, Germany, and the Soviet Union.

686

Bushnell, D. 1960 THE BEGINNINGS OF GUIDANCE SYSTEM TESTING AT THE AIR FORCE MISSILE DEVELOPMENT CENTER, HOLLOMAN AIR FORCE BASE, NEW MEXICO 1955-1959 (Air Force Missile Development Center, Holloman Air Force Base, N. Mex.) ASTIA AD [illegible]08

CONTENTS:
Development of the Holloman mission in guidance testing
Guidance and control testing on the Holloman track

687

Busis, S. N. 1960 LABYRINTHINE VESTIBULAR FUNCTION AND TESTING METHODS. Arch. Otolaryngol. 72 (1): 2-10

ABSTRACT: After a detailed description of the vestibular apparatus, the author discusses the problem of quantitatively and qualitatively estimating the vestibular function. This problem is reflected in the maze of techniques and, more importantly, in the divergent attitudes of established investigators toward these methods. The techniques used in evaluating the vestibular apparatus are as follows:

1. Caloric stimulation
   - A. Minimal
   - B. Cold Air
   - C. Mass
   - D. Alternate hot and cold
2. Rotation
   - A. Barany
   - B. Cupulometry
3. Fistula test
4. Galvanic stimulation
5. Optokinetic nptagmus
6. Postural tests.

688

Busnengo, E. 1961 BEHAVIOR OF THE ELECTROCARDIOGRAM OF SUBJECTS SUBJECTED TO ACCELERATION ALONG VARIOUS BODY AXES.
Rev. Med. Aero (Paris) 2:25-27, Dec. 1961 (Fr)

689

Busse, E. W. PSYCHOPHYSIOLOGICAL MECHANISMS OF STRESS
(Duke University School of Medicine, Durham, N. C.)
Proj. 9778, Contract AF 49(638)-354; AFOSR, DLS, RPO - 805

ABSTRACT: This research covers the development of multiple-focused techniques for the investigation of the neurophysiological, neurohormonal, and psychophysiologic mechanism underlying the stress response capability of human beings. It will involve the identification of and focusing on specific physiologic and psychologic factors in order to evaluate the interaction of specific emotional, neurohormonal, and neurophysiologic factors. The ultimate aims are to establish techniques applicable to the evaluations of human tolerance to stressors of any type, and to formulate methods for altering human response to stressful situation.

690

Busseling, J. F. 1959 A THEORY OF SMALL DEFORMATIONS OF SOLID BODIES. (U.S. Air Force Office of Scientific Research, Washington, D.C.) AFOSR TN 59-605 9 Feb. 1959; ASTIA AD-238 419.

ABSTRACT: A theory is presented which is capable of giving a mathematic decription of the following phenomena observed in the deformation and heating of solid bodies: thermal stresses, thermoelastic damping of vibrations, dynamic and static moduli, Bauschinger effect and other anisotropic hardening phenomena in plastic deformation, primary creep preceding the secondary stage of steady creep under constant stress, creep recovery and stress relaxation. The variational principles of thermoelasticity, creep and of the theories of plasticity are all derived from one thermodynamic variational principle which is formulated with the aid of the entropy displacement field introduced by Biot. Thermoelastic damping of bending vibrations of beams and creep damping of pure shear vibrations are considered in some detail. (AUTHOR)

691

Busyrev, A. 1962 SCIENCE AND TECHNOLOGY IN THE WORLD. Sovetskaya Aviatsiya, Issue Nr. 142 (3312), 19 June 1959, p. 4, col. 3-4. (Translated by Translation Services Branch Foreign Technology Division, Wright-Patterson AFB, Ohio) Rept. No. FTD-TT-61-255/1+2 11 Jan. 1962; ASTIA AD-271 867.

ABSTRACT: Briefly discusses training of flight surgeons and present experimentation intended to increase protection for pilots of high-speed and high-altitude aircraft. (CARI)

692

Butz, J.S., Jr. 1958 ORBITAL RE-ENTRY WILL INTENSIFY DEMANDS ON STRUCTURES Aviat. Wk. 68:50-51, 53, 55, 57, 59, Apr. 21, 1958

ABSTRACT: Outlines main structural problems faced in proposals for Dyna Soar, an orbital bomber.

693

Butz, J.S., Jr. 1958 RADICAL CONFIGURATIONS MAY FIND ROLE IN PUSH TOWARD SPACE FLIGHT Aviat. Wk. 68:48-49, 51, 52, Feb. 24, 1958

ABSTRACT: Wedge-shaped fuselages and biplane and triplane wing arrangements may be used at hypersonic speeds, such as those that might be attained in re-entry from space, to raise lift-drag ratios to acceptable values.

694

Buys, E. 1924 CONTRIBUTION A L'ETUDE DU NYSTAGMUS OCULAIRE DE LA ROTATION CHEZ L'HOMME (CONTRIBUTION TO THE STUDY OF OCULAR NYSTAGMUS BY ROTATION TO MAN) Rev. d'Oto-Neuro-Ocul. 2, 641, 721 (1924); 3, 10,105, 2 pl. (1925).

695

Byford, G. H., & P. Howard 1956 THRESHOLD DETERMINATION TECHNIQUES ON THE HUMAN CENTRIFUGE. (RAF, Institute of Avia. Med., Farnborough) FPRC Memo 75.

696

Byford, G. H. and P. Howard 1958 THE DISTRIBUTION AND ACCURACY OF "G" IN A HUMAN CENTRIFUGE. (RAF, Instit. of Aviat. Med., Farnborough, Eng.) FPRC Memo 97, Sept. 1958.

ABSTRACT: The errors encountered in the production and measurement of "g" forces in a human centrifuge are examined from the point of view of the definition of the basic unit "g", and of the spatial distribution of forces within the car. Theoretical equations are developed for this distribution and specific evaluations made for absolute and % errors in the R.A.F. Institute of Aviation Medicine centrifuge. The theoretical results are confirmed by measurements, and an analysis made of the centrifuge performance under normal operating conditions. It is suggested that standardised measurement techniques could be adopted.

697

Byford, G. H. 1959 INSTRUMENTATION AND THE HUMAN CENTRIFUGE. (RAF, Institute of Aviation Medicine, Farnborough, England; North Atlantic Treaty Organization, Advisory Group for Aeronautical Research & Development; Aero-Medical Panel; Aachen, Germany) Sept. 1959

698

Byford, G. H. 1961 ACCELERATION RESEARCH PROGRAM IN GREAT BRITAIN. (Paper, Panel on Acceleration Stress of the Armed Forces-NRC Committee on Bio-Astronautics, 6-11 March 1961, NASA Ames Research Ctr., Moffett Field, Calif.)

699

Byford, G. H. 1961 INSTRUMENTATION AND THE HUMAN CENTRIFUGE. In Bergeret, P., ed., Bio-Assay Techniques for Human Centrifuges and Physiological Effects of Acceleration. (London, New York, Paris: Pergamon Press, 1961). AGARDograph 48. Pp. 42-51.

700

Byford, G. H. 1961 EYE MOVEMENTS AND THE OPTOGYRAL ILLUSION. (RAF Institute of Aviation Medicine, Farnborough) Rept no. FPRC/1174, 4 April 1961, ASTIA AD-279662

ABSTRACT: The visual sensations accompanying angular acceleration of a subject whose field of view is restricted to objects known to be rotating with him, may be divided as follows:

1. A small, initial apparent displacement-usually less than 10^{o} - of the fixation target with respect to the subject, in the same direction as the sensation of rotation. This displacement is accompanied by a movement of the eyes of a magnitude and direction which could reasonalby be held to account for its presence. The sensation is almost invariably present following impulsive stimulation of the labyrinth, but is difficult to detect during low steady state accelerations.

2. A smoothly continuous indirectional motion, of approximately the same duration and in the same direction as the sensation of rotation, about an axis coincident with that of the stimulus. No evidence was disclosed which would support a hypothesis that this visual sensation could be connected, by a cause and effect relationship, with nystagmus of the eyes. The phenomenon may be present (a) in a subject whose eye is incapable of producing nystagmus; (b) under conditions when nystagmus is absent; and (c) in subjects observing a target, the image of which cannot move with relation toe the retinal recptors.

701

Byford, G. H. 1961 EYE MOVEMENTS AND THE OPTOGYRAL ILLUSION J. of Aerospace Medicine 32(3):224, March 1961.

ABSTRACT: The optogyral illusion has been the subject of considerable interest in both clinical and aviation medical spheres. There is a diversity of opinion on the role which nystagmic movements of the eyes play in this phenomenon; some maintaining that the illusion results from the passage of

images across the retina during nystagmus and others that these movements of the eyes play no part in the production of the illusion. Experiments have been conducted with a view to establishing the existence or otherwise of a correlation between ocular nystagmus and the optogyral illusion. A vestibular stimulation was provided by a servo controlled rotating chair; the subject being rotated about a spinal axis in the normal seated position. Eye movements were measured by means of a contact lens and photoelectric cell, with a sensitivity of not lews than 1 minute arc of eye rotation per cm. of trace deflexion. In addition, qualitative experiments were used to examine the illusion whilst an immovable image was maintained on the retina. No evidence was found which would support the hypothesis that nystagmic eye movements play any part in the production of the optogyral illusion. It is suggested that the eye movements, and sensations of rotation, are separate effects which stem from the same cause.

702

Byford, G. H. 1962 THE FIDELITY OF CONTACT LENS EYE MOVEMENT RECORDING
Optica. Acta., 9:3, 1962

ABSTRACT: The fidelity with which a contact lens may follow horizontal movements of the eye is examined under steady state, or fixation, conditions and also in the presence of normal optokinetic nystagmus. During fixation no relative displacement between lens and eye could be demonstrated for eye deflections less than 30′ arc, and only small differences over the test range, $\pm 9^{\circ}$. Simultaneous photoelectric and high speed cine recordings of optokinetic nystagmus showed that the lens may be used with accuracy for this purpose. A possible mechanism of lens movement is discussed.

703

Byford, G. H. 1963 EYE MOVEMENTS AND THE OPTOGYRAL ILLUSION
Aerospace Medicine, 32(2):119-123.

ABSTRACT: The visual sensations accompanying angular acceleration of a subject whose field of view is restricted to objects known to be rotating with him, may be divided as follows: A small, initial apparent displacement -- usually less than 10° -- of the fixation target with respect to the subject, in the same direction as the sensation of rotation. This displacement is accompanied by a movement of the eyes of a magnitude and direction which could reasonably be held to account for its presence. The sensation is almost invariably present following impulsive stimulation of the labyrinth, but is difficult to detect during low steady state accelerations.

A smoothly continuous unidirectional motion of the fixation target, of approximately the same duration and in the same direction as the sensation of rotation, about an axis coincident with that of the stimulus. No evidence was disclosed which would support a hypothesis that this visual sensation could be connected, by a cause and effect relationship, with nystagmus of the eyes. The phenomenon may be present (a) in a subject whose eye is incapable of producing nystagmus; (b) under conditions when nystagmus is absent; and (c) in subjects observing a target, the image of which cannot move with relation to the retinal receptors.

704

Byrne, W. A. 1943 FINAL REPORT ON TEST OF ANTI-"G" DEVICES UNDER SIMULATED COMBAT CONDITIONS. Proof Dept. AAF Proving Ground Command, (Eglin Field) Serial No. 4-43-40. AAF Board Project No. (M-4)205. 3 Nov. 1943

ABSTRACT: (a) Pilots wearing an anti-"g" suit have a definite tactical advantage over those not protected in combat. They are also less fatigued.
(b) Guns can be fired without difficulty under as much as 8.8 "g".
(c) The Berger Bros. GPS is definitely superior to the Clark-Wood AOS.
(d) The instrument vacuum pump installation is more satisfactory than the Cornelius Air Compressor installation from the standpoint of reliability, ease of installation and maintenance, and adequacy at altitude.
(e) Photographs of GPS and AOS are incluued.

705

Byrnes, V.A. 1942-43 EYE PROBLEMS IN COMBAT AVIATION. Tex. St. J. Med., 38:399-402

ABSTRACT: Discusses particularly the problems of night vision and dark adaptation. Brief discussion of acceleration problems: Blacking out under g occurs when the force is greater than 4 g. Loss of consciousness occurs between 5 and 8 g. Devices to prevent this are not satisfactory because of their bulk. Crouching raises the black-out threshold about 2 g. If the pilot could lie prone, he could withstand a force of 10 g. Retinal hemorrhage may be caused by negative g. (CARI)

706

Byrnes, V. A. 1951 VISUAL PROBLEMS OF SUPERSONIC SPEEDS.
Amer. J. Ophth. 34(2):169-177, Feb. 1951.

ABSTRACT: Some of the visual problems of supersonic speeds have been discussed. The optical effect of the shock wave and the effect of slanting surfaces on incident light have been pointed out. The effects of vibration on the eye and the effect of the delay in visual perception have been mentioned. The restricting visual effect of acceleration on the maneuverability of supersonic craft has been reviewed. Possible effects of temperature and high speed escapes on the eyes have been pointed out. These will all be factors relating to the use of the eyes in flying the very high speed aircraft of the future. (AUTHOR)

ACCELERATION

C

707

Cabanon, A. 1961 THE CENTRIFUGE OF THE AIR TEST CENTER OF BRETIGNY.
(Paper, Panel on Acceleration Stress of the Armed Forces-NRC Committee on Bio-Astronautics, 6-11 March 1961, NASA Ames Research Ctr., Moffett Field, Calif.)

708

Caidin, M., & G. Caidin 1962 THE FORCES OF GRAVITY
In Aviation and Space Medicine, Man Conquers The Vertical Frontier
(New York: E. P. Dutton & Co., Inc., 1962) Chapter 10

709

Caidin, M. and B. Caidin 1962 AVIATION AND SPACE MEDICINE: MAN CONQUERS THE VERTICAL FRONTIER
(E.P. Dutton & Co., Inc., New York, 1962, 215 pp.)

ABSTRACT: This treatise on aviation and space medicine is illustrated with many photographs. The topics discussed include historical aspects of aviation medicine, gravity, vertigo, high altitude flight, oxygen supply during flight, decompression chamber flight, pressurization and pressure suit, and escape and survival.

710

Calkum, F. J. and R. L. Larkins 1959 DEFLECTION OF THE HOLLOMAN TRACK UNDER STATIC LOAD.
(U.S. Air Force Missile Development Center, Holloman AFB, New Mex.)
Rept. no. AFMDC TN-59-2. ASTIA AD 209 778

ABSTRACT: Measurements were made of the deflection of the AFMDC track under a static load of 100,000 lbs (approximately five times the weight of present day sleds) which was applied to the track at 2 adjacent tie-down points. Deflection of the rails was recorded along the track from the load points to a point at which no deformation could be measured by the most precise survey methods. Subsequent observations were made at the same observation points to determine the rate of settlement under static load and the rate of recovery after removal of the load. Under the influence of the load a maximum deflection of .05 in. was observed. The deflection was smaller than .005 in. at a distance

24 ft. from a load point. Recovery after the removal of the load was slow and incomplete. (Author)

711

Cambeis, L. 1963 BIBLIOGRAPHY OF IMPACT ACCELERATION LITERATURE. ANNEX TO SYNTHESIS OF IMPACT ACCELERATION TECHNOLOGY FOR AVIATION CRASH INJURY PREVENTION. (PROJECT SIAT). (U.S. Army Transportation Research Command, Fort Eustis, Va.) TRECOM TR 63-31B, June 1963. See Miller, C.O. 1963. TRECOM TR 63-31A.

ABSTRACT: This report was prepared by Flight Safety Foundation, Inc., New York. It contains a listing of approximately 900 references related to impact acceleration by author and by organization. (CARI).

712

Cameron, G.R., R.H.D. Short, and C.P.G. Wakeley 1942 PATHOLOGIC CHANGES PRODUCED IN ANIMALS BY DEPTH CHARGES Brit. J. Surg. 30:49-64

713

Cameron, J.E. 1951 SEAT ASSEMBLY UPWARD EJECTION (Boeing Airplane Company, Seattle 14, Washington) 10 Sep. 1951, ASTIA ATI-131225

714

Cammack, K., et al. 1959 DECELERATION INJURIES OF THE THORACIC AORTA. A.M.A. Archives of Surgery 79:244-251, Aug. 1959

SUMMARY: An attempt has been made to explain the forces concerned in deceleration injuries of the thoracic aorta and to account for the usual sites of laceration on a physical basis.
We have stated the signs and symptoms of this injury and have urged early thoracotomy when any consideration has been given to such a diagnosis. (AUTHOR)

715

Campbell, B. J. 1961 A COMPARISON OF AUTOMOTIVE CRASH INJURY RESEARCH SAMPLES WITH COMPLETE STATE DATA.
(Automotive Crash Injury Research, Cornell University, New York, N. Y.)
Feb. 1961

DISCUSSION AND CONCLUSIONS: The hypothesis of this study is that ACIR data adequately represent the population from which they are selected. On a purely logical basis (with no reference to empirical data), the nature of sampling procedures employed supports this contention. The attempt to supplement this reasoning with empirical data produces some difficulties. These difficulties stem from the fact that methods employed necessitate demonstration of the similarity of distributions, and tests of statistical significance cannot very well accomplish this. When a difference is obtained, the hypothesis of similarity is rejected, but when the opposite happens, and no significant difference is found, it is not necessarily correct to accept the hypothesis of similarity. Failing to reject the hypothesis of similarity does not furnish proof that there is similarity. This situation is an outgrowth of the logical foundations on which significance tests are based. Despite these difficulties, the fact remains that by conducting repeated tests, many opportunities were furnished during which differences between ACIR and State data could be established. Since substantial differences failed to emerge, the empirical data lend support to the previously mentioned logical basis for believing the samples to be representative. In this study, 31 opportunities were afforded for detection of stable differences between ACIR and State data, and in only four cases were such differences found. Moreover, in at least two of these four cases, it was clear that there were reasons for the significance other than sample inadequacy. It is concluded that ACIR data adequately represent comparable accident events in the areas sampled. (Author)

716

Campbell, B. J., I. Drillien et al 1961 SUMMARY: REPORT: AUTOMOTIVE CRASH INJURY RESEARCH OF CORNELL UNIVERSITY. (1953-1961)
(Automotive Crash Injury Research, Cornell University, New York, N. Y.)
3 April 1961

717

Campbell, Eldbridge, and H. Kuhlenbeck 1950 MORTAL BRAIN WOUNDS: A PATHOLOGICAL STUDY Journal of Neuropathology 9:139-149

718

Campbell, F. J. 1960 THE RELIABILITY OF ACCIDENT AND INJURY SEVERITY RATING PROCEDURES USED AT ACIR.
(Automotive Crash Injury, Cornell University, New York, N. Y.) Dec. 1960

719

Campbell, F. J. 1961 THE CONSISTENCY OF ACIR ACCIDENT-INJURY RELATIONSHIP IN FOUR STATES.
(Automotive Crash Injury Research, Cornell University, N. Y.) June 1961

720

Campbell, H.E. 1954 DECELERATION AND MOTOR CAR.
J A M A 154:1023, March 20, 1954

ABSTRACT: The motor car manufacturers must build the automobile to crash. An active program resulting in safety belts for every motor car occupant can save more lives per dollar than anything else we can do.

721

Campbell, H. E. 1956 REARWARD SEATING URGED FOR AIRLINE USE
Aviation Week, 16 Jan. 1956

722

Campbell, H. E. 1957 DETROIT - ACCELERATION AND DEATH.
Car Life 4(2):72-73, Feb. 1957.

723

Campbell, H. E. 1959 HOW CAN WE GET SAFE CARS?
Rocky Mountain Medical Journal(Denver) 56(1):41-47, Jan. 1959.

SUMMARY: We are well along in our second million of motorcar dead. The Congress is the ultimate expression of public opinion. We have had years of clamor and outcry, and still we cannot get automobiles designed for safety. The Congress must integrate and implement the many people who know that highway safety is a matter of motorcar design, and who have the knowledge and the desire to bring it into being. (Author)

724

Campbell, P.A. 1942 A PRELIMINARY REPORT ON THE STUDY OF AIRSICKNESS.(Sch. Avia. Med. Randolph AFB) Proj. No. 31, Report No. 1.

725

Campbell, P.A., M.V. Thorner, A. Hemingway, F.E. McDonough, and F.W. Ogden 1942 A PRELIMINARY REPORT ON THE STUDY OF AIRSICKNESS (NRC, Canada, Com. Avn. Med.) Report No. 74, 1942

726

Campbell, P. A. 1952 HUMAN ORIENTATION DURING TRAVEL IN THE AEROPAUSE. In White, C. S. and O. O. Benson, Jr., eds., Physics and Medicine of the Upper Atmosphere, A Study of the Aeropause (Albuquerque, N. Mex.: Univ. of N. Mex. Press, 1952) pp. 488-493.

ABSTRACT: Orientation of man in his environment involves integration of stimuli received from the visual, the kinesthetic, and the vestibular systems. The normal functioning of these mechanisms is determined by the following limiting factors: (1) adequate oxygenation must be provided for unimpaired performance of the brain and nerves; (2) abnormal motions such as spinning and tumbling should be avoided; (3) violent or prolonged linear and (4) gravitational forces should not deviate markedly from 1 g. The paper reviews briefly the present status of experimental research on human reactions under conditions where the above limitations are exceeded.

727

Campbell, P. A. 1952 MEDICAL ASPECTS OF FLIGHT ABOVE THE ATMOSPHERE J. Am. Med. Assoc. 150(1):3-6

ABSTRACT: Flights beyond the atmospheric layer of the earth create a number of physiological problems which may be divided into the following main catagories: (1) those resulting from rapid penetration of the atmosphere (high temperature and acceleration); (2) those resulting from loss of the life-sustaining qualities of the atmosphere (oxygen, nitrogen, carbon dioxide, and water): and (3) those resulting from the loss of protection afforded by the filtering qualities of the atmosphere (cosmic and ultraviolet radiation, meteorites). The physical and physiological factors involved are briefly summarized.

728

Campbell, P. A. 1952 KNOWN AND PREDICTED PROBLEMS OF HUMAN TRAVEL IN THE AEROPAUSE. In White, C. S., & O. O. Benson, Jr., eds., Physics and Medicine of the Upper Atmosphere, A Study of the Aeropause (Albuquerque, N. Mex.: Univ. of New Mexico Press, 1952) p. 479

729

Campbell, P. A., 1957. SPACE TRAVEL: A SYMPOSIUM. INTRODUCTION. J. Aviation Med. 28(5):479-480.

ABSTRACT: Presents two graphs plotting altitude achievements for sixty years.

730

Campbell, P. A. 1958 ACHIEVEMENTS OF THE PAST YEAR
J. Aviation Med. 29(7):485-492, July 1958.

ABSTRACT: Significant events of the year 1957-1958 in the field of space travel are reviewed. Achievements in the human parameters of space flight are also discussed, including accomplishments in acceleration, speed, duration of flight, altitude, weightlessness, and temperature control.

731

Campbell, P.A. 1958 AVIATION MEDICINE ON THE THRESHOLD OF SPACE: A SYMPOSIUM--ACHIEVEMENTS OF THE PAST YEAR. J. Aviation Med. 29(7):485-492. July 1958.

ABSTRACT: Briefly traces with charts and graphs the development of aviation medicine toward space medicine as a concomitant of technological development increasing speeds and altitudes attainable.

732

Campbell, P. 1958 HUMAN LOGISTICS FROM THE VIEWPOINT OF SPACE TRAVEL. In Alperin, M., M. Stern, & H. Wooster, eds., Vistas in Astronautics: Proceedings of the First Annual AFOSR Astronautics Symposium. (New York: Pergamon Press, 1958) Part 6, Human Factors, Pp. 285-287.

733

Campbell, P. A. 1958 INTRODUCTION TO THE PROBLEM OF ESCAPE AND RESCUE DURING SPACE OPERATIONS. Proceedings of Second International Symposium on the Physics and Medicine of the Atmosphere and Space, Nov. 1958

734

Campbell, P. A. 1959 ESCAPE AND SURVIVAL DURING SPACE OPERATIONS.
Air University Quarterly Review, Winter 1958-1959

735

Campbell, P. A. 1959 AVIATION MEDICINE ON THE THRESHOLD OF SPACE: GENERAL CONSIDERATIONS
Ann. Intern. Med., 50(6):1542-1549, June 1959.

736

Campbell, P. A. 1959 PROGRESS TOWARD SPACE FLIGHT
Federation Proc. 18(4):1255-1259, Dec. 1959.

737

Campbell, P. A. 1960 AVIATION MEDICINE TO SPACE MEDICINE IN FOUR DECADES
Med. Times 88(11):1245-1253, Nov. 1960

ABSTRACT: The medical problems which have accompanied man's progress from aviation to space flight are reviewed and discussed. The problems of anoxia and aeroembolism at high altitudes have been solved by improvements in oxygen systems and oxygen-breathing techniques and by the development of pressurized and sealed cabins. New airfoil design and new propulsion methods have reduced the excessive vibrations experienced during flight at the speed of sound. The intense temperatures generated by atmospheric friction have been circumvented by improvements in materials, design, and air conditioning. Still remaining, however, are the apparent barriers of the aeropause, the Van Allen radiation belts, and the Newell barrier (radiation from high speed penetration of the sparsely distributed hydrogen atoms of space). Problems of weightlessness, launch acceleration, and deceleration and heating during re-entry are serious but solvable. More or less absolute limitations of space flight are imposed by the inability of matter to exist at a speed-of-light velocity (according to the theory of relativity) and by the distance which can be traversed in an acceptable period of time (thereby curtailing the distances man may wish to go).

738

Campbell, P. A. 1960 PROBLEMS OF LUNAR COLONIZATION.
In Lectures in Aerospace Medicine, 11-15 January 1960. (School of Aviation Medicine, USAF Aerospace Medical Center, Brooks AFB, Texas)

739

Campbell, P.A. 1961 MEDICAL AND BIOLOGICAL ASPECTS OF THE ENERGIES OF SPACE. (New York: Columbia University Press, 1961)

740

Cambridge Instrument Co., Inc., New York, N. Y. n.d.
OMNIDIRECTIONAL ACCELEROMETER, DEVICE 9032, INSTRUCTIONS FOR USE AND CARE OF.

741

Canfield, A.A., A.L. Comrey, R.C. Wilson and W.S. Zimmerman. 1948 THE EFFECT OF INCREASED POSITIVE RADIAL ACCELERATION UPON HUMAN ABILITIES (PART II: PERCEPTUAL SPEED ABILITY) (Univ. of So. Calif., Dept of Psychol.) Contract No. N6 ori 77, Task Order 3, Sept. 1948

742

Canfield, A. A., A. L. Comrey and R. C. Wilson 1948 AN INVESTIGATION OF THE MAXIMUM FORCES WHICH CAN BE EXERTED ON AIRCRAFT ELEVATOR AND AILERON CONTROLS. (Univ. of Southern Calif., Dept. of Psychology, Rept. to the Office of Naval Res.) Contract N60ri77, Sept. 1948.

743

Canfield, A.A., Jr. 1949 THE EFFECT OF INCREASED POSITIVE RADIAL ACCELERATION ON THE SPEED AND ACCURACY OF REACHING MOVEMENTS.
(Dissertation, University of Southern California)

744

Canfield, A. A., A. L. Comrey, and R. C. Wilson, 1949 A STUDY OF REACTION TIME TO LIGHT AND SOUND AS RELATED TO INCREASED POSITIVE RADIAL ACCELERATION. J. Aviat. Med. 20(5): 350-355.

CONCLUSIONS: It is concluded on the basis of the experiment reported here that the reaction time to both light and sound stimuli becomes significantly longer under conditions of increased radial acceleration. The superiority of reaction to sound, in addition to the known failure of sight at crucial G-levels, suggests the advisability of presenting important signals to the pilot in the auditory sense modality rather than the visual. This is especially vital in those cases where such signals demand emergency action. The tremendous speed of the aircraft of today and tomorrow will necessitate action to conserve every split second. Taking steps such as those suggested here should help to take some of the burden from the limiting factor in aircraft design - the pilot.

745

Canfield, A. A. et al 1950 THE EFFECT OF INCREASED POSITIVE RADIAL ACCELERATION UPON DISCRIMINATION REACTION TIME. J. Exper. Psychol. 40(6):733-737, Dec. 1950.

ABSTRACT: Twenty-three volunteer college students were tested on the human centrifuge at the University of Southern California at 1, 3 and 5 g (use of the Navy Coverall Type Z-2 anti-g suit enabled testing at 5 g with no physiological embarrassment).

The test problems were presented on a panel mounted vertically in front of the subject. He was to move a toggle switch in the direction that a red light lay from a green one on this test panel. A small white light in the center served as a warning light and the test stimuli were presented from 1.5 to 2.5 seconds after the appearance of this warning light. This foreperiod was varied from response to response in an irregular order. Each subject was given six experimental trials on each of four testing days, two runs each at 1, 3, and 5 g. Each experimental trial lasted about fifteen seconds, during which time the subject made five separate responses.

The subject's ability to make discriminatory reactions was impaired significantly under increased positive radial acceleration forces of 5 g in the first few trials for the first couple of experimental days only, and thereafter was unaffected. Any physiological compensatory mechanism seems unlikely, and the impairment is attributed to effects of novelty, distraction and apprehension. After a few exposures, the subject functions as well at 5 g as at 1 g.

These results and others on the Spatial Orientation and Perceptual Speed Test (in the same laboratory) support the view that no drastic changes in mental efficiency occur in the pilot wearing an anti-g suit up to 5 g, i.e., as long as vision is maintained.

Further research is needed on these and other skills under conditions of lengthened exposure and increased level of force to determine if some critical point, short of unconsciousness, does exist where these functions might be impaired. (J. of Aviation Medicine 23(2):204-205, April, 1952)

746

Canfield, A. A. 1950 THE EFFECT OF POSITIVE G ON THE SPEED AND ACCURACY OF REACHING MOVEMENTS. Amer. Psychol. 5(9):482

747

Canfield, A. A. 1950 THE INFLUENCE OF POSITIVE G ON REACTION TIME. Amer. Psychol. 5(7):362.

Canfield, A.A. 1950 THE HUMAN ...
Research Reviews. March 1950

749

Canfield, A. A., A. L. Comrey, and R. C. Wilson. 1952 THE INFLUENCE OF IN-CREASED POSITIVE G ON REACHING MOVEMENTS.
J. Applied Psychol. 37(3):230-235

ABSTRACT: From the results of this experiment, using 48 subjects, certain conclusions about the effect of increased positive radial acceleration on reaching movements may be advanced. Both the speed and accuracy of reaching movements at increased g levels are seriously impaired, the degree of impairment being roughly equivalent to the amount of force imposed. The kinesthetic cues governing the thrust of the arm under normal circumstances are inadequate to maintain similar accuracy or speed under radial accelerative conditions. Due to the increased weight of the arm and the inadequacy of the normal kinesthetic cues, two types of errors are found, one being the negative inertia error and the other the error of downward tendency. The most favorable location of controls for the pilot of high-speed aircraft, both from the standpoint of speed and accuracy, is to the side of the pilot's preferred hand and below its normal resting point. Emergency controls that might have to be manipulated under conditions of increased positive radial acceleration should be no smaller than two inches in diameter if a pushing motion is required.

750

Cantor, J.J. 1945 RUPTURE OF TYMPANIC MEMBRANE DUE TO AIR BLAST
Ann. Otol., Rhin. & Laryng. 54:554-562, Sept. 1945.

ABSTRACT: During the period of blast: The rupture of the tympanic membrane may be explained without a negative pressure being present. The damage done to the ossicular chain, can not be explained by a negative pressure of even 15 pounds to the square inch but can be explained by this positive pressure hypothesis. The pathway of the blast is through the eustachian tube and not through the external auditory canal. Unilateral rupture of the tympanic membrane is due to the occlusion of the unruptured side because of pathological or anomalous conditions of the eustachian tube. Nasal pathology may be responsible for the rupture of the tympanic membrane.

751

Caporale, R. & V. Camarda 1958 THE VESTIBULAR FUNCTION OF SOME PILOTS OF A ACROBATIC CREW. Revista di Medicina Aeronautica, March 1958, pp. [illegible]

Summary: This study sought to determine the threshold of stimulation of the labyrinthic neuro-epithelium. The four subjects were pilots, with approximately 1000 jet-hours each, who had trained daily for more than a year in F-86 [illegible]

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flight, this data ending about two months before the present tests. Equipment used was the TOULOUSE seat, a gyrating seat which can impart absolutely constant positive angular accelerations ranging between 0.5 and 10 /sec.^{2}, and a 2-channel electronystagmograph with preamplifier to increase signals from electrodes attached at periorbital contours of one or both eyes and "grounded" to ear lobe.

Acrobatic flight in jet fighter planes had an effect on the vestibular apparatus of the pilots tested. In each pilot one of the two labyrinths proved less excitable than the other. Moreover, both "followers of the left" had hyperexcitable left labyrinth and those of the right hyperexcitability of the right labyrinth. It seems that the vestibular assymetry is a function of the position of the pilot in the acrobatic V-formation most frequently used.

The authors hypothesize that attitude of the head assumed during acrobatics should be in agreement with the determination and localization of the vestibular hyperexcitability. (CARI)

752

Caporale, R. 1961 BEHAVIOR OF SOME POSTURAL REFLEXES IN INTACT, DELABYRINTHIZED OR DECEREBRATED PIGEONS DURING VARIATIONS OF ACCELERATION IN WEIGHTLESSNESS IN SUB-GRAVITY ROTATION.
Rev. Med. Aero (Paris) 2;165-170, Dec. 1961 (Fr.)

753

Caporale, R. 1962 COMPORTAMENTO DI ALCUNI RIFLESSI POSTURALI IN COLUMBI INTATTI, SLABIRINTATI O DECEREBRATI, DURANTE VARIAZIONI DI ACCELERAZIONI TRA DUE E ZERO G (BEHAVIOR OF SOME POSTURAL REFLEXES IN INTACT, LABYRINTHECTOMIZED, OR DECEREBRATED PIGEONS, DURING VARIATIONS OF ACCELERATIONS BETWEEN TWO AND ZERO G)
Rivista di medicina aeronautica e spaziale (Roma), 25 (2): 243-256. April-June 1962. In Italian, with English summary on p. 254

ABSTRACT: Cinematographic registration made of static reflexes and posture kinetics (spontaneous posture, changes of head position in space, hop preparation reflex) of pigeons subjected to accelerations between 2 and 0 g in the subgravity tower. Intact pigeons displayed no significant changes due to subgravity. Decerebrated pigeons retained the hop preparation reflex and the capacity to fly; however, the static head reflex was weaker than that of intact animals. Totally labyrinthectomized pigeons demonstrated a disappearance of compensatory static reflexes, hop preparation reflex, and voluntary equilibration. Hemilabyrinthectomized animals retained normal posture similar to intact animals but tended to fly circularly around the intact side; the hop preparation reflex was retained while the compensatory head reflexes were missing.

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754

Caporale, R. 1962 BEHAVIOR OF OCULAR NYSTAGMUS OF LABYRINTHINE ORIGIN IN HUMANS AND RABBITS SUBJECTED TO RADIAL ACCELERATIONS. Riv. Med. Aero 25:653-666, Oct.-Dec. 1962 (Italy)

755

Cappel, K. L., C. A. Belsterling, et al. 1961 FEASIBILITY STUDY ON A DYNAMIC ESCAPE SIMULATOR (HUMAN CENTRIFUGE). FINAL REPORT. (Laboratories for Research & Development, Franklin Institute, Philadelphia, Pa.) Rept. No. F-A2407; Contract AF 33(616)7118; ASTIA AD-259 716

ABSTRACT: The construction of a device capable of simulating the acceleration patterns of escape from high speed aircraft was found to be feasible. The reduction in the rates of simultaneous rotation of the main arm, fork and cab is recommended in the interest of economy and protection of the subject from excessive gyroscopic forces. The construction of the major components of the proposed Simulator is within the state-of-the-art and can be accomplished with existing techniques. A high proportion of the components are shelf items which have proved satisfactory in operation. (AUTHOR)

756

Capucci, M. 1949 EFFECTS OF ACCELERATION IN FLYING ON EYES Rivista di Medicina Aeronautica (Rome) 12: 261-267

757

Carayon, A., & V. Andre 1956 NOTES SUR LES ACCIDENTS CRANIOCERVICAUX DU PARACHUTAGE. (Note on Cranio-cervical Injuries Caused by Parachuting) Societe de Medecine Militaire francaise, Bulletin mensuel (Paris). 50(4):124-126

ABSTRACT: Cases are recorded of cranio-cervical injuries (fractures, dislocations, closed injuries, contusions) occurring during parachute jumps. Lesions are attributed to either a faulty jump due to bad terrain, violent winds, or bad body position, and to the shock produced by the opening parachute. Lesions caused by the shock of an opening parachute are not usually evident during rapid physical examination and lead to painful manifestations. Mention is made of therapeutic techniques.

758

Carbery, W. J., C. A. Steinberg, W. E. Tolles, & A. H. Freiman, 1961 AUTOMATIC METHODS FOR THE ANALYSIS OF PHYSIOLOGIC DATA Aerospace Medicine 32(1):52-59, Jan 1961.

ABSTRACT: A computer facility for the rapid analysis of physiologic data from the manned space satellite is described. The details of this facility and methods for performing each of the analytic operations are discussed. Main features of the facility are 1) automatic signal recognition and measurement, 2) automatic analysis of several channels of simultaneously recorded data for early detection of significant changes, and 3) automatic analysis to determine underlying causes of these changes. Results obtained from analyses of similar types of data in the laboratory are presented to demonstrate the feasibility of the computer facility for use in experiments with manned space satellites. (Tufts)

759

Carlson, A. J., A. C. Ivy, L. R. Krasno and A. H. Andrews 1942 THE PHYSIOLOGY OF FREE FALL THROUGH THE AIR: DELAYED PARACHUTE JUMPS. Quart. Bull. Northw. Univ. Med. Sch. 16:254-266. 1942.

760

Carlson, D.D. and R.H. Underwood 1961 DESIGN OF AN AEROSPACE SYSTEMS ENVIRONMENTAL CHAMBER. (Arnold Engineering Development Center, Arnold Air Force Station, Tenn.) Rept. No. AEDC TR 61-10, ASTIA AD-260 486

ABSTRACT: Design parameters for large space environmental chambers are discussed. The feasibility, ranges, and limitations of simulating these parameters in the U.S. Air Force's Mark I Aerospace Systems Environmental Chamber are presented. (Author)

761

Carlson, L.D. PHYSIOLOGICAL MECHANISMS INVOLVED IN TOLERANCE TO AEROSPACE FLIGHT ENVIRONMENTS (Kentucky University, Lexington) Project 7220(805A), Contract AF 33(616)-8414; MRMB, AMRL

ABSTRACT: The contractor will conduct research on the physiological mechanisms influencing human responses to hypodynamic environments and the subsequent return to normal conditions, changes in the respiratory mechanisms during acceleration and their effect on human tolerances and the mechanisms of human body temperature regulation during exposure to thermal extremes peculiar to aerospace flight. At the completion of each work phase the contractor will reduce, analyze and present the data obtained.

76.

Carlson, N.W. 1958 AN ANALYSIS OF A DEVICE FOR CONTROL OF ROTATIONAL MOTION. (Wright Air Development Center , Wright-Patterson AFB, Ohio) WADC TN 58-81, April 1958. ASTIA AD 151106

ABSTRACT: By varying the moment of inertia of a rotating body, speed changes are possible without a reaction on the support. A mechanical decelerator, based on the above principle has been successfully tested in the laboratory. Although, this device was originated to control flat spin encountered in freefall human parachute drops, other applications appear useful.

763

Carlson, Toby N. & Morton Glass 1962 VERTICAL VELOCITIES OBTAINED FROM AIRCRAFT ACCELEROMETER MEASUREMENTS IN A SEVERE THUNDERSTORM. (AF Cambridge Research Laboratories, Bedford, Mass.) AFCRL-62-499, Project 8620, May 1962. ASTIA AD 282 772

ABSTRACT: A penetrative flight by a T-33 aircraft was made through a large thunderstorm on July 26, 1960, over northern Arizona. From instruments recording airplane acceleration, angle of attack, and pitch angle, precise measurements yielded a vertical velocity every 60 ft. of flight path. Calculated velocities differed from the true motions by a constant of integration. Evaluating the constant by alternate procedures produced two velocity distributions, differing from each other by a constant.

764

Carlson, W. A. 1939 PSYCHOLOGY AND AVIATION. J. Aviation Med. 10(4):216-222, Dec. 1939.

ABSTRACT: Aviation is a comparatively new field that has taken man into an unusual environment. Consequently, an attempt must be made to determine what abilities and traits are necessary in an individual to make a good pilot. Normal or above-average intelligence is one prerequisite for a good pilot. Piloting an airplane demands a good and accurate capacity for learning, the ability to remember these learned reactions and sound judgment as to when to execute them. Normal span and control of attention is another requirement for a flier. A good pilot must also be emotionally stable. Youth is a desirable characteristic of the flyer. Reaction time becomes slower as a person grows older though this slowing down process varies in different persons.

765

Carlsten, [illegible] 1965 BLAST INJURY OF LUNG: [illegible] IN FATAL CASES - EXPERIMENTAL STUDY [illegible] -773, June 1965.

ABST: The cause of death following increased intrabronchial pressure produced by single or multiple blasts of air in eighteen dogs was coronary air embolism in fifteen, with pneumothorax as a contributory factor in eight. Pneumothorax appeared to be the sole cause of death in the remaining three. Other gross findings noted in these animals were similar to those reported in human beings following blast injury. In some patients dying immediately following a blast injury the cause of death has not been adequately explained. Coronary air embolism may be very easily overlooked and might well be the cause of death in some cases of blast injuries.

766

Carlsten, A., C-J. Clemedson and H. Hultman 1955 THE ELECTROCARDIOGRAM OF RABBITS IN BLAST INJURY.
Acta. Physiol. Scand. 33:243-256.

767

Carlyle, L. 1959 LITERATURE SURVEY ON AIRCREW RESTRAINT.
(Douglas Aircraft Co., El Segundo, Calif.) Rept. ES 29260, 10 Feb. 1959

SUMMARY: This report has been prepared to serve as a general reference for future development of air crew safety and restraint systems. A survey of the literature on human response to accelerative forces and mechanics of vertebral injury plus current and proposed safety and restraint systems was made and abstracted for the report. (AUTHOR)

768

Carlyle, L. 1960 MAN AND SPACE
(Paper SAE National Aeronautic Meeting, New York, N. Y., April 5-8, 1960)
(Society of Automotive Engineers, Inc., New York, N. Y.) Rep. 173A

ABSTRACT: Procedures are described for determining functional human envelopes for flight in vehicles within the earth's atmosphere and beyond. As a first step, a comparison of various types of manned flight is made to determine functional and, consequently, volumetric requirements of a human occupant. The use of two-dimensional manikins based on anthropometric data is described and a composite (5th through 95th percentile of body sizes) functional envelope is developed. Allowances are made for heavy flight clothing and boots. The effect of a full-pressure garment is considered. Factors unknown as yet about interplanetary flight are considered in relation to this approach. (Tufts)

767

Carlyle, L. 1961 CINEFLUOROGRAPHIC TECHNIQUE IN ACCELERATION STUDIES. (Paper, Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Material Center, Philadelphia, Penn. June 14-15, 1961).

ABSTRACT: The high incidence of vertebral fractures in aircraft accidents is a major problem in aviation safety. However, none of the studies done on this subject casts sufficient light on the basic problem - the true dynamics of the living vertebral column when subjected to acceleration forces.

The development of electronic image intensification devices to increase the brightness of the fluoroscopic image at tolerable radiation dosages has radically imporved the utility of x-ray equipment and offers a means of implementing research studies formerly considered impractical. This paper describes the function of the electron optical image intensifier which, for a given input of radiant energy, can produce an image at least 3000 times brighter than that obtained by orthodox fluoroscopy. A test film will be shown to demonstrate the technique.

768

Caro, C.G., J. Butler & A.B. Dubois 1960 SOME EFFECTS OF RESTRICTION OF CHEST CAGE EXPANSION ON PULMONARY FUNCTION IN MAN: AN EXPERIMENTAL STUDY. J. Clin. Invest. 39:573-583, April 1960.

ABSTRACT:

1. The total lung capacity and its subdivisions were reduced by restricting chest expansion in normal man.

2. The lung pressure-volume relationship was altered (smaller volume resulting from unit pressure) over much of the vital capacity. Respiratory frequency was increased and tidal volume was reduced. Airway conductance at resting lung volume was not changed despite reduced functional residual capacity. There was slight uneveness of alveolar ventilation with evidence of non- or poorly ventilated lung units. Systemic arterial O_2 tension fell during oxygen breathing, and there was a slight increase of peripheral venous pressure.

3. Following release of chest restriction, the mechanical changes in the lungs were reversed via a hysteresis-like pathway. They appear to be explained in part by the opening of lung units which had become closed during chest restriction.

769

Carpenter, A. 1954 ACCELEROMETERS AND PSYCHOLOGY (Applied Psychology Research Unit, Cambridge, Great Britian) Rept. No. APU 225/54, Dec. 1954

ABSTRACT: A brief list is given of the possible applications of acceleration-sensitive instrumenrs in psychological experiments, and the theoretical basis of these sensitive instruments is described. In the type of accelerometer

described, a magnetic bridge unit is used to measure the displacement of the spring-mounted mass, relative to the instrument case, that is produced by applied acceleration. With the circuits energized by an alternating current of a suitable frequency, the device becomes sensitive to deflections of about 0.0001 inch. The constructional details of the design are given, and practical considerations are mentioned.

770

Carpenter, M. S. 1962 ASTRONAUT PREPARATION.
(In Results of the First U. S. Manned Orbital Space Flight, February 20, 1962) (Washington, D. C.: National Aeronautics and Space Administration, 1962) Pp. 105-111.

771

Carpenter, M. S. 1962 PILOT'S FLIGHT REPORT
(In Results of the Second United States Manned Orbital Space Flight, May 24, 1962, pp. 69-75. Washington, D. C.: National Aeronautics and Apce Administration, 1962) NASA SP-6.

ABSTRACT: An account of the major events and personal observations of the MA-7 flight is reviewed by the pilot. Prior to and during powered flight, launch-vehicle noise and vibration were less than expected. As in the MA-6 mission, the astronaut quickly adapted to weightless flight and remarked that it was more comfortable and provided greater mobility than under normal gravity. Astronaut Carpenter also observed the space particles and the bright horizon band, previously reported by Astronaut John H. Gleen, Jr., and secured new information on both phenomena. The final phases of the flight, including retrosequence, reentry, landing, and egress, are covered in detail.

772

Carpenter, M. S. 1963 ORBITAL EXPERIENCE
In (School of Aerospace Medicine, Brooks AFB, Texas) Lectures in Aerospace Medicine (Address given 4 Feb. 1963; to be published at later date)

ABSTRACT: Astronaut Carpenter discussed various aeromedical aspects of his space flight of 24 May 1962 in the Aurora 7 Mercury-Atlas orbital flight, in which he completeed a 3-orbit mission reaching a maximum altitude (apogee) of 164 miles, and attained an orbital velocity of 17,532 mph. Vibration and acceleration effects were stated to present no problem. The Gemini or Apollo missions re-entry profiles would not exceed the 11 G Redstone or 8 G orbital re-entry accelerations. He mentioned training missions in the centrifuge at Johnsville up to 16 G, and that decrement did not become evident until after 8-10 G. Vibration difficulty on the previous flight by J. H. Gleen was overcome by simply placing a sponge between the helmet and couch, which successfully eliminated vibration. (CARI)

773

Carr, S. J. 1944 COMPARATIVE TRIALS BETWEEN FRANKS' AND COTTON'S ANTI-G SUITS.
(RAF Institute of Aviation Medicine, Farnborough) F.P.R.C. Rept. No. 567, February 1944.

774

Carringer, E.M., M.G. Hoppe and B.H. Nichols 1961 ASTRONAUTICS INFORMATION. OPEN LITERATURE SURVEY. VOLUME III, NUMBER 6 (ENTRIES 31,146-31, 373). (Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena, Calif.) ASTIA AD-260 278

775

Carringer, E. M., M. G. Hoppe, & B. H. Nichols 1961 ASTRONAUTICS INFORMATION. OPEN LITERATURE SURVEY, VOLUME IV, NO. 3 (ENTRIES 40, 454-40, 728). (Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena, Calif.) (Contract NASw-6) September 1961. ASTIA Doc. No. AD-264 956.

776

Carringer, E.M., M.G. Hoppe & B.H. Nichols 1962 ASTRONAUTICS INFORMATION. OPEN LITERATURE SURVEY, VOLUME V, NO. 2 (ENTRIES 50,206-50,417). (Jet Propulsion Lab., Calif. Inst. of Tech.); ASTIA AD 273 505.

777

Carringer, E.M., M.G. Hoppe, and B.H. Nichols 1962 ASTRONAUTICS INFORMATION, OPEN LITERATURE SURVEY VOLUME V, NO. 3 (ENTRIES 50,418-50,669). (Jet Propulsion Lab., Calif. Inst. of Tech.); ASTIA AD 274 399.

778

Carroll, J., & H. F. Roegner 1958 PRELIMINARY PHOTOGRAPHIC EVALUATION REPORT OF BRANIFF ACCIDENT FOR ALPA (Aviation Crash Injury Research, A Division of Flight Safety Foundation Inc., Phoenix, Arizona) Rept. AvCIR-8-PR-100; Dec. 1958

779

Carroll, J. 1960 PRINCIPLES OF CRASH INJURY INVESTIGATION.
(Aviation Crash Injury Research, Phoenix, Arizona) AvCIR 62-0-107, September 1960.

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780

Carroll, J. and H. F. Boettner 1960 CRASH INJURY REPORT: U. S. ARMY U-1A DE HAVILLAND OTTER ACCIDENT, FORT CARSON, COLORADO, 1 JUNE 1959. (Aviation Crash Injury Research, Phoenix, Arizona) AvCIR-9-PR-104, February 1960.

SUMMARY: A crash injury investigation revealed that injuries were the result of the occupants being thrown free due to seat and/or seat belt failures an striking interior structures and rifles.

The analysis of injury causation factors indicates the need for: (1) increa strength of seats and tie-downs, (2) a better restraint system for occupant and (3) a method of stowing hand-carried weapons. (Author)

781

Carroll, J. 1960 CRASH INJURY INVESTIGATOR'S SCHOOL REFERENCE MANUA (Aviation Crash Injury Research, Phoenix, Arizona) October, 1960

782

Carroll, J. and W. R. Knowles 1960 CRASH INJURY EVALUATION: U. S. A [illegible] MOCKUP, MORTON, [illegible] January 1960. (Aviation Crash Injury Research, [illegible] AvCIR-15-PV-118, TREC Tech. Rept. 60-[illegible] 1960.

SUMMARY: The U. S. Army YHC-1B helicop[illegible] is presented for review by the Vertol Division of the Boeing Company, Morton, Pennsylvania, January 27, 1960.
Aviation Crash Injury Research, participa[illegible] review independ from the research standard, evaluating th[illegible] survival poin view. As a result of the evalua[illegible] based in part on previous accident experience, it was concluded th[illegible] of desirable crash safety feat[illegible] 1) The crew compartment [illegible] cabin generally appear to offer [illegible] worthy features free from the [illegible] number of protruding, injurious compo usually found in earlier model Army troop-carrying helicopters. 2) The Y[illegible] provides a good cockpit arrangement with the instrument panel mounted low [illegible] striking range for an adequately restrained pilot and copilot. 3) [illegible]ects [illegible] overhead consoles, lights, and motors are installed and mounted i[illegible] and [illegible] thereby removing them from striking range of the pilot an[illegible] pilot. 4) Provisio[illegible] for emergency exits in the crew compartment are adequate.

783

Carroll, J. 1961 CRASH INJURY EVALUATION: U. S. ARMY YHU-1D BELL IROQUOIS HELICOPTER MOCKUP, FORT WORTH, TEXAS, 7 JULY 1960, 19-20 JANUARY 1961. (Aviation Crash Injury Research, Phoenix, Arizona) AvCIR 16-PV-127, TREC Tech. Rept. 60-74, February 1961.

SUMMARY: Two crash injury evaluations of the mockup of the YHU-1D were c[illegible]ted

by AvCIR at the request of the U. S. Army Transportation Research Command (TRECOM). The first evaluation was conducted on 7 July 1960, at which time many of the design details had not been completed. A subsequent evaluation was made on 19-20 January 1961. Both evaluations were made at the Bell Helicopter plant, Fort Worth, Texas. The purpose of the evaluations was to: 1) Evaluate over-all crash safety of the basic aircraft structure; 2) Determine the existence, if any, of features which could lead to unnecessary exposure of crew members and passengers to serious or fatal injury in the event of an accident involving crash conditions of a survivable nature; 3) Make recommendations for remedial action in the areas where deficiencies exist in order to improve the overall crash safety aspects of the aircraft; and 4) Point out desirable crash safety features revealed through inspection of the mockup, engineering drawings, and detailed specifications.

The above work was accomplished through a comprehensive crash injury evaluation of the entire aircraft, its components, and equipment. This was supported by discussions with members of the Bell engineering staff and reference to applicable technical manuals and military specifications.

As a result of the evaluation, which was based in part on previous accident experience with the similar HU-1A helicopter, it was concluded that: (1) The basic structure of the YHU-1D provides a strong, crashworthy platform with a reasonable degree of crash force energy absorption through a well-designed skid gear assembly; (2) the YHU-1D presents a good cockpit arrangement, with the instrument panel mounted low and out of striking range for an adequately restrained pilot or copilot; and that (3) provisions for emergency exit in both the crew and troop compartments are adequate, except as otherwise noted herein.

The evaluation also revealed a number of crash safety deficiencies existing in troop seats, litter installations, certain emergency escape provisions, potential fuel system hazards, and, in particular, the continued use of a magnesium cast transmission support case which has proven to be an inherent weak point of design in the Bell Iroquois helicopter series. In addition, the Military Specifications and crash load structural criteria governing the design and strength of various components, such as seats, litters, etc., are considered deficient in that minimum requirements specified are inadequate and incompatible with simultaneous application of crash forces in three planes, and with magnitudes and durations experienced in actual helicopter accidents.

Based on the data and analyses presented in this evaluation, several recommendations are made concerning the airframe, components, main cabin, furnishings, and related Military Specifications. These arecontained in Section III. (AUTHOR)

784

Carroll, John J. 1962 A REVIEW OF U. S. AIR CARRIER ACCIDENTS IN WHICH FATALITIES RESULTED FROM FIRE FOLLOWING IMPACT, 1952-1961. (Civil Aeronautics Board, Bureau of Safety, Engineering Division, Washington 25, D. C.) June 1962

785

Carroll, K.D. 1960 PRIMATES IN SPACE CAPSULES. (Lockheed Missiles and Space Company, Sunnyvale, Calif.) SB-60-13

786

Carter, C. V. 1956 LOADS ON AIRCRAFT AND PILOT DURING SPINS AND POST-STALL GYRATIONS. (Chance Vought Aircraft) Memo E-1837, 4 June 1956

787

Carter, C.V. & W.W. Huff, Jr. 1959 THE PROBLEM OF ESCAPE FROM SATELLITE VEHICLES
(Paper: Institute of Aeronautical Sciences 27th Annual Meeting, Jan. 26-29, 1959, New York City, New York)/ IAS Rept. No. 59-41

ABSTRACT: Problems of design of escape systems for manned satellite vehicles are discussed: escape prior to takeoff, during boost at high dynamic pressure, during exit from the atmosphere and entry of the atmosphere, and during orbit. Design procedures which can be employed to determine a satisfactory escape system configuration are presented.

788

Carter, E. T. and M. W. J. Bell 1958 BIOTHERMAL ASPECTS OF RE-ENTRY FROM EXTRA-ATMOSPHERIC FLIGHT.
(Paper, American Rocket Society, New York 36, N. Y.) Paper 704-58

ABSTRACT: This paper points out certain biothermal problems that are expected to arise as a result of atmospheric re-entry of manned vehicles. Some solutions are presented, although the authors admit that they fall far short of being acceptable answers to the problem. It is also pointed out that these methods take into account only the stress of temperature and do not consider the possibility that other stresses such as hypoxia or high g loading are present at the same time. These additional stresses could cause an intolerable situation for the vehicle occupant. More information is needed regarding human performance under the combined stresses of heat and acceleration.

789

Carter, L.J., ed. 1957 REALITIES OF SPACE TRAVEL: SELECTED PAPERS OF BRITISH INTERPLANETARY SOCIETY. (New York: McGraw, 1957)

ABSTRACT: Among the subjects treated in this series of articles published since 1948 are the following: Astronautics (introduction, history, and development), interplanetary flight, space flight (biological aspects of, and physical factors in), satellite vehicles, testing stations, and the future of space travel. The appendix contains a report on the British Interplanetary Society and a list of astronautical and rocket societies.

790

Carter, R. L. 1958 VERTEBRAL INJURIES FROM EJECTION FORCES. (Paper presented at the 29th Annual Meeting, Aero-Med. Assoc., Washington, D. C., March 1958)

ABSTRACT: A review is presented of the literature concerning human tolerance to ejection forces. Evidence was found that all thoracic and lumbar vertebrae have essentially the same tolerance to positive accelerations of high magnitude and short duration. Consideration is given to factors which abet spinal injuries, especially body position. (J. Aviation Med. 29:233)

791

Carter, R. L. 1959 HUMAN TOLERANCE TO AUTOMATIC POSITIONING AND RESTRAINT SYSTEMS FOR SUPERSONIC ESCAPE (North American Aviation, Inc., Columbus Division, Columbus 16, Ohio, Engineering Department) Report No. NA59H-220 *

Abstract: A complete torso and extremity positioning and restraint system for supersonic escape has been demonstrated with multiple live tests. This system requires no pre-positioning whatsoever on the part of the airman prior to initiating escape. All forces imposed upon the airman during these operations are well within human tolerance limits. The time required from initiation to inflation of the recovery parachute has not been compromised.

792

Carter R L. & G.A. Holcomb 1959 HUMAN TOLERANCE TO FORCES IMPOSED UPON AN AIRMAN DURING SIMULTANEOUS SEAT BOTTOMING, KNEE ELEVATING AND LEG POSITIONING AND RESTRAINING IN THE A3J-1 ESCAPE SYSTEM. (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: The seat bucket on the A3J-1 escape system adjusts to accommodate various height airmen while the rest of the seat and the seat catapult remain stationary. The seat bucket must be bottomed prior to firing the seat catapult in order to have proper center of gravity-rocket thrust relations when the seat leaves the rails. At the same time, the seat is being bottomed, the knees are being elevated and the legs positioned and restrained This prevents flailing of the lower extremities, insures symmetry of the ejected mass, and reduces the decelerative forces imposed by the dynamic wind pressure. All these operations are accomplished in 0.2 seconds by ballistically powered units. This paper presents data that show that all forces imposed upon the airman during these operations are within human tolerance limits. Production units were tested using anthropomorphic dummies and a human subject. No deleterious effect whatsoever was experienced, not even mild, transient pain. The knee raising bar impacted the

legs with a maximum velocity of 7.6 feet per second. The leg restraining hooks impacted the legs with a maximum force of 110 pounds. Raising the knees did not produce spinal flexure. Movies of the human test are presented. (J. Aviation Med. 30(3):179, March 1959

793

Carter, R. L. 1961 BIODYNAMICS OF CAPSULE RESTRAINT SYSTEMS.
(Paper, Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Material Center, Philadelphia, Pa., June 14-15, 1961.)

794

Carter, R.L. 1961 HEAD IMPACT STUDIES
(Paper, Symposium on Impact Acceleration Stress, Brooks AFB, Texas, Nov. 27-29, 1961)

ABSTRACT: Subjects wearing standard U.S. Navy flight Helmets impacted their heads against an ejection seat headrest to determine voluntary tolerance limits to this type of acceleration. Accelerometers were mounted on the helmet and on the subject's forehead.

Six subjects were used in the study. Pain was used as the endpoint. Voluntary limits ranged from 42.2 G's to 67.3 G's. Impact velocities ranged to 31.3 ft/sec. Rates of onset of acceleration ranged to 13,460 G/sec. Total times of acceleration ranged from 0.018 to 0.029 sec.

The subjects experienced no ill effects following the tests.

795

Case, Robert W. 1938 TESTING APPARATUS FOR AIRCRAFT

U.S. Patent n2, 115, 841. May 3, 1938

ABSTRACT: The apparatus drop tests the fuselage or any other similar mass. Cylindrical charts at various positions along the fuselage (or other structure) rotate and record the movement of the structure as it strikes the landing base. A tachometer records the revolutions of the cylindrical charts to determine their speed. Height of drop may be varied and damping springs under the landing base may be changed to change degree of impact force.

796

Cass-Beggs, D. 1943 INTERIM REPORT ON THE WORK DONE DURING THE YEAR 1942 ON THE CONSTRUCTION OF THE HUMAN CENTRIFUGE UNDER DOMINION GOVERNMENT GRANT A.M. 4 MADE THROUGH THE NATIONAL RESEARCH COUNCIL. (National Research Council of Canada, Toronto) C-2422, 2 March 1943.

ABSTRACT: Final stages in the construction of the human centrifuge and its electronic control are described.

797

Cassen, B., L. Curtis, and K. Kistler 1950 INITIAL STUDIES ON EFFECT OF LABORATORY-PRODUCED AIR BLAST ON ANIMALS. J. Aviat. Med. 21:38-47

ABSTRACT: Simple equipment was developed for subjecting mice to a controlled airpressure pulse produced by bursting a diaphragm, separating the test chamber from a high pressure compartment. Twenty mice per hour may be tested, including autopsy for gross damage and recording the degree of lung hemorrhage produced by the blast. Preliminary observations have been made on 4000 mice. Degree of lung hemorrhage was dependent upon blast pressure, volume of compression compartment, spatial orientation, previously induced x-ray irradiation, and premedication with some Vitamin P-like compounds. (from AUTHOR'S SUMMARY)

798

Cassen, B., K. Kistler and W. Mankiewicz 1952 SOME EFFECTS OF AIR BLAST ON MECHANICALLY CONSTRAINED MICE. J. Aviation Med. 23(2)120-129.

ABSTRACT: Mice were held on heavy plates by attaching their feet with Scotch tape. The plates were suspended vertically at various distances from an explosive charge which was detonated. A large proportion of the mice died, gasping for breath, within 10-15 minutes after blast exposure. Autopsies showed that the mice killed had their lungs swollen to 2-3 times their normal average. Determinations were made of hemoglobin content (hemorrhage) and weight of the lungs. In another experimental series, the mice had parts of their bodies, either thorax or head, sheilded during blast exposure. Shielding of the thorax did not reduce the incidence of swollen lungs but shielding of the head did reduce it. The authors conclude that the swelling (edema) of the lung was due not to direct injury of the lung but to injury of the brain (probably hypothalamic region).

799

Cassen, B., K. Kistler, and W. Mankiewicz 1952 LUNG HEMORRHAGE PRODUCED IN HEPARINIZED MICE BY AIR BLAST.
J. Aviation Med. 23: 115-119, 185.

ABSTRACT: Mice were heparinized (to prevent clotting of the blood) and then exposed to air blast in a special laboratory apparatus. The amount of pulmonary hemorrhage which resulted from this exposure was determined (method is described in detail) 1, 15, or 25 minutes after the experiment. The results indicate that bleeding was moderate for the first 15-20 minutes and more severe after that period of time. The authors conclude that there is a hemostatic mechanism (probably vasoconstriction) in the lung tissue which prevents severe bleeding for a limited time. If no clotting takes place, profuse hemorrhage occurs after hemostasis wears off.

800

Cassen, B., P. Kalian and H. Gass 1952 HIGH SPEED PHOTOGRAPHY OF THE MOTION OF MICE SUBJECTED TO LABORATORY-PRODUCED AIR BLAST
J. Aviation Med. 23(2): 104-114.

ABSTRACT: An apparatus is described by which the behavior of unconstrained mice subjected to air blast may be analyzed in high-speed motion pictures (2,400 frames per second). The part of the body which is struck first by the blast wave, is violently accelerated before the other parts start moving. There is much compression and distortion of the body before the animal flies off in a twisting and rotating motion.

801

Cassen, B., H. Gass and K. Kistler 1954 COMPARATIVE EFFECTS OF HIGH EXPLOSIVE BLAST ON MECHANICALLY CONSTRAINED MICE AND RATS.
J. Aviation Med. 25: 123-127.

ABSTRACT: Field tests were conducted by subjecting both mice and rats simultaneously to dorsally incident air blast while their feet were loosely taped or tied to ½-inch-thick steel plates. The technique was the same as that described for mice previously. It was found that altnough the weights of the animals differed by a factor of about ten, the relative degree of pulmonary edema produced in the rats and mice at the same position was the same; also, the pressure range producing lethality was the same for the two types of animals. (Author)

802

Cassidy, William B. 1961
PERSONAL RESTRAINT AND IMPACT SYSTEMS FOR FLIGHT CAPSULES.
(Paper, Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Material Center, Philadelphia, Penn. June 14,15).

ABSTRACT: In conjunction with the development of a capsule system for the F8U aircraft, a program was conducted to design a pilot restraint and impact system capable of preventing injury to the pilot during normal flight operation and emergency escape. The restraint system complied with the over-all capsule design philosophy to unburden the pilot of personal environmental protective equipment and at the same time provide effective restraint. Other design criterias included self attachment, simplified adjustment and lightweight easy operating hardware. Acceleration loads were determined for the critical separation, boost, recovery, and impact phases. Based on these load requirements, various restraint system configurations were designed and comparatively evaluated with existing systems considering such features as effectiveness, comfort, ease of ingress and egress, complexity, weight, etc. The use of a non-ejectable mesh seat permitted many design innovations to the restraint system unattainable with conventional ejection seat installation. Impace loads on the pilot were maintained within tolerable limits by using such devices as automatic restraint take-up, two position seat and capsule bridle attachment, properly sized recovery parachutes, inherent energy absorption characteristics of the aircraft structure and a contoured seat. Details of this research and development program will be presented, including conclusions and recommendations.

803

Castor, J.G.B. n.d. STUDIES ON AVIATION MEDICINE (THE X SECTION OF THE NATURAL RESEARCH COUNCIL OF JAPAN)
In List and Dispostion of Documents Collected by the Aero-Medical Section, Air Technical Intelligence Group (ATIG Report No. 241)

804

Castor, John G.B. 1946 LIST OF JAPANESE AERO-MEDICAL RESEARCH PUBLICATIONS, CONTENT AND DISPOSITION
(Air Technical Intelligence Group, Advanced Echelon, FEAF Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio) Report No. F-IR-91-RE.
ASTIA ATI 26 382

ABSTRACT: Two lists of Japanese Aero-medical research publications are given. One is a list of documents in the hands of Japanese nationals and the other is a list of documents collected by the Aero-Medical section, Wright Field.

805

Castor, J.G.B 1946 ACCELERATION (G-FORCE) RESEARCH EQUIPMENT, STUDIES, RESULT AND TRAINING. (Hq., AMC, Wright-Pat. AFB, Ohio) Air Tech. Intelligence Review Rept. F-IR-127-RE, December
ASTIA ATI No. 12710

ABSTRACT: In order to observe the changes of the intermediary carbohydrate metabolism produced by centrifugal effects in the direction of feet toward head or head toward feet, rabbits were subjected to centrifugal forces of 10g for 10 seconds in various directions, and the changes in blood sugar and lactic acid were determined. Furthermore, the influence on the above changes by anesthetics (urethane and luminal), as well as by vegetative nerve stimulants (pilocarpine, atropine, adrenlin, and ergotamine) and by vagotomy, was analyzed.

From the experimental results it may be concluded that hyperglycemia and hyperlactacidemia which are gradually produced by centrifugal effects in the directional of feet toward head or head toward feet, and persist for 1 1-1/2 hours after stopping the centrifugal action are probably due to the fact that the vegetative nerve center or the control center of the carbohydrate metabolism in the midbrain are irritated by the centrifugal forces. This stimulus, in turn, is transmitted to the liver via the sympathicus, where it results in the splitting of glycogen. It was furthermore pointed out that hyperlactacidemia which occurs immediately after stopping the centrifugal action in direction of head towards feet, and which is intensive but transitory, must be of peripheral and not of central origin.

806

Castor, J.G.B. 1956 ACCELERATION (G FORCES) RESEARCH, EQUIPMENT STUDIES, RESULTS AND TRAINING (Air Materiel Command, Wright-Patterson AFB, Ohio) Intelligence Rev. Report No. F-IR-127-RE, December 1956

807

Cathcart, W. T., Jr. 1959 AN ORBITAL SIMULATOR
In 1959 Proceedings of the Institute of Environmental Sciences, Annual Technical Meeting, April 22-24, 1959, La Salle Hotel, Chicago, Illinois (Institute of Environmental Sciences, Mt. Prospect, Ill.) pp. 68-70

808

Catling, F.P. 1958 TRENDS IN NAVAL AVIATION INJURY PATTERNS.
(U.S. Naval Air Station, Aero-Medical Department, Norfolk, Va.) Rept. No. AM 3-59, Oct. 1958. ASTIA AD 227 326.

SUMMARY: Data from the Naval Aviation Safety Center were accumulated from accident reports from the close of World War II (1946) through 1958. The data were examined and tabulated by specific accident type, phase, and damage classifications in current use at the Safety Center. Corresponding tables were constructed for fatal injuries. In addition, the data were developed for bailouts and ejections and their related injury patterns.

Taking the data in their entirety, they indicated that there has been a gradual shift over the years in the aircraft accident pattern. For instance, changes in the type of accidents, the phases in which they begin, the methods of escape and so forth, are occurring. Perhaps because of a universal inability to develop a satisfactory classification system, inadequate reporting procedures, or perhaps because it does not exist, practically no shifting is discernible in the patterns of injury, with one exception. This exception has been the steady increase in the proportion of fatal injuries which has grown steadily over the years in Naval Aircraft accidents.

809

Cattell, McKeen 1936 THE PHYSIOLOGICAL EFFECTS OF PRESSURE
Biol. Rev. 11(4):441-476.

810

Cawthorne, T. 1959 VERTIGO.
Proc Roy Soc Med 52:529-36, July 1959

811

Ceausu, V. 1960 PSYCHOLOGICAL PROBLEMS OF FLIGHT. (Problemele Psihologice ale Zborului) Revista de Psihologie (Bucuresti). 6(3):95-114. (In Rumanian, with French summary, p. 113).

812

Celander, H., C-J. Clemedson, U.A. Ericsson & H. Hultman 1955
THE USE OF A COMPRESSED AIR OPERATED SHOCK TUBE FOR PHYSIOLOGICAL BLAST RESEARCH. Acta Physiol. Scand. 32:6-13.

813

Celander, H., C-J. Clemedson, U. A. Ericsson & H. Hultman 1955
A STUDY ON THE RELATION BETWEEN THE DURATION OF A SHOCK WAVE AND THE SEVERITY OF THE BLAST INJURY PRODUCED BY IT. Acta Physiol. Scand. 33:16-18.

814

Černoch, O. and M. Kopecký 1951 NĚKTERÉ POZNATKY ZVYSETŘOVÁNI CVICENCU VYSADKOVÝCH ODDILU SOKOLA (Certain Observations On Examination of Young Parachutists)
Vojenské Zdravotnické Listy, Prague, 20: 108-111, May-June 1951

815

Chae, E. U. 1957 THE INFLUENCE OF TEMPERATURE UPON THE TOLERANCE OF MICE TO POSITIVE RADIAL ACCELERATION. J. Av. Med. ROKAF. 5(1).

816

Chaffee, J. W. 1961 THE EFFECT OF ACCELERATION ON HUMAN CENTERS OF GRAVITY. (General Dynamics Corp., Fort Worth, Tex.) Rept. no. FZY-013 ASTIA AD 271 613

ABSTRACT: The location in two-dimensional (x-z) space of the center of gravity of the seated human body was studied on 25 living male subjects under conditions of experimentally controlled changes in the angle at which a 1 g acceleration acted upon the completely restrained body. Varying the direction of acceleration from 15 degrees through 80 degrees, measured from the torso axis forward, produced a migration of the group average center of gravity along a curved path of 2.15 seconds arc length, a consistent rotation of the axis of maximum individual variability from 10 degrees 53 minutes aft of the torso axis to a maximum forward angle of 90 degrees 16 minutes, and a characteristic fluctuation in absolute size of the individual variation about the group average. The practical applications of these findings to the design of rocket-powered systems (e.g., escape capsules) is discussed. (Author)

817

Chaffee, J.W. 1962 CHANGE IN HUMAN CENTER OF GRAVITY PRODUCED BY CHANGE IN DIRECTION OF ACCELERATION. ARS Journal, 32 (11): 1677-1680, November 1962

ABSTRACT: The two-dimensional location of the center of gravity of the seated human body was studied on 25 male subjects under conditions of experimentally controlled changes in the angle at which a 1-g acceleration acted upon the completely restrained body. It was found that varying the direction of the simulated acceleration vector from 15° through 80°, measured from the torso axis forward, produced: (1) a migration of the group average center of gravity along a curved path of 2.15-in. arc length; and (2) a consistent rotation of the axis of maximum individual variability (supposed "optimum" thrust vector) from 10° 53' aft of the torso axis to a maximum forward angle of 90° 16'. Speculation concerning the practical applications of these findings to the design of rocket-powered systems (e.g., escape capsules) is presented. (Author's summary)

818

Chamberlain, N. E. and H. S. Overman 1952 PERSONNEL EJECTION CATAPULT TESTING DEVICE
(U. S. Naval Proving Ground, Dahlgren, Va.)
Report No. 915, 25 Jan. 1952. ASTIA ATI-139 471

ABSTRACT: This is the final report on a series of exploratory firing tests

conducted to investigate experimentally the ballistic characteristics of a personnel ejection catapult. Sixty rounds were fired in a test model of the catapult, during which variations were introduced in the length of stroke, catapulted weight, types of propellant, weights of charge and booster, and initial volume. The effects of variables on ballistic performance were recorded on high-frequency-response cathode-ray oscillograph equipment and are presented herein. Also included is an analysis of the theoretical performance of an ideal catapult, from which are derived criteria for the evaluation of the actual performance.

The performance of the Personnel Ejection Catapult Test Model, as reflected in the ratio of ejection velocity to maximum acceleration, is consistently within the range from 91% to 97% of ideal performance, and is relatively insensitive to the variations in propellant types, boosters and initial volumes which were used in these tests.

819

Chambers, A. N. 1957 HUMAN FACTORS CONSIDERATIONS IN THE SIMULATION OF ACCELERATION FORCES IN FLIGHT TRAINERS AND SIMULATORS (Dunlap and Associates Report, Stanford, Connecticut) ASTIA AD 110 604

820

Chambers, R. M. n.d. EFFECTS OF G ENVIRONMENTS ON PSYCHOMOTOR ABILITIES NADC-MA-6121. (Unpublished).

821

Chambers, R. M. and R. G. Lathrop n.d. CONSIDERATIONS IN TESTING FOR INTELLECTUAL IMPAIRMENT DUR TO ACCELERATION NADC-MA-6125 (Unpublished)

822

Chambers, R.M. and H.V. Doerfel 1959 CLOSED-LOOP CENTRIFUGE SIMULATION OF SPACE VEHICLE PERFORMANCE. (Paper presented at ARS semi-annual meeting, 8-11 June1959, San Diego) ARS paper no. 807-59

ABSTRACT: This paper presents the development of some closed-loop human centrifuge simulations of proposed space vehicles, and presents some applications of these simulations to humen factors problems anticipated in specific space maneuvers.

823

Chambers, R. M., & J. G. Nelson 1960 PILOT PERFORMANCE CAPABILITIES DURING CENTRIFUGE SIMULATIONS OF BOOST AND RE-ENTRY. (Paper, American Rocket Society, 15th Annual Meeting, 5-8 Dec. 1960, Washington, D. C.) ARS Paper No. 1401-60

ABSTRACT: Presents 9 principles concerning the effects of acceleration on human performance. These principles are derived from centrifuge experiments in which human subjects were exposed to acceleration environments which were designed to simulate three basic types of proposed space vehicles. The principles deal with the areas of : performance tolerance, practice effects restraint system, individual differences, control system, control feedback, task difficulty level, display characteristics, and higher mental proces.

824

Chambers, R. M. 1960 HUMAN PERFORMANCE CAPABILITIES IN HIGH G ENVIRONMEN (Presented at Amer. Psychol. Assn. Convention, Chicago, Illinois. 1-7 September 1960)

825

Chambers, R. M. 1960 EFFECTS OF G ENVIRONMENTS ON PSYCHOMOTOR ABILITIE (Paper, 31st Annual Meeting of the Aerospace Medical Association, Ame ana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960)

ABSTRACT: The psychomotor abilities of the human pilot were tested in a s ies of 211 closed loop centrifuge runs in which the primary A_z, $-A_x$, and $+A_xG$ ctors and their combinations were systematically varied so as to produce a serie of steady-state G fields. During specific flight co-ordination and tracking neuvers, psychomotor task difficulty levels and acceleration amplitudes were lso varied. Physiological and performance recordings were obtained simultanec ly during each run. Piloting opinion regarding sensations and perceptions, b athing and visual symptoms, effects on control motions, and adequacy of restraint systems were also obtained from each pilot. An analysis of the various quantitati recordings resulted in a comparison of the effects of each experimental va iable on specific psychomotor and physiological components. Performance tolerar curves were constructed which reflect the deterioration of piloting capabi ties as a function of (1) G-vectors and their combinations, (2) acceleration at itude, and (3) tas difficulty.

826

Chambers, R. M., et al 1961 THE EFFECTS OF WATER IMMERSION ON PERFORM NCE PROFICIENCY
(Naval Air Development Center, Aviation Medical Acceleration Lab., Jo nsville, Pa.) NADC-MA-6133, 22 Aug. 1961.

ABSTRACT: In an attempt to study a wide range of human performance abilit s

associated with weightlessness and the transition from weightlessness to high G reentry environment, the technique of water immersion and centrifugation was used to simulate these conditions. Six male subjects were immersed in water to the neck level for a 12-hour period and one subject for a 23-hour period. Eight selected performance tasks were administered: (1) before immersion, (2) during immersion, (3) after immersion and centrifugation so that gross motor and perceptual behavior could be sampled. It was found that behavior was not apparently affected by prolonged water immersion followed by reentry type accelerations.

827

Chambers, Randall M. 1961
CONTROL PERFORMANCE UNDER ACCELERATION WITH SIDE-ARM ATTITUDE CONTROLLERS
(U.S. Naval Air Development Center, Johnsville, Pennsylvania)
NADC-MA-6110. November. ASTIA AD-269 487

ABSTRACT: This paper presents some procedures, data, and conclusions based on several closed-loop centrifuge experiments in which side-arm controllers were used by pilots to perform specific control tasks. Under certain conditions the pilots could perform as well in adverse acceleration fields as they could statically, even though they were exerting much more physical effort and psychological concentration, and they were enduring visual impairment, chest pains, breathing difficulties, and other stressful effects of acceleration. The pilots demonstrated a remarkable ability to adapt to physiologically severe acceleration environments, and they maintained control performance within acceleration time history profiles which contained vectors with amplitudes as high as +15 G_x, -7G_x. Some closed-loop human centrifuge simulations were conducted which provided human factors data which may have application to the design and evaluation of side-arm controllers for use within proposed space vehicles.

828

Chambers, R. M. & J. G. Nelson 1961 PRINCIPLES CONCERNING PILOT PERFORMANCE IN CENTRIFUGE SIMULATIONS OF SPACE VEHICLES.
(Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.) Rept. No. NADC-MA-6143, 22 December 1961.
ASTIA Doc. No. AD-270 282.

ABSTRACT: This report presents 9 principles concerning the effects of acceleration on human performance. These principles were derived from centrifuge experiments in which human subjects were exposed to acceleration environments designed to simulate three basic types of proposed space vehicles. These principles deal with the areas of: (1) performance tolerance, (2) practice effects, (3) restraint system, (4) individual differences, (5) control system, (6) control feedback, (7) task difficulty level, (8) display characteristics, (9) higher mental processes. The need for research on the effects of acceleration variables other than peak G and direction of G is noted, as is the problem of interaction between variables. (Author)

829

Chambers, R. M. & J. G. Nelson 1961 PILOT PERFORMANCE CAPABILITIES DURING CENTRIFUGE SIMULATIONS OF BOOST AND RE-ENTRY. ARS J.31(11):1534-1541, Nov. 1961.

ABSTRACT: One part of a human factors research effort that has been concerned with the human performance capabilities of pilots during accelerations experienced during boost, orbit, and re-entry rocket flight trajectories is summarized. Ss are 38 men who collectively received over 2,600 closed loop centrifuge exposures. Some of the conclusions reached are formulated as general principles dealing with areas of: 1) performance tolerance, 2) practice effects, 3) restraint system, 4) individual differences, 5) control system, 6) control feedback, 7) task difficulty level, 8) display characteristics, and 9) higher mental processes. Other research needs are noted. (Tufts)

830

Chambers, R. M. et al 1961 CHANGES IN PERFORMANCE PROFICIENCY UNDER CONDITIONS SIMULATED BY WATER IMMERSION AND CENTRIFUGATION.

ABSTRACT: An attempt was made to investigate changes in piloting proficiency and related human performance under gravitational conditions simulated by water immersion and centrifugation. Seven dimensions of human ability felt to best reflect the influence of these gravitational environments were studied: (1) tracking, (2) G-tolerance, (3) target aiming, (4) positioning, (5) complex discrimination-reaction time, (6) complex coordination, and (7) time estimation. Two separate experiments, a neck level immersion and complete immersion experiment, were performed each using six male subjects immersed for periods up to twelve hours. Before and after reduced gravity simulation in a water tank, the subjects were exposed to a 8 G re-entry profile produced by a human centrifuge. Changes in piloting skill level and in related performance capabilities were found. (Aerospace Med. 32(3):225, March 1961)

831

Chambers, R. M. 1962 PROBLEMS AND RESEARCH IN SPACE PSYCHOLOGY. (Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.)
NADC-MA-6145, 24 April 1962. ASTIA AD 275 830

ABSTRACT: The scientific literature on the psychological aspects of space flight is reviewed in the following areas: (a) psychological requirements for man in space, (b) sensing and perceiving (c) perceptual and motor skill performance, (d) cognitive processes and other higher mental abilities, (e) personality and emotional behavior, (f) psychological aspects of astronaut selection, and (g) psychological conditioning and training. (Author)

832

Chambers, R. M., W. F. Augerson, R. Kerr, & D. A. Morway 1962 EFFECTS OF POSITIVE PRESSURE BREATHING ON PERFORMANCE AND PHYSIOLOGY DURING ACCELERATION (Paper, 33rd Annual Meeting of Aerospace Medical Association, Atlantic City, N. J., 9-12 April 1962) Abstract: Aerospace Medicine 33(3):331, Mar.1962

ABSTRACT: Statistical analysis of results from two experiments indicated that breathing positive pressure oxygen facilited performance during exposure to transverse (+Gx) and positive (+Gz) acceleration stress. In the first experiment, five test pilots were required to perform an orbital tracking task during steady-state accelerations ranging from 6 to 12 +Gx while breathing 100% oxygen under pressure and under control conditions of normal breathing. In the second experiment, six other subjects were required to perform a visual brightness discrimination task during exposure to steady-state accelerations ranging from 1 to 7 +Gx and from 1 to 5 +Gz. Effects on visual brightness discrimination were recorded under comparable breathing conditions. There were major individual differences in response to the effects of acceleration during pressure breathing. Analyses of the performance and piloting opinion data indicated beneficial effects on performance and pilot comfort from breathing 10% oxygen under pressure at the higher acceleration levels. (AUTHOR)

833

Chambers, R.M., R. Kerr et al. 1962 EFFECTS OF POSITIVE PRESSURE BREATHING ON PERFORMANCE DURING ACCELERATION. (Aviation Medical Accel. Lab., Naval Air Development Center, Johnsville, Pa.) Report No. NADC MA-6205, ASTIA AD-298 009

ABSTRACT: The effects of positive pressure breathing of 100% oxygen were evaluated in terms of increasing man's ability to perform a complex psychomotor task during sustained accelerations of 6, 8, 10, and 12 transverse G, and in terms of visual brightness discrimination requirements during sustained accelerations of 1, 2, 3, 5, and 7 transverse G, and 1, 2, 3, and 5 positive G. In addition, subjective reports regarding comfort and performance were obtained during all acceleration conditions. Details of the test results are included in this report.

834

Chambers, R. M., R. Kerr, W. S. Augerson, and D. A. Morway 1962 EFFECTS OF POSITIVE PRESSURE BREATHING ON PERFORMANCE DURING ACCELERATION. (U. S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-6205 July 2, 1962

ABSTRACT: The effects of positive pressure breathing of 100% oxygen were evaluated in terms of increasing man's ability to perform a complex psychomotor task during sustained accelerations of 6, 8, 10 and 12 transverse G, and in terms of visual brightness discrimination requirements durin sustained accelerations of 1, 2, 3, 5, and 7 gransverse G, and 1, 2, 3, and 5 positive G. In

addition, subjective reports regarding comfort and performance were obtained during all acceleration conditions. The following tentative conclusions are suggested: (a) At 6, 8, and 10 G_x no differences in ability to perform a comples three-dimensional psychomotor task were observed. However, at 12 G_x there were definite suggestions that performance under conditions of positive pressure breathing of 100% oxygen was superior to normal (atmospheric) breathing of 100% oxygen. (b) Subjectively, the pilots reported that positive pressure breathing of 100% oxygen was superior to the condition of normal breathing of 100% oxygen in terms of breathing ease and general comfort. (c) During transverse accelerations at 1, 2, 3, 5, and 7 G_x, significantly less lighting contrast was required at 5 G_x for the condition of positive pressure breathing of 100% oxygen as compared with breathing 100% oxygen without pressure or normal air. (d) During transverse acceleration, both positive pressure breathing of 100% oxygen, and normal breathing of 100% oxygen, precluded the necessity of an increase in brightness contrast which was necessary for normal air conditions. (e) During positive accelerations at 1, 2, 3, and 5 G_z, positive pressure breathing of 100% oxygen required significantly less lighting contrast at 3 G_z than did either normal breathing of 100% oxygen or greathing normal air. (f) Subjectively, all subjects reported that positive pressure breathing of 100% oxygen was superior to the condition of normal breathing of 100% oxygen in terms of breathing ease and general comfort during exposure to transverse accelerations of 5 and 7 G_x and to positive accelerations of 3 and 5 G_z. (Author)

835

Chambers, R. M. and J. C. Ferguson 1963 PRELIMINARY COMPARISON OF HUMAN CENTRIFUGE CAPABILITIES IN THE UNITED STATES. (Letter report concerning) (U. S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-L6304

ABSTRACT: This report contains a chart to provide a convenient comparison of nine centrifuges, in existence or approved for construction, in terms of the following features: arm, main drive, radial G, gondola, payload, degrees of freedom, gimbals, availability of closed-loop operation, gondola environments, slip rings, and availability. Entries are based on the best available information as of 12 March, 1963.

836

Chambers, R.M. 1963 EFFECT OF ACCELERATION ON PILOT PERFORMANCE. (Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.) NADC MA 6219, 26 March 1963. ASTIA AD 408 686

ABSTRACT: This report attempts to consolidate the findings of previous research in the area of acceleration effects upon performance and to relate these findings to basic piloting behaviors. The decrements in the visual, psychomotor response and intellectual processes which have been found to accompany acceleration stress are quantified where possible. Both transverse and positive accelerations have been shown to raise the level of contrast

required for visual brightness and to reduce general acuity at acceleration loads well below those which result in gross visual impairment. Similar impairments in discrimination response rates are also discussed. The techniques thus far used to assess higher mental ability under acceleration are presented as are some of the problems which complicate such measurements. Data from such studies are presented to illustrate the reduction in immediate memory and information processing capabilities of pilots experiencing both high level, short term and moderate, extended accelerations. (Author)

837

Chambers, R. M. 1963 LONG-TERM ACCELERATION AND CENTRIFUGE SIMULATION STUDIES
(Naval Air Development Center, Aviation Medical Acceleration Lab., Johnsville, Pa.) April 11, 1963.

ABSTRACT: Some of the major effects of long-term acceleration on human performance and physiology are reviewed. Also, some of the results of recent centrifuge simulation studies of manned spaceflights and proposed spacecraft are presented. The paper is primarily concerned with the results of studies conducted on the Aviation Medical Acceleration Laboratory (AMAL) Human Centrifuge in support of NASA and USAF space projects. The problems of acceleration-nomenclature is outlined, and following Gauer's procedure, long-term acceleration is defined as any acceleration stress lasting longer than ten seconds. Physiological tolerance to $+G_x$, $+G_z$, $-G_x$, and $-G_z$ acceleration vectors are discussed and it is pointed out that in addition to physiological tolerance limits, there are also performance tolerance limits which define the reliable functioning of any particular overt behavior system during acceleration. Major concepts in protection are discussed, recent work on contour couches studied on the AMAL centrifuge is reviewed. and a newly-developed universal contour couch is described. Some of the basic principles of centrifuge simulation of several types of space vehicles are outlined, and the use of the AMAL centrifuge in astronaut training is reviewed. Also, the effects of various acceleration profiles on visual and auditory performance, discriminating and responding, complex psychomotor skill performance, and higher mental functioning are discussed. (N63-19313)

838

Champlin, G. A. and E. S. Wilbarger 1959 BIO-FLIGHT PROJECT 2B REVISION I. REPORT FOR 10 SEPT. 1958 - 10 JULY 1959.
(Army Medical Services Research and Development Command, Ft. Knox, Ky.)
Rept. no. CSCRD-16 ASTIA AD 227 227

ABSTRACT: Primates have been successfully recovered following ballistic missile flight. The results assured environmental conditions to be adequate for the comfort of human travelers. A detailed preliminary inspection of the results in terms of biological measurements is included. Monkey Baker was said to be in excellent health. The autopsy performed on rhesus monkey Able revealed

no morbid pathology resultant from her flight. Physiological well-being under conditions of restraint, isolation, artificial environment and ballistic missile acceleration, weightlessness, spin, deceleration, and impact for a high phylogenetic order of research animal has been proven. Consciousness for monkey Able was proven past the peak decelerative force of re-entry on the in-flight films. All facets of medical preparation and engineered equipment, however, need detailed analysis and design refinement.

839

Champney, W. B., J. B. Athans, & C. D. Mayerson 1961 A STUDY OF HYPERSONIC AERODYNAMIC DRAG DEVICES. (Aeronautical Systems Division, Air Force Systems Command, Wright-Patterson AFB, Ohio) WADC TR 59-324, Part II; ASTIA AD-272 013

ABSTRACT: A two-phase study of hypersonic zero-lift drag devices which could be used to recover space vehicles re-entering the earth's atmosphere has been made. The results of the first theoretical phase, which are summarized in an interim report, indicate that variable area drag devices produce less heating and deceleration than a fixed-area device of the same maximum size. Also, for a fixed-drag device, minimum peak decelerations occur with $C_D A/W$ of 0.10. In this second test phase, various drag device models were tested at hypersonic speeds. Good agreement was found in heating and drag on simple shapes. Heat distributions and drags were determined for a number of complex shapes and some parametric relationships were established. Criteria for selecting an optimum device were also established. (AUTHOR)

840

Chance Vought Aircraft 1959 TYPICAL ACCELERATION LOADS IMPOSED ON PILOTS DURING CATAPULTING AND ARRESTING. (Chance Vought Aircraft Inc., Dallas Tex.) Report No. 1, CVA 39,169

841

Chance Vought Aircraft 1959 ANTICIPATED ACCELERATION LOADS ON PILOTS OF 1963-65 AIRCRAFT.
(Chance Vought Aircraft Inc., Dallas, Tex.)
Enclosure (5) to AER-E9M-677, Dec. 1959.

842

Chance Vought Aircraft 1959 PHYSIOLOGICAI AND PSYCHOLOGICAL CONSIDERATIONS FOR MANNED SPACE FLIGHT
(Chance Vought Aircraft, Inc., Dallas, Tex.) CVA Rept. No. E9R-12349, 7 July 1959.

843

Chance Vought Astronautics 1960. MANNED SPACE FLIGHT SIMULATOR FACILITY. (Vought Astronautics, Dallas, Texas) Report No. AST/EOR-12965, May 1960

844

Chance Vought Aircraft 1960 INTEGRATED FLIGHT CAPSULE - PILOT SEAT. (Chance Vought Aircraft, Inc., Dallas, Tex.) CVA Report No. AER-EOR-12828

ABSTRACT: This report discusses the Pilot's Seat Study accomplished during preliminary design of the Integrated Flight Capsule. The study began as a simple replacement of the ejection seat with a light-weight pilot's seat, but recommendations resulting from the blackout protection study caused the study to be directed toward the design of a supinating pilot's seat. The research trade studies, and mockups lead to the final design of a tubular frame stainless steel mesh seat. It is concluded that supinating pilot's seat would be a comfortable and useful device once tested and qualified. Further studies are recommended to qualify the seat for service use.

845

Chance Vought Aircraft 1960 INTEGRATED FLIGHT CAPSULE - PILOT RESTRAINT (Chance Vought Aircraft, Inc., Dallas, Tex.) CVA Report no. AER-EOR-12829, 25 March 1960

ABSTRACT: This report discusses the pilot restraint system study accomplished during the preliminary design of the Integrated Flight Capsule. Present day pilot restraint systems were evaluated, and methods of eliminating their major deficiencies investigated. However, the majority of the study effort was directed towards the design of an optimum pilot restraint system. The integration of the pilot restraint and the pilot's flight garment was developed for several of the more promising methods of restraint. A mock-up of these methods used in the mock-up appear to be feasible methods of pilot restraint when used in conjunction with an integrated flight garment. Several of the pilot restraint methods considered appear to warrant further development toward providing the pilot with an optimum restraint system. This study was not concerned with the design of the garment; however, it was given consideration during the design of the system. Several studies in the area of head restraint are presented. These studies are suggested methods of head restraint which will support the head in the event high loads are experienced, while keeping at a minimum restriction of head movement during the long periods when head restraint is not required.

846

Chance Vought Aircraft 1960 INTEGRATED FLIGHT CAPSULE - IMPACT & FLOTATION BAG INFLATION SYSTEM
(Chance Vought Aircraft Inc., Dallas, Tex.)
CVA Report no. AER-EOR-12836, 25 March 1960

ABSTRACT: This report describes the studies made, system selected for inflation of the impact bags and flotation bags used on the integrated flight capsule. Three different types of inflation systems were investigated. The single air bottle, single pressure regulator system, requires extremely large lines to achieve desired results. A system using a single air bottle with a pressure regulator at each bag allows use of smaller lines, but the required inflation time of 3 seconds is not feasible using the proposed 900 cu. in. air bottle. Both of these systems can be designed; however, calculations are presented only to the point that the assumptions made for system design are insufficient to meet established criteria. The system recommended for this application is individual air bottles with no pressure regulators. The most apparent advantage of this system is insurance against loss of the entire recovery system in the event of failure of one bag.

847

Chance Vought Aircraft 1960 STRUCTURAL DESIGN LOADS
(Chance Vought Aricraft, Inc., Dallas, Tex.)
CVA Report no. AER E9R-12581 - CONF, 25 March 1960.

ABSTRACT: The structural design loads on the fuselage and stabilizing fins of the F8U-1 flight test capsule are presented.

The applied loads resulting from the capsule recovery system are also shown. Included are the parachute loads, boost rocket loads and landing impact loads. Procedures and criteria used in determining design conditions are discussed. A procedure for defining the maximum allowable combination of accelerations on the man is shown.

848

Chance Vought Aircraft 1960 SUMMARY OF INTEGRATED FLIGHT CAPSULE PARACHUTE RECOVERY SYSTEM PROGRAM.
(Chance Vought Aricraft, Inc., Dallas, Tex.)
CVA Report No. AER-E9R-12446, 25 March 1960. ASTIA AD 263 508

ABSTRACT: This report contains a review of the work accomplished to date on the recovery system for the Integrated Flight Capsule and outlines a program that would permit concurrent development of the recovery system and the capsule. The preliminary design parameters, established in previously completed feasibility studies, are included for information. The report includes a general summary of all the other sections which comprise the total report submitted under Bureau of Naval Weapons contract NOa(s)59-6150-c.

849

Chance Vought Aircraft 1960 INTERIM REPORT ON PARACHUTE RECOVERY AND IMPACT SYSTEMS
(Chance Vought Aircraft, Inc., Dallas, Tex.)
CVA Report No. AER-E9R-12582, 25 March 1960.

ABSTRACT: This interim report contains information on the parachute recovery system for the Integrated Flight Capsule flight test vehicle. The various energy absorption systems investigated for the landing impact condition are also discussed.

850

Chance Vought Aircraft 1960 PHYSIOLOGICAL REQUIREMENTS, INTEGRATED FLIGHT CAPSULE.
(Chance Vought Aircraft, Inc., Dallas, Tex.)
CVA Report No. AER-EOR-12841, 25 March 1960.

ABSTRACT: The improvement of the pilot environment in the Integrated Flight Capsule required definition of the physiological capabilities and limitations of the man. This was accomplished for cabin pressure, atmosphere composition, temperature, ventilation rate, environmental toxicity, accelerations, noise, vibration, body restraint, oscillation and tumbling, pilot incapacitation sensing, vision, thermal radiation effects, and body waste removal. The physiological requirements presented assumed that no personal protective equipment is worn.

851

Chance Vought Aircraft 1960 PILOT ACCELERATION PROTECTION ON THE INTEGRATED FLIGHT CAPSULE
(Chance Vought Aircraft, Inc., Dallas, Tex.)
CVA Report no. AER-EOR-12843

ABSTRACT: A first approximation of accelerations the pilot might expect to encounter in airplanes in the 1963-65 period is made based on stresses recorded during a large number of flight hours on current airplanes. The recorded G-time patterns are analyzed statistically for frequency of occurence and mean levels. These acceleration levels are adjusted according to predicted performance of future airplanes and when compared to native human tolerance, show a need for pilot protection.

Several methods of increasing G tolerance are noted, and the anti-G suit and supination (tilting the pilot backward) are selected as the most practical. A review is made of centrifuge experimentation which defines the debilitating effects of G stress and the degree of protection afforded by the anti-G suit and a supinating seat.

852

Chandler, Richard F. 1962 DETERMINATION OF EQUIVALENT NATURAL FREQUENCY INDICATED BY ACCELEROMETERS MOUNTED OVER THE STERNUM DURING HUMAN IMPACT IN THE G_x DIRECTION
(6571st Aeromedical Research Laboratory, Holloman Air Force Base, New Mexico) Project 7850, Task 785001, ARL-TDR-62-29, Dec. 1962

ABSTRACT: Analysis of 29 human impact tests in the G_x position on the Daisy Decelerator indicated that the natural frequency of the response measured by sternum accelerometers varies inversely as the duration of the onset of the input deceleration. The value of the product of response frequency (cps) and onset duration (sec) is approximately 0.5. (AUTHOR)

853

Chang, S. S. L. 1957 AN AIRFRAME PITCH LINEAR ACCELERATION CONTROLLER. National Electronics Conference Proceedings 12:134-151

854

Chapman, D.R. 1958 AN APPROXIMATE ANALYTICAL METHOD FOR STUDYING ENTRY INTO PLANETARY ATMOSPHERES.
(National Advisory Committee for Aeronautics, Washington, D.C.)
NACA TN 4276, May 1958.

ABSTRACT: Study is made of the decelerations, heating rates, and total heat absorbed for entry into Venus, Earth, Mars, and Jupiter.

855

Chapman, D.R. 1958 DECELERATION DURING ENTRY INTO PLANETARY ATMOSPHERES. (National Aeronautics and Space Administration, Ames Research Ctr., Moffett Field, Calif.) (Paper presented at 2nd International Symposium on the Physics and Medicine of the Atmosphere and Space, San Antonio, Tex., Nov. 10-12, 1958). See also in Benson and Strughold, eds., Physics and Medicine of the Atmosphere and Space (New York: John Wiley & Sons, 1960) pp. 339-351.

ABSTRACT: An analytical method recently developed for computing the motion of an orbiting vehicle during entry into planetary atmospheres is applied to study the deceleration-time curves for various types of shallow entry. It is pointed out that the initial rate of onset of deceleration, following the period of weightlessness in orbit, can be alleviated considerably by certain types of entry which start near perigee with a slightly super-circular velocity. Deceleration-time curves for vehicles with various amounts of aerodynamic lift are presented for entry into Earth, Mars, Venus, and Jupiter.

856

Chapman, D.R. 1959 AN ANALYSIS OF THE CORRIDOR AND GUIDANCE REQUIREMENTS FOR SUPERCIRCULAR ENTRY INTO PLANETARY ATMOSPHERES. (National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.) NASA Technical Rept. R-55. ASTIA AD 228 509

ABSTRACT: The analysis of supercircular entry is developed around a new dimensionless parameter which combines certain conditions at the conic perigee altitude with certain characteristics of the vehicle; this parameter conveniently determines either deceleration limited or heating-limited corridor widths for elliptic, parabolic, or hyperbolic approach trajectories. Illustrative calculations of corridor widths and the associated guidance problems are presented for Venus, Earth, Mars, Jupiter, and Titan. Generalized curves are presented for application to various entry conditions.

857

Chapman, D.R. 1960 DECELERATION DURING REENTRY INTO PLANETARY ATMOSPHERES. In Benson, O.O., and H. Strughold, eds., Physics and Medicine of the Atmosphere and Space. (New York: John Wiley & Sons, 1960) pp. 339-351

858

Charles, J. P. 1955 FRACTURED VERTEBRAE IN U.S. NAVY AIRCRAFT ACCIDENTS. J. Aviation Med. 24:483-490.

SUMMARY: The fractured vertebrae sustained in U. S. Navy aircraft accidents involving pilots only were reviewed over the five year period from January, 1948. The causal factor in fractures other than compression fractures of the lumbar and thoracic was clear. Transverse process fractures generally followed violent swerving or cartwheeling during a forced landing. Cervical fractures of all types most frequently involved nose overs followed by acute flexion of the neck. The majority of cases were compression fractures of the lower thoracic and upper lumbar vertebrae. In general the aircraft either stalled or mushed into the ground or struck an embankment in a nose-high altitude during the initial part of the slide. The evidence appears to indicate that vertical forces acting through the seat bottom rather than acute flexion of the spinal column are causing the compression fractures of the thoracic and lumbar vertebrae.

859

Chason, J. L., E. S. Gurdjian, B. F. Haddad, & J. E. Webster 1955 CHANGES IN CELL STRUCTURE FOLLOWING SUDDEN INCREASES IN INTRACRANIAL PRESSURE. (Proceedings, 2nd International Congress Neuropathology, London, 1955)

860

Chason, J.L., W.G. Hardy, J.E. Webster, and E.S. Gurdjian 1957 ALTERATI N IN CELL STRUCTURE OF THE BRAIN ASSOCIATED WITH EXPERIMENTAL CONCUSSION (resented at Harvey Cushing Society Meeting, April 26, 1957)

861

Chason, J. L., E. S. Gurdjian, W. G. Hardy, & J. E. Webster 1958 ALTE TIONS IN CELL STRUCTURE OF THE BRAIN ASSOCIATED WITH EXPERIMENTAL CONCUSSI J. Neurosurgery 15(2):135-139

862

Cherniack, N.S., A.S. Hyde, & F.W. Zechman 1959 THE EFFECT OF TRANSVE ACCELERATION ON PULMONARY FUNCTION.
(Wright Air Development Ctr., Wright-Patterson AFB, Ohio)
WADC TR 59-347, ASTIA AD 226 054.
See also J. Appl. Physiol. 14(6):914-916, 1959.

ABSTRACT: Since difficulty with respiration limits tolerance to transver acceleration, the effect of this acceleration on different respiratory fa was tested in 15 subjects experienced in riding the WADC human centrifuge Minute volume, respiratory rate, tidal volume, maximum breathing capacity .5 second times vital capacity and total vital capacity were measure l after and three minute durations at 3 and 5 g with the subject's trunk perpendi ar to the centrifugal force and legs and knees flexed at 90 degrees. Vital capacity was reduced significantly at 3 and 5 g. Maximum breathing capac was significantly reduced at 5 g. One-half second timed vital capacity r e- sented an increasing fraction of total vital capacity as acceleration inc ased. Minute volume and respiratory rate also increased significantly at 5 g wh tidal volume was essentially unchanged. The subjects show marked reduct in breathing reserve at moderate acceleration which indicates that respirati probably becomes ineffectual at higher g-levels in most subjects. After cu- lation of the Air Velocity Index of Gaensler and by use of Miller, Wu, an Johnson's four quadrant system, results are obtained which indicate that nature of the predominent respiratory defect during forward acceleration restrictive. Of the respiratory parameters measured, vital capacity sho the greatest decrement. Since vital capacity decreased at different rate in different subjects it may be useful in predicting performance during acceleration and might be of aid in crew selection. (Author)

863

Cherniack, N.S., A.S. Hyde, & F.W. Zechman 1959 THE EFFECT OF TRANSVE ACCELERATION ON PULMONARY FUNCTION.
J. Appl. Physiol. 14(6):914-916
See also (Wright Air Development Ctr., Wright-Patterson AFB, Ohio)
WADC TR 59-347, ASTIA AD 226 054.

ABSTRACT: Since difficulty with respiration limits tolerance to transve

acceleration, the effect of this acceleration on different respiratory factors was tested in 15 subjects. Minute volume, respiratory rate, tidal volume, maximum breathing capacity, 0.5-second timed vital capacity and total vital capacity were measured at 3 and 5 g with the subject's trunk perpendicular to the centrifugal force and legs and knees flexed at 90 degrees. Vital capacity was significantly reduced at 5 g. One-half-second timed vital capacity represented an increasing fraction of total vital capacity as acceleration increased. Minute volume and respiratory rate also increased significantly at 5 g while tidal volume was essentially unchanged. Results are obtained which indicate that the nature of the predominant respiratory defect during forward acceleration is restrictive. Of the respiratory parameters measured, vital capacity showed the greatest decrement.

864

Cherniack, N.S., A.S. Hyde, J.F. Watson & F.W. Zechman, Jr., 1961 SOME ASPECTS OF RESPIRATORY PHYSIOLOGY DURING FORWARD ACCELERATION. Aerospace Med., 32(2):113-120, Feb. 1961.

ABSTRACT: A review of current experiments in respiratory physiology during forward acceleration is presented.

Dyspnea, inspiratory chest pain, tracheal tugging, paroxysmal coughing and a sensation of weight on the thorax are typical symptoms occuring during forward acceleration. Fine crepitant rales are sometimes heard over the posterior lung fields for several minutes after centrifugation if the acceleration has been prolonged and has been of considerable magnitude.

Hemoptysis lasting 6 hrs. has occurred on one occasion. There is, naturally, considerable variation among subjects and even in the symptoms experienced by the same subject from day to day.

No serious cardiac aberrations were noted during several experiments with levels of forward acceleration up to 16.5 g and with duration up to 3 minutes at 12 g.

865

Chernigovs'kyi, V. M. and K. O. Lange 1961 TOMORROW IN PHYSIOLOGICAL SCIENCE (Zavtrashnii Den'Fiziologichnoi Nauki). Trans. of Nauka i Zhyttya (USSR) 11(4):44-47, 1961. (Joint Publications Research Service, New York, N.Y.) Sept. 21, 1961 JPRS: 10137

ABSTRACT: The urgent tasks of physiology and medicine are the development of recommendations for a schedule of activity for space flight, the careful and deep study of all factors acting on the organism during flight in space, and reliable training of the bodies of future astronauts. (Extract)

866

Chernov, V.N. and V.I. Yakovlev 1959 RESEARCH ON THE FLIGHT OF A LIVING CREATURE IN AN ARTIFICIAL EARTH SATELLITE.
ARS J. 29(10):736-742, Oct. 1959.

ABSTRACT: This appears to be as complete a single report as is available in the English language on the experimental results of Laika's orbital flight of Nov. 3, 1957, in Sputnik II. Soviet technical and scientific accomplishments preceding the flight are included. Described and discussed in some detail with illustrations are the cabin for the animal, its equipment and experimental apparatus, and the preparation and training of experimental animals. Results of the experiment are examined with regard to three basic periods: the preflight period, the launching of the rocket and the satellite's escape into orbit, and the orbital flight of the satellite.

867

Chernov, V. N. and V. I. Yakovlev 1960 RESEARCH ON ANIMAL FLIGHT IN AN ARTIFICIAL EARTH SATELLITE.
In L. V. Kurnosova, ed., Artificial Earth Satellites. (New York: Plenum Press, Inc., 1960) Vol. I, pp. 102-120.

ABSTRACT: This paper discusses the animal's cabin, equipment, preparation and training of the animals, and provides results of satellite tests. It is noted that unlike high-altitude rocket biological tests, work on satellites enables a study to be made of the effects of long-maintained accelerations, as well as noise and vibration, and maintained weightlessness. Experiments carried out on 14 dogs in training undergoing varying centripetal accelerations maintained for 6-15 minutes of 2-10 g showed little effects. An increase in salivary secretion was observed during rotation. At the start of rotation the heart rose to 1.5-2 times its initial value, and remained at this level, with some fluctuations, for the whole period of acceleration. Respiration generally rose 1.5-2 times the initial rate, but as acceleration increased and the animal's body became pressed against the floor breathing became more frequent and superficial, with respiration rate 1.5-3 times initial value. Arterial pressure rose to 50-80 mm Hg above initial value.

868

Chinn, H. I., B. A. Strickland, F. W. Oberst, S. S. Wilks and M. Tinkham 1950 EVALUATION OF SOME DRUGS IN MOTION SICKNESS.
J. Aviation Med. 21(5):424-429.

SUMMARY: 1. A number of antihistaminic and antispasmodic drugs have been tested for their effectiveness in preventing motion sickness. Simulated turbulence in the airplane, training flights, and the swing have been utilized.

2. A mixture of 50 mg. of Benadryl with 0.65 mg hyoscine has been shown to be the most effective prophylaxis tested. Hyoscine aminoxide (Scopodex) is of the same order of effectiveness. Dramamine, Benadryl, hyoscine, and a mixture of half doses Benadryl plus hyoscine afford good prophylaxis. Artane and Perazil

give fair protection. Thephorin and Chlor-Trimeton exert only slight protection while Decapryn, Neoantergan, Panparnit, Phenergan and A-446 give no or questionable protection.

3. Anti-motion sickness effectiveness is not related to antihistamine potency.

4. The effective pharmacological action is discussed. It seems likely that the degree of central anticholinergic action determines in large part the effectiveness of the drug, although other actions cannot be excluded.

5. All strongly effective compounds in the antihistamine group have two carbocyclic rings attached directly to a common carbon.

869

Chinn, H. I., W. K. Noell, and P. K. Smith 1950 PROPHYLAXIS OF MOTION SICKNESS. EVALUATION OF SOME DRUGS IN SEASICKNESS.
Arch. Int. Med., 86:810 ASTIA AD 101 265

ABSTRACT: Hyoscine, Benadryl, Dramine, Artane and Perazil were all markedly effective in decreasing the incidence of seasickness of normal, unselected soldiers during a transatlantic crossing aboard a U. S. Army Transport. Thephorin and Neoantergan were ineffective. Among known motion sick susceptibles, Thephorin showed a slight protective action, although less marked than hyoscine, Dramamine or Benadryl. Hyoscine and Dramamine were tested therapeutically and found not to be significantly effective. A lower, but nevertheless significant, incidence of relief was afforded with placebos alone.

Side effects were most frequent among those receiving 2.25 mg. hyoscine hydrobromide or 15 mg. Artane daily. Blurred vision and dry mouth were the most common complaints. One case of hallucinations was encountered with hyoscine and two with Artane. Tinnitus, insomnia and nervousness were also increased with Artane. Drowsiness was not increased with any medication.

Seasickness caused an activation of the alpha rhythm of the electroencephalogram and a slowing of the dominant wave frequency. A pattern of drowsiness was particularly evident in cases of persistent seasickness. No significant changes could be detected as a result of the drug administration.

870

Chinn, H. I. and F. W. Oberst 1950 EFFECTIVENESS OF VARIOUS DRUGS IN PREVENTION OF AIRSICKNESS. I. EFFECTS OF CHEMICAL COMPONENTS OF DRAMAMINE. (USAF School of Aviation Medicine, Randolph Field, Tex.)
Project No. 21-32-014, Rept. No. 1, Aug. 1950; ASTIA ATI-98 534

SUMMARY: No significant difference was found between Benadryl (50 mg.) and Dramamine (100 mg.) in protecting subjects from airsickness during simulated turbulence in an airplane. 8-chlorotheophylline gave no significant protection. A combination of hyoscine-hydrobromide (0.65 mg.) and Benadryl (50 mg.) was found to be more effective than either drug alone. A combination of half doses

of hyoscine-hydrobromide (0.33 mg.) and Benadryl (25 mg.) gave an effectiveness equal to that of a full dose of hyoscine (0.65 mg.) but inferior to the full dose mixture. (Author)

871

Chinn, H. I., & B. A. Strickland 1950 EFFECTIVENESS OF VARIOUS DRUGS IN PREVENTION OF AIRSICKNESS. II. COMPARISON OF HYOSCINE WITH BENADRYLHYOSCINE MIXTURE DURING NAVIGATION TRAINING FLIGHTS. (School of Aviation Medicine, Randolph AFB, Texas) Project 21-32-041, Rept. No. 2. ASTIA AD-105596

ABSTRACT:

The incidence of nausea and vomiting among cadets undergoing actual navigator training flights was compared after they had received the following medications: 1) placebo; 2) hyoscine hydrobromide, 0.65 mg.; 3) hyoscine hydrobromide, 0.33 mg.; Benadryl, 25 mg.

No subject receiving the hyoscine-Benadryl mixture vomited or became severely nauseated, whereas 7.3 percent receiving hyoscine alone and 16.7 percent receiving placebo were affected in this fashion.

Among those who had been airsick at some previous time, the incidence of severe nausea and vomiting was: Benadryl-hyoscine mixture-0 percent, hyoscine alone- 9.0 percent, placebo- 20.6 percent.

The incidence of drowsiness was the same for all groups. Dry mouth was high in both the hyoscine and mixture groups. The occurrence of blurred vision, nervousness, excessive fatigue and headaches was lower in the mixture group than in the hyoscine group.

872

Chinn, H. I., F. W. Oberst, & S. S. Wilks 1950 EFFECTIVENESS OF VARIOUS DRUGS IN PREVENTION OF AIRSICKNESS. III. STUDY OF ADDITIONAL ANTIHISTAMINICS IN AIRPLANE AND SWING. (School of Aviation Medicine, Randolph Field, Texas) Project No. 21-32-014, Rept. No. 3, Aug. 1950; ATI-89 279

ABSTRACT: Object - To determine whether antihistaminic activity is related to protection against motion sickness. Summary and Conclusions - 1) The antihistaminics Decapryn and Chlor-Trimeton exert only a slight protection against airsickness induced by artificial turbulence. 2) Artane, an antispasmodic, protects against airsickness but to a lesser degree than hyoscine. 3) Chlor-Trimeton and Thephorin do not protect against swing sickness. 4) It is concluded that antihistaminic potency is not related to motion sickness prophylaxis. (AUTHOR)

873

Chinn, H. I., F. W. Oberst and S.S. Wilks, 1950 ANTIHISTAMINICS AND MOTION SICKNESS PROPHYLAXIS. Texas Rep. Biol. and Med., 8:320

874

Chinn, H. I., B. A. Strickland, Jr., O. H. Waltrip & S. H. Gainer 1951 PREVENTION OF AIRSICKNESS BY BENADRYL-SCOPOLAMINE MIXTURES. U. S. Armed Forces Med. J. 2(3):401-404, March 1951.

ABSTRACT: A mixture of 0.33 mg. of scopolamine hydrobromide and 25 mg. of benadryl was compared with 0.65 mg. of scopolamine bydrobromide alone in the prevention of airsickness. No significant difference could be detected between the two groups when tested in the airplane using simulated turbulence for 1 hour. When actual navigator training flights were used for testing, the benadryl-scopolamine mixture gave greater protection against severe nausea and vomiting than did scopolamine hydrobromide alone. Among those who had been airsick at some previous time, the incidence of severe nausea and vomiting was: none with benadryl-scopolamine mixture; 9 percent with scopolamine hydrobromide alone; and 20.6 percent with the placebo. The incidence of drowsiness was the same for all groups. Dry mouth was common in both the group receiving scopolamine hydrobromide and in the group receiving the benadryl-scopolamine mixture. The occurrence of blurred vision, nervousness, excessive fatigue, and headaches was lower in the group receiving the mixture than in the group receiving scopolamine hydrobromide alone. (Author)

875

Chinn, H. I. 1951 MOTION SICKNESS
(USAF Sch. Avn. Med., Randolph AFB, Tex)
Special Report, December 1951, ASTIA ATI 128 351

ABSTRACT:

1. The incidence of sickness during aircrew training is discussed and methods for selection of motion-resistant personnel considered.

2. Evidence is presented to support the conclusion that the utricular maculae in the labyrinth are the chief structures responsible for motion sickness. Contributory factors in its etiology are visual disturbances, visceral stimulation, and psychic influences.

3. The efficacy of various drug preparations in preventing motion sickness is considered. The most promising preventive is Lergigan, a Swedish antihistaminic. Further studies are necessary, since the number of subjects tested to date is rather small. A mixture of Benadryl and hyoscine gives excellent results against airsickness but produces undesirable side effects when taken for 2 or 3 days. For this reason, it is less desirable against seasickness, where medication may be required for several days. Similarly, hyoscine alone or hyoscine aminoxide shows good protection against airsickness but produces side effects during frequent administration. The antihistaminics Dramamine, Trimeton, and Wellcome Preparation 47-83 all give good protection. The

antispasmodics Parsidol and Artane show fair protection. Thephorin, Chlor-Trimeton, Decapryn, Diatrin, Neoantergan, and Prantal all give slight or no protection.

876

Chinn, H.I. 1951 MOTION SICKNESS IN THE MILITARY SERVICE Mil. Surgeon 108:20-29

877

Chinn, H.I., O.H. Waltrip and H.W. Massengale 1951 FURTHER STUDIES ON THE EFFECTIVENESS OF VARIOUS DRUGS AGAINST AIRSICKNESS. J. Aviation Med. 22(6):535-539

ABSTRACT: A mixture of 25 mg. of Benadryl and 0.35 mg of Scopolamine-Hydrobromide has been compared during navigation training flights and in routine C-54 flights with the following preparations: Perazil--50 mg.; Scopodex--2.0 mg.; Lergigan-- 25.0 mg.; Scopodex--1.0 mg.; Benadryl--25.0 mg. mixture. All preparations reduced the incidence of nausea and vomiting below the control groups, although the protection afforded by Perazil was not at a statistically significant level. From the studies reported here, the Benadryl--Scopolamine mixture and Lergigan were the most effective, Benadryl-Scopodex slightly less effective, Scopodex alone next, and Perazil the poorest. It is recommended that further comparison be made between the effectiveness and side effects of the Benadryl-Scopolamine mixture and Lergigan.

878

Chinn, H.I., H. Waltrip and W. Massengale 1951 EFFECTIVENESS OF VARIOUS DRUGS IN PREVENTION OF AIRSICKNESS V. COMPARISON OF ADDITIONAL PREPARATIONS IN AIRCRAFT. (School of Aviation Medicine, USAF Randolph AFB, Texas) Rept. No. 21-32-014-5, July 1951.

879

Chinn, H. I., et al 1952 THE EFFECTIVENESS OF VARIOUS DRUGS FOR THE PROPHYLAXIS OF SEASICKNESS
(USAF Sch. Av. Med., Brooks AFB, San Antonio, Tex.)
Proj. No. 21-32-014, Rpt. No. 6, March 1952. ASTIA AD 150 406

ABSTRACT: Lergigan, Trimeton, Benadryl-scopolamine mixture, and Wellcome Preparation No. 47-83 all provided approximately equal protection against seasickness. No preparation was significantly superior to that of diphenhydramine although the observed percentage of protection afforded by Lergigan was slightly greater.

No protection was given by the antihistaminic Diatrin or by the antispasmodics W-290 and Prantal. Slight protection, not significant at the 1 percent level, was obtained with Scopodex alone or with a mixture of Benadryl and Scopodex. Side effects were minimal in all cases except among those persons receiving the Scopodex. When 2.0 mg. doses of the latter were given three times daily, hallucinations, an increased incidence of nightmares, dry mouth, blurred vision, and ringing in the ears was observed. When 1.0 mg. was given combined with 25 mg. of Benadryl, there were no hallucinations but the incidence of nightmares, dry mouth, and blurred vision was still increased.
There was an inverse relation between the incidence of vomiting and the age of the subject. No relation could be detected between the number sick and the compartments in which they were quartered nor with the degree and/or duration of motion therein under the conditions of these sea trials.

880

Chinn, H.I., W.R. Gammon, & M.E. Frantz 1952 EFFECTIVENESS OF VARIOUS DRUGS IN PREVENTION OF AIRSICKNESS: IX. PROTECTION OF AIRBORNE TROOPS (USAF School of Aviation Medicine, Randolph Field, Texas) Proj. No. 21-32-014, Rept. No. 9., December 1952

ABSTRACT: Airborne soldiers received placebo or medication during two flights of 5 to 7 hours' duration. The incidence of vomiting for the placebo group was 6.8 percent. The following drugs given immediately prior to take-off significantly lowered the incidence of vomiting: Wellcome 47-83 (50 mg.), Phenergan (25 mg.), Phenergan (12.5mg.), Trimeton (25 mg.), Pyrrolazote (50 mg.), and scopolamine (0.65 mg.). Postafene (50 mg.) given 24 hours prior to take-off also afforded significant protection. None of these medications was superior to the others.

881

Chinn, H. I., & L. J. Milch 1952 EFFECTIVENESS OF VARIOUS DRUGS IN PREVENTION OF AIRSICKNESS. VII. EVALUATION OF PHENERGAN AND TRIMETON (School of Aviation Medicine, Randolph Field, Texas) Project No. 21-32-014, Rept. No. 7, Aug. 1952; ATI-159 336

ABSTRACT: Object - To compare the effectiveness of various preparations against air sickness. Summary and Conclusions - 1) The following preparations were tested during simulated aircraft turbulence: (a) placebo; (b) Lergigan, 25 mg.; (c) Phenergan, 25 mg.; and (d) Trimeton, 25 mg. All three drugs reduced significantly the incidence of vomiting below that in the placebo group. Phenergan exhibited the greatest protection. 2) Side effects with each drug were slight, an increase in drowsiness being the most apparent effect. 3) The possibility that the effectiveness of Lergigan is due to an admixture with Phenergan is discussed. Recommendations - 1) That the optimum dosage and duration of action of Phenergan be investigated. 2) That a comparison of Phenergan and Lergigan be made with rigorously purified materials so that there is no question of a mixed preparation. (AUTHOR)

882

Chinn, H.I. and N.P. Plotnikoff 1952 EFFECTIVENESS OF VARIOUS DRUGS IN PREVENTION OF AIRSICKNESS: VIII. EVALUATION OF VARIOUS TECHNIQUES FOR SCREENING ANTI-MOTION SICKNESS DRUGS (USAF School of Aviation Medicine, Randolph Field, Texas) Project No. 21-32-014, Report No. 8.

ABSTRACT: Hyoscine, Benadryl, and Lergigan did not increase the vomiting threshold of dogs to apomorphine injection, nor did any of them protect dogs against swing sickness. Hyoscine protected human subjects on the swing, but Lergigan and Benadryl were without effect. The lack of correlation between these findings and the effectiveness of these preparations in air and seasickness are discussed.

883

Chinn, H. I. 1952 THE EFFECTIVENESS OF VARIOUS DRUGS FOR THE PROPHYLAXIS OF SEASICKNESS
Am J. of Med. 12:433-439, Apr. 1952

884

Chinn, H.I., B.A. Strickland, Jr., 1953 EFFECTIVENESS OF VARIOUS DRUGS IN PREVENTION OF AIRSICKNESS: STUDIES DURING ROUTINE TRAINING FLIGHTS (USAF School of Aviation Medicine, Randolph Field, Tex.) Proj. No. 21-1208, Report No. 1. September 1953.

ABSTRACT: A mixture of 25 mg. of Benadryl and 0.35 mg. of scopolamine gave good protection against motion sickness both with and without the addition of 5 mg. of dexedrine. No significant difference in prophylaxis between the two groups could be detected. The following preparations failed to afford a significant protection: Parsidol (25 mg.) Wyeth 46062 (25 mg.), Schering 1667, and Wyeth 4606R (15 mg.) plus scopolamine (0.35 mg.). Side effects with all groups were slight.

The significance of adding an analeptic drug to combat the sedation of motion-sickness preventives is discussed.

885

Chinn, H.I., A.J. Dugi, and L.J. Milch 1953 EFFECTIVENESS OF VARIOUS DRUGS IN PREVENTION OF AIRSICKNESS: COMPARISON OF SCOPOLAMINE, POSTAFENE, AND PHENERGAN (School of Aviation Medicine, USAF Randolph, AFB, Texas) Rept. No. 21-1208-0012-2, September 1953

886

Chinn, H.I. and N.P. Plotnikoff 1953 EVALUATION OF VARIOUS TECHNIQUES FOR SCREENING ANTI-MOTION-SICKNESS DRUGS. J. Appl. Physiol., 5: 392

887

Chinn, H.I., W.R. Gammon, and M.E. Frantz 1953 PREVENTION OF AIRSICKNESS AIRBORNE TROOPS. J. Appl. Physiol., 5(10):599-602

ABSTRACT: Air-borne soldiers received placebo and medication during 2 flights of 5-7 hr duration. The incidence of vomiting for the placebo group was 6.8%. The following drugs given immediately prior to take-off significantly lowered the incidence of vomiting: Wellcome 47-83(50 mg), Phenergan (25 mg), Phenergan (12.5 mg), Trimeton (25 mg), Pyrrolazote (50 mg) and scopolamine (0.65 mg). Postafent (50 mg) given 24 hr prior to take-off also afforded significant protection. None of these medications was superior to the others. The incidence of drowsiness, blurred vision, dry mouth and fatigue was increased by some of the drugs, while dizziness, sweating and headache were reduced. Almost 19 per cent of the paratroopers became sick during a 60 to 90-min flight prior to their jump.

888

Chinn, H. I. 1955 EVALUATION OF DRUGS EFFECTIVE AGAINST MOTION SICKNESS. (School of Aviation Medicine, Brooks AFB, Texas) Rept. No. 55-144, Oct. 1955

ABSTRACT: Twenty-six compounds have been tested against sea-sickness, using soldiers and airmen crossing the North Atlantic aboard troop transports. A total of 16,902 subjects was employed. Fourteen of the drug treatments gave significant protection at the 1 percent probability level. There was no apparent difference between British or American brands of hyoscine. Seasickness varied inversely with age. The highest incidence of side effects was observed with hyoscine.

889

Chinn HI, P.K. Smith 1955 MOTION SICKNESS Pharmacol. Rev 7:33-82, March 1955

890

Chinn, H. I., R. W. Hyde and L. J. Milch 1955 EFFECTIVENESS OF VARIOUS DRUGS IN PREVENTION OF AIRSICKNESS: TREATMENT BY INTERNAL MEDICATION. (USAF School of Aviation Medicine, Randolph AFB, Tex.) Rept. No. 56-6, November 1955

ABSTRACT: Scopolamine was administered to subjects aboard aircraft by nasal instillation (nose drops and spray) 15 to 20 minutes after take-off. The incidence of vomiting from airsickness during the subsequent 40 to 45 minutes was markedly reduced. Oral and sublingual administration under these conditions was ineffective. Considerable variations in the amount of drug instilled resulted when given by spray. The use of nose drops allowed more accurate medication. The significance of this mode of administration for treating motion sickness is discussed.

891

Chinn, H. I. 1956 EVALUATION OF DRUGS FOR PROTECTION AGAINST MOTION SICKNESS ABOARD TRANSPORT SHIPS. J. Amer. Med. Assoc. 160(9):755-760, 3 Mar. 1956

ABSTRACT: Twenty-six compounds were tested as to effectiveness in the prevention of motion sickness in 16,920 soldiers and airmen crossing the North Atlantic aboard troop transport ships. Best results were obtained by using 50mg. of meclizine once or thrice daily, 50 mg. of cyclizine thrice daily, or 25 mg. of promethazine thrice daily. Buclizine (Vibazine), benztropine methanesulfonate (Cogentin), Sandostene, and UCB 158 (N-benzhydryl-N-m-methylbenzylpiperazine) were demonstrated for the first time to be effective against motion sickness. Single doses of scopolamine hydrobromide were effective, but on continued use produced distressing side-effects. For continued use, meclizine was the most satisfactory. Motion sickness was twice as frequent in those having it before as in those with no previous history of it. It occurred less frequently in older men, and in those who had crossed before.

892

Chkhaidze, L. V. 1961 ON THE PHYSICAL TRAINING OF THE COSMONAUT
Trans. of Teoriya i Praktika Fizicheskoi Kul'tury (USSR) 24(12):907-909, 1961.
(Joint Publications Research Service, New York, N. Y.)
June 4, 1962 JPRS: 13996

893

Chkhaidze, L. V. 1962 COORDINATION OF HUMAN MOTOR HABITS IN HIGH GRAVITY FIELDS AS A METHOD FOR THE STUDY OF THE CONTROL OF VOLUNTARY MOVEMENTS.
In Biofizika 7:80-85, 1962 (Russian)

894

Christensen, J. M. 1951 PSYCHOLOGICAL RESEARCH PROJECTS OF SELECTED BRITISH LABORATORIES AND ESTABLISHMENTS
(USAF AMC, Wright-Patterson AFB, Ohio)
USAF Memorandum Report WCRDP-694-24C, July 1951. ASTIA ATI 151 644

895

Christensen, J. M. 1952 RESEARCH PROJECTS OF CERTAIN BRITISH LABORATORIES AND ESTABLISHMENTS THAT RELATE TO AIR DEFENSE
(USAF, AMC, Wright-Patterson AFB, Ohio)
WCRD Technical Memorandum report 52-95, November 1952. ASTIA AD 5278

896

Christensen, J. M. 1960 PERFORMING MAN-SIZED TASKS IN SPACE
1960 Proceeding of the Institute of Environmental Sciences, C-37--C-38

ABSTRACT: This is a commentary on a paper presented by S. N. Roscoe to the Institute of Environmental Sciences in April of 1960. The title of the paper was "Performing Man-sized Tasks in Space."

897

Christensen, K.K. & L.L. Johnson 1958 STUDY TO DETERMINE METHODS OF SIMULATING g EFFECTS.
(Wright Air Development Center, Wright-Patterson AFB, Ohio)
Contract No. AF33(600)-37276, WADC TN 58-314, ASTIA AD 211 849

ABSTRACT: Methods of simulating acceleration and deceleration sensations in aircraft flight simulators were determined. Significant sensations were ascertained, and studies were conducted of methods of mechanically inducing heaviness and immobility sensations, chemically inducing physiological effects, psychologically inducing effects of acceleration, and controlling the various simulated effects. Several devices that may indirectly induce acceleration effects were investigated.

Mechanical means of inducing and controlling heaviness and immobility are considered feasible, although all devices have a 1-g pressure sensation which cannot be eliminated. Visual effects can be simulated. Chemical simulation does not appear satisfactory because function with respect to g is lacking, added safety precautions are necessary, and detrimental effects are possible. A period of experimental development will be necessary to determine the optimum methods and to make a full evaluation of the effectiveness of the simulated sensations.

898

Christian, G.L. 1958 MILITARY BOOSTING ESCAPE PROGRAMS.
Aviation Week, 68(9):181, 183, 187, and 189.

ABSTRACT. Development of aircraft crew stations, the heart of the entire vehicle, has threatened to lag--and sometimes has conspicuously lagged--behind the rapid strides being made to increase new planes' performance capabilities.

To combat this dangerous deficiency, Air Force's Wright Air Development Center here is attacking with increased vigor the manifold problems of making crew stations and escape systems compatible with new high performance aircraft and manned space vehicles. Dual purpose is to make crewmen comfortable, therefore capable of maximum efficiency during flight and to provide them with maximum chance of survival if escape becomes necessary.

899

Christy, R.L. 1949 THE NEW HUMAN CENTRIFUGE.
Aviation Medicine 20(6):454-458

ABSTRACT: Because of technical difficulties and limitations encountered i aircraft during acceleration experiments, it was decided to construct a l. very high-performance centrifuge which would overcome the disadvantages o inabilities of present centrifuges or aircraft in conducting the necessar research. First, the new centrifuge has a rate of change of acceleration 10 g per second, and can attain a maximum of 40 g. Second, the new centr has a fifty-foot radius. Third, a decompression chamber 10 feet in diamet and 6 feet wide is mounted in the end of the arm of the new centrifuge. chamber can be decompressed to a pressure altitude of 60,000 feet, and t temperature neither can be carefully regulated between 40° and 110° F. F the gondola, including the decompression chamber is mounted inside a pair gimbels, which are powered by hydraulic motors mounted on the counter wei

900

Christy, R.L. Jr. 1951 THE NAVY PROGRAM FOR AIRCRAFT ESCAPE.
J. Aviation Med. 22(5):408-413

ABSTRACT: Conventional bailout will be used for low-speed escape, althoug is believed that an ejection seat should be strongly considered where feas for all one-place and two-place training and operational aircraft. The es chute has particular value in relatively high performance two-place fighte attack aircraft. Finally, the ejectable cockpit is considered to be the p ferred method for the very high-speed, high-altitude fighter aircraft.

901

Christy, R.L. 1952 A SURVEY OF PRESENT TECHNIQUES FOR EMERGENCY ESCAPE FROM AIRCRAFT. In White, C.S., & O.O. Benson, Jr., eds., Physics and Medicine of the Upper Atmosphere, A Study of the Aeropause (Albuquerque, N. Mexico: Univ. of New Mexico Press, 1952) pp. 509-515

ABSTRACT: The advantages and drawbacks of the following escape techniques are discussed: (1) ordinary bailout over the side of the airplane; (2) the escape chute, in which the pilot drops backward and downward; (3) the ejection seat, propelled by an explosive charge with sufficient upward velocit to clear the vertical stabilizer (two types are in use: one in which the seat is fired by the pilot reaching up and pulling a curtain down over his head and face, and the other fired by controls placed near the legs of the pilot); and (4) the ejectable cockpit capsule. Further studies are in progress on deceleration tracks, catapults, and human centrifuges to determin man's tolerance for acceleration and deceleration under various conditions

902

Christy, R.L. 1961 EFFECTS OF RADIAL AND ANGULAR ACCELERATIONS. In H.G. Armstrong, ed. Aerospace Medicine (Baltimore: Williams and Wilkins Co., 1961)

903

Chu, C C., R.J. Coskren & H.M. Morgan 1960 INVESTIGATION OF THE HIGH SPEED IMPACT BEHAVIOR OF FIBROUS MATERIALS. PART I. DESIGN AND APPARATUS. (Fabric Research Labs., Inc., Boston, Mass) WADD TR 60-511 pt. 1, Contract AF 33(616)6321, Proj. 7320, Sept. 1960. ASTIA AD 247 493.

ABSTRACT: A high speed impact test machine has been designed, constructed, and calibrated to test parachute components at high rates of loading. This instrument is capable of rupturing materials of up to 10,000 pounds static breaking strength at velocities of from 200 to 750 feet per second. The impacting force is applied by a free flying missile launched by a gas gun utilizing either nitrogen or helium gas at moderately low pressures. The gun has a bore of 2.5 inches and fires missiles weighing up to 10 pounds. Pertinent data are obtained by means of multiple exposure photography using a multi-microflash lighting source which provides a maximum of fifteen separate flashes spaced at predetermined intervals of between 10 and 10,000 micro-seconds The resulting photograph records the specimen and the impacting missile before, during and after the impact. Measurement of the distances between successive exposures yields information such as the breaking strength, the extension to rupture, and the energy absorbed by the specimen. (Author)

904

Chu, Wen-Hwa 1960 ON THE DEVELOPMENT OF A MORE ACCURATE METHOD FOR CALCULATING BODY-WATER IMPACT PRESSURES (Department of the Navy, David Taylor Model Basir Fundamental Hydromechanics Research Program, Southwest Research Institute, San Antonio, Texas) Contract No. Nonr 2729(00), SwRI Project No. 23-834-2, 30 September 1960, ASTIA AD 251 927

ABSTRACT: This paper presents the details of a theoretical investigation into the hydrodynamic forces and pressures developed during the early stages of water entry of a circular cylinder. The method employed is a numerical scheme developed from formulations of the governing equations and boundary conditions that are less restrictive than those usually employed, and is applicable to a wide class of body forms. Some comparisons with experimental data are made. It is concluded that the method is not yet suitable for general usage because of excessive requirements for computing machine time.

905

Chung, Sung Jang 1945 ELECTROCARDIOGRAMS OF MICE UNDER POSITIVE RADIAL ACCELERATION STRESS. ROK Air Force J. Avia. Med. 4:31

906

Chung, Sung Jang, & Yae Wee Choi 1956 STUDIES OF POSITIVE RADIAL ACCELERATIONS ON MICE AND MATHEMATICAL FORMULAE EXPRESSING HUMAN TOLERANCE TO ACCELERATION.
(Fifth Semi Annual Medical Conference of the Far East Air Force, Baguio, Phillipines, Nov. 29, 1956)

907

Chung, Sung Jang 1956 PATHOLOGY OF MICE UNDER POSITIVE RADIAL ACCELERATION STRESS. ROK Air Force J. Avia. Med. 4:45

908

Chung, Sung Jang 1956 STUDIES OF POSITIVE RADIAL ACCELERATION ON MICE; BEHAVIOR, SURVIVAL CURVE, FATAL CURVE, DANGEROUS ZONE, MORTALITY, AND EFFECTS OF ANTI-G SUITS. ROK Air Force J. Avia. Med. 4:20

909

Chung, S.J. 1959 STUDIES OF POSITIVE RADIAL ACCELERATION ON MICE. J. Appl. Physiol., 14(1):52-54, Jan. 1959

ABSTRACT: One hundred and ninety-one mice were subjected to positive acceleration of from 3 to 85 g, for periods of 5 seconds to 80 minutes. Data on mortality and on pathologic findings are presented. No significant differences were observed in the resistance of male and female mice to positive g. ECG tracings from mice exposed to 8 g for 25 minutes were examined. Formulas are presented to express probability of survival of mice in terms of exposure and magnitude of acceleration stress.

910

Chung, Sung Jang 1960 STUDIES ON A MATHEMATICAL RELATIONSHIP BETWEEN STRESS AND RESPONSE IN BIOLOGICAL PHENOMENA.
Journal of the National Academy of Sci., Republic of Korea, Vol 2, Dec. 1960

911

Cicala, A., & G. Assensi 1956 ERNIA DEL DISCO INTERVERTEBRALE DA ACCELERAZIONE POSITIVA: OSSERVAZIONI SU DI UN CASO CLINICO. (HERNIA OF THE INTERVERTEBRAL DISK CAUSED BY POSITIVE ACCELERATION: CASE REPORT) Rivista di medicina aeronautica (Roma) 19(3):511-519, July-Sept. 1956

ABSTRACT: A case is reported of intervertebral disk hernia caused by positive

acceleration in a military diver pilot. Following surgery, the pilot returned to flight duty. Consideration is given to the anatomy and physiology of the intervertebral disk, and to the medico-legal aspects of the disorder.

912

Ciccone, R., & R.M. Richman 1948 THE MECHANISM OF INJURY AND THE DISTRIBUTION OF 3000 FRACTURES AND DISLOCATIONS CAUSED BY PARACHUTE JUMPING. J. Bone Joint Surg. 30A(1):77-97

ABSTRACT: In order to recapitulate our experience with fractures of the ankle mortise, the authors have reviewed the last 300 fractures of the ankle; correlated the clinical, roentgenographic, and operative findings; and tabulated the injuries according to the traumatic mechanism. As explained earlier, this arrangement depends upon the interpretation of circumstantial evidence, and one must beware of straining such evidence too far by postulating a theoretical sequence of trauma, or by intricate subclassifications, or tortured analogies with the laws of mechanics. The authors have tried to avoid these pitfalls of speculation. Table IV merely groups the fractures under well-recognized mechanisms, and it is with these mechanisms rather than with the minor variations in pattern that we are primarily concerned.

A comparison of this cross section of the series with other reported groups of ankle fractures indicates that it makes little difference whether the ankle is broken by falling downstairs, steping off a curb, playing football, or parachute jumping: From the point of view of etiological stresses, the statistical distribution of fractures is much the same. There are certain minor variations, such as the high incidence of posterior marginal fractures of the tibia, and the relatively low incidence of vertical compression fractures in this series. These differences, however, are trivial; the fundamental point of similarity is the preponderance of external-rotation injuries. External rotation and abduction, taken together, account for 75 per cent of the fractures reported by Ashhurst and Bromer, Stevens, Moritz, and Bishop, as well as the present authors. This cannot be mere coincidence; the figures are consistently too high, and they are independent of the source of the patients or the circumstances of injury. One may reasonably conclude, therefore, that the vulnerability of the ankle to external rotation represents an inherent weakness of the joint, either a local structural weakness, or else a lack of adaptive resiliency of the leg as a whole. This latter possibility gains support from the fact that not only the ankle, but the entire lower extremity, shows a statistical preponderance of external rotation injuries.

913

Ciffrin, A., & W. A. Swenson 1959 STUDY AND DEVELOPMENT OF PARACHUTES AND SYSTEMS FOR IN-FLIGHT AND LANDING DECELERATION OF AIRCRAFT. PART II. DEVELOPMENT AND TEST EVALUATION OF THE RING SLOT PARACHUTE. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 57-566, Pt. 2; ASTIA AD-155 707

ABSTRACT: Based on German research in the development of the FIST ribbon para-

chute, Radioplane performed a development and test evaluation of a type of parachute known as the Ring Slot parachute. The purpose of the program was to determine the feasibility of replacing the FIST ribbon parachute with the Ring Slot parachute for aircraft deceleration. Tests consisted of drag tests, drop tests, and tests behind a taxiing aircraft. Test results indicate that the performance of a properly designed Ring Slot parachute is equal or superior to that of the FIST ribbon parachute for aircraft deceleration. In addition to an analysis of the performance, a suggested design procedure and cost analysis of the Ring Slot parachute are presented. (AUTHOR)

914

Cipriani, A. & D. McEachern 1942 MONTREAL MOTION SICKNESS MACHINE (NRC, Canada, Proc. Conf. Motion Sickness) Report No. C615

915

Cipriani, A. 1942 AN ANALYSIS OF THE FORCES ENCOUNTERED ON THE SIMPLE SWING USED IN THE STUDY OF MOTION SICKNESS. (National Research Council, Canada, Assoc. Comm. on Av. Med. Research) C-2246. 8 December 1942.

ABSTRACT: Radial acceleration, in the long axis of the body with the subject seated upright, is the principal vestibular stimulus encountered on the simple motion sickness swing. It is greatest at the lowest point of the arc. The magnitude of the stimulus is 0.7G for a maximum displacement of the swing from the vertical of forty degrees. This stimulus is repeated twice during each complete cycle of the swing, or usually about 30 times per minute. The radial component of acceleration can be changed in magnitude by changing the arc of swing. On the other hand, the magnitude can be kept constant and the frequency and duration of the stimulus varied by changing the length of the swing. There are three components of tangential acceleration. The first component is the tangential acceleration relative to stationary objects around the swing. This is the greatest at the ends of the arc and is about 0.64 G for an angular displacement of forty degrees from the vertical. This acceleration plays no part in stimulating the vestibular system since it affects equally the mobile and fixed portions of the vestibule. The second component of tangential acceleration is zero at the center of gravity of the swing and increases at points away from the centre of gravity. On the swings in use, this stimulus is about 0.1 G at the level of the ear of a subject sitting in the erect position. This acceleration may act as a small, probably subliminal, vestibular stimulus. It is effective due to constraint of the head in a tangential direction. Another component of tangential acceleration arises from the push or driving mechanism. Its magnitude is unknown and probably variable in swings pushed by hand. It may be an effective vestibular stimulus. The acceleration curves for the pitch motion of the roll-pitch rocker, show a maximum of 1.2 G with the carriage at its lowest point and a minimum G of 0.85, with the carriage elevated. The frequency of the pitch is about 8/min and the linear displacement 12 feet. This produces an effective acceleration of 0.35 G applied once

in each complete cycle, or about 8 times per minute.

916

Cipriani, A. 1942 A MECHANICAL DRIVE FOR THE SIMPLE SWING USED IN THE STUDY OF MOTION SICKNESS.
(National Research Council, Canada, Assoc. Comm. on Av. Med. Research) C-2245. 8 December 1942.

ABSTRACT: A method of driving a swing by means of an electric motor and V belt reduction is described.

917

Clamann, H.G. 1937 CONCERNING INJURIES TO THE RETINA IN FLIERS.
(Ueber Netzhautschadigungen bei Fliergern) Luftfahrtmed. 2:314-316

918

Clamann, H.G. 1941 ATMOSPHERIC PRESSURE DROP TESTS ON HUMANS.
(Ueber Drucksturzversuche Am Menschen) ASTIA ATI-68 253, Jan 1941

919

Clamann, H. G. 1958 THE ENGINEERED ENVIRONMENT OF THE SPACE VEHICLE.
AU Quarterly Review 10(2):53-64.

920

Clamann, H. G. 1960 MEDICINE AND SPACE FLIGHT: MAN IN CAPSULE (MEDIZIN UND RAUMFAHRT: DER MENSCH IN DER KAPSEL), Flugkorper, Wiesbaden 2(1):16-18, Jan. 1960

ABSTRACT: This lecture reviewed current and projected areas of investigation in the medical problems of space flight: acceleration tolerance, weightlessness, the use of pressure suits, hazards of Van Allen belt radiations, the food requirements and techniques for space flight feeding, methods of re-cycling water and of CO_2 -O_2 exchange, isolation, and tolerance to high dry-heat temperatures.

921

Clamann, H.F. BIOLOCICAL EXPERIMENTS WITH SPACE PROBES In Konecci, E.B., REVIEW OF JANUARY 1961 LECTURES IN AEROSPACE MEDICINE, SCHOOL OF AVIATION MEDICINE, Randolph AFB, Texas (Santa Monica, California: Douglas Aircraft Co., 1961)

ABSTRACT: In a major portion of this paper, the author defines more closely the criteria for selecting feasible biological specimens and biological space probes. One example of a biological space probe (Atlas ballistic shot of Oct. 13, 1960) is described in detail, and preliminary results of the three-mice experiment (Project MIA) are presented. The pulse-rate data of one mouse during the total flight is interpreted, viz., "As a certain surprise, the pulse rate is influenced much more by vibration and noise than by even the high G force at reentry. The pulse rate climbs directly after ignition of the rocket and decreases even before burnout. At reentry, the pulse rate climbs to a peak long before the G force reaches its maximum. During weightlessness, the pulse rate remains fairly constant and resembles the pulse rate found during sleep."

922

Clamann, H. G. 1961 HOW TO ADAPT BIO-EXPERIMENTS TO SPACE PROBES. Space Aeronautics 35(4):73-77, April 1961.

ABSTRACT: A discussion of the use of having biological specimens in space experimentation is presented. Criteria for specimens best suited to a given space probe are presented and illustrated by describing the use of three mice aboard the recoverable nose cone of an Atlas missile. The biopack design, life-cell atmosphere, recording equipment, and some results are reported. (Tufts)

923

Clare, V. R., D. R. Richmond, V. C. Goldizen, C. C. Fischer, D. E. Pratt, C. S. Gaylord, & C. S. White 1962 THE EFFECTS OF SHOCK TUBE GENERATED, STEP-RISING OVERPRESSURES ON GUINEA PIGS LOCATED IN SHALLOW CHAMBERS ORIENTED SIDE-ON AND END-ON TO THE INCIDENT SHOCK (Lovelace Foundation for Medical Education & Research, Albuquerque, N. Mex.) Technical Progress Report on Contract No. DA-49-146-XZ-055, May 31, 1962

ABSTRACT: A total of 308 guinea pigs were exposed to air blast in 4 close-fitting shallow, rectangular chambers mounted on the top, bottom and sides of an air-driven shock tube. With a reflecting plate at the downstream edge of the chambers the animals were exposed to "long"-duration, shock overpressures that initially rose in a single step. The LD_{50}-24-hr reflected pressure calculated from grouping all positions was 36.2 ± 0.8 psi.
By moving the reflecting plate to various distances downstream of the chambers, shock overpressures that initially rose in two steps were applied. The results were that the animals' tolerances to overpressure rose as the time between pressure steps was increased.
Comparison of the LD_{50}'s obtained with animals in each chamber revealed that there was not a significant statistical difference in their tolerances, whether

they were "loaded" initially with the single-step pulse from their right, left, dorsal or ventral surfaces.
Animals that survived pressure-time conditions in the lethal range were considered as having been injured by the blast, and were all pooled for 30-day serial sacrifice. It was found that the lung hemorrhage "cleaned up," and the lung weights returned to normal in 7 to 10 days as did the submucosal hemorrhages in the stomach and intestines. The body-weight curve displayed an initial drop in 2 to 3 days, after which it rose to the starting level by the sixth day and then paralleled the controls. (AUTHOR)

924

Clark, B. & A. Graybiel 1946 VISUALLY PERCEIVED MOVEMENT CAUSED BY ANGULAR ACCELERATION AND BY CENTRIFUGAL FORCE DURING FLIGHT.
American Psychologist 1(7):238-239, 1946.

ABSTRACT: A method was designed to observe and report the effects of angular acceleration and variations in g on visual perception during flight. All of the data were obtained while the subject sat in the rear cockpit of an SNJ-6 aircraft, a single engine, two-place, advanced Navy trainer. The visual stimulus was a collimated "star" installed in such a fashion that observations could be made in complete darkness. All of the pilot's and observer's verbal reports were automatically inscribed onto the wire of an airborne wire recorder which also provided a time line. The recordings were transcribed in the laboratory and all analyses were made from these written protocols. Experiments were carried out on three subjects using 5 basic maneuvers in addition to control periods of straight and level flight. It was found that angular acceleration and g during flight induce illusory perception of motion and displacement of an objectively motionless object. The apparent displacements of the object may be great, the fixation object appearing to be displaced as much as 60° from its true position. The method is adaptable to a number of types of studies concerned with the influence of angular acceleration and g on visual perception.

925

Clark, B., A. Graybiel & K. MacCorquodale 1946 THE ILLUSORY PERCEPTION OF MOVEMENT CAUSED BY ANGULAR ACCELERATION AND BY CENTRIFUGAL FORCE DURING FLIGHT. IV. ILLUSORY ROTATION OF A TARGET DURING TURNS.
(U.S. Naval School of Aviation Medicine, Pensacola, Fla.)
Rept. NM 001 059. 01. 16

ABSTRACT: This study was designed to collect additional data on illusory motion and displacement of a fixed target in the dark while the plane in which the observations were made executed turns at varying degrees of bank. Four subjects made observations in the rear cockpit of an SNJ-6 aircraft during flight. They followed a previously established procedure save in one regard. Instead of attempting to report all of the illusory motion present they confined their attention to a single aspect, namely, the apparent rotation of a collimated star about its central point.

926

Clark, B., A. Graybiel, & K. MacCorquodale 1946 THE ILLUSORY PERCEPTION OF MOVEMENT CAUSED BY ANGULAR ACCELERATION AND BY CENTRIFUGAL FORCE DURING FLIGHT. II. VISUALLY PERCEIVED MOVEMENT OF A FIXED TARGET DURING TURNS. (Naval School of Aviation Medicine, Pensacola, Fla.) MR005.13-6001.1.8 16 Apr. 1946.
See also J. Exp. Psychol. 38(3):298-309, June 1948.

ABSTRACT: The oculo-gyral and oculo-gravic illusions were studied in flight using three trained subjects which served a fixed luminous target in the dark. All observations were made in the rear cockpit of a standard Navy training plane. The subject gave a running account of the apparent motion and displacement of the target while the pilot maneuvered the plane through different degrees of bank. All of the observers' reports and the pilot's signals were recorded on an airborne wire recorder and written transcriptions of these recordings were made in the laboratory. These written protocols served as a basis for the analyses of the data.

927

Clark, B., A. Graybiel, & K. MacCorquodale 1946 THE ILLUSORY PERCEPTION OF MOVEMENT CAUSED BY ANGULAR ACCELERATION AND BY CENTRIFUGAL FORCE DURING FLIGHT. III. HABITUATION AND TECHNIQUE OF ASSUMING THE TURN AS FACTORS OF ILLUSORY PERCEPTION. (U.S. Naval School of Aviation Medicine, Pensacola, Fla.) Rept. NM 001 059. 01. 11, 1 July 1946.

ABSTRACT: Additional data were obtained on the occurrence of the oculo-gyral and oculo-gravic illusions in a flight and compared with the results found in a previous study. The same three subjects observed a fixed luminous target in the dark. The subjects sat in the rear cockpit of an SNJ-6 aircraft while the pilot described turns with different degrees of bank. The chief purposes of the study were : (1) to compare the illusions observed during two methods of executing a turn, and (2) to determine whether habituation occurred during the experiment.

There was no consistent difference in the pattern of illusory response observed in the three series. This was true of the amount of illusory motion and displacement, the time relations, and the sequence of events. Therefore, there was no significant evidence of any difference in the illusory perceptions during the two types of banks nor was there evidence of habituation within the limits of this experiment.

928

Clark, B., & A. Graybiel 1947 LINEAR ACCELERATION AND DECELERATION AS FACTORS INFLUENCING NONVISUAL ORIENTATION DURING FLIGHT. (U.S. Naval School of Aviation Medicine, Pensacola, Fla.) Rept. No. 18, NM 001 059.01.18, 25 Sept. 1947.
See also J. Aviation Med. 20:92-101, 1949.

ABSTRACT: This study was designed to determine the effects of linear acceleration and deceleration on the flyer's spatial orientation in the absence of visual

perception. All observations were made during flight in an SNJ-6 aircraft so equipped that all visual cues could be eliminated. During one series of trials the subject faced forward and in another series he faced to the left in the cockpit. He gave a running account of his perceptions of bodily position during each trial using a throat microphone which was connected to a wire recorder.

The accelerations and decelerations were produced by the pilot who changed the settings of power and flaps (brakes) to give a range of forces were measured by a three component accelerometer. The records showed that the forces built up quickly to a maximum and shortly thereafter began to drop off to zero. The net result of these linear accelerations was to change the magnitude and direction of the resultant force acting upon the body.

The subjective reports showed clearly that the observers did not merely have sensations of change in velocity, but they also reported that they perceived a strong sensation of tilt. These reports of tilt showed that the observer reorients himself to the resultant force acting on the body as if it were the true vertical, but the estimates of tilt in degrees, were substantially greater than the change in direction of the resultant force. The frequency of the reports of tilt during acceleration increased with the magnitude of the force while the observer faced both forward and to the side, the threshold being of the order of 0.02 G for forces acting in a direction fore and aft with respect to the plane. This involved a change in resultant force of approximately 0.0002G and a change in the direction of the force of approximately 1 degrees. The number of degrees of tilt reported and the duration of the perception of tilt also increased with the strength of the stimulus.

The reports during deceleration exhibited essentially the same characteristics as those during acceleration. The thresholds were somewhat higher and the degree and duration of tilt reported increased with the strength of the stimulus.

These results show that the perception of position in space is a function of the resultant of the force of gravity and the accelerative force acting on the body. The subjects reported clear perceptions of being tilted which would be interpreted as climbing or diving as far as the behavior of the aircraft is concerned. This is an added source of confusion in orientation resulting from accelerative forces acting on the body during normal flight. These confusions result in disorientation in space which have important implications for flying particularly when visual cues are lacking and the pilot must rely on the secondary cues presented by the instruments. (DACO)

929

Clark, B., A. Graybiel, & K. MacCorquodale 1948 THE ILLUSORY PERCEPTION OF MOVEMENT CAUSED BY ANGULAR ACCELERATION AND BY CENTRIFUGAL FORCE DURING FLIGHT. IV. ILLUSORY ROTATION OF A TARGET DURING TURNS. Amer. J. Psychol. 61(1):50-58, Jan. 1948
See also (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005. 13-6001.1.16., 4 Sept. 1946

930

Clark, B. 1948 EFFECTS OF REPEATED ROTARY ACCELERATION ON THE OCULOGYRAL ILLUSION. (U.S. Naval School of Aviation Medicine and Research, Pensacola, Fla.) (Proj. X-148(AV-4-3) Rept. No. 20. ASTIA ATI 44558
See also J. Exp. Psychol. 39(2):219-227

ABSTRACT: The effects of repeated angular acceleration and deceleration on visual perception were studied in three subjects to establish whether any change in the oculogyral illusion would occur. The subjects were rotated while they sat in a Link Trainer which rotated only about a vertical axis. The subjects were turned for ten successive trials at three rpm and then for ten successive trials at 20 rpm on ten successive days. On the following four days the subjects took 19 successive trials at 20 rpm. Measures of the angular accelerations and decelerations were available at the slower rotation speeds. The subjects observed a complex target in the dark and reported the onset and offset of the oculogyral illusion following both acceleration and deceleration for each trial. The duration of the effects was recorded in an adjacent room by the experimenter. The three subjects were familiar with the effects observed, but they had not been rotated for approximately one year so they were suitable for a study of habituation.

931

Clark, B., & A. Graybiel 1948 THE EFFECT OF ANGULAR ACCELERATION ON SOUND LOCALIZATION: THE AUDIOGYRAL ILLUSION.
(U.S. Naval School of Aviation Medicine, Pensacola, Fla.)
Proj. MR005.13-6001.1.21., ASTIA ATI 69 773.
See also J. Psych. . 28:235-244, 1949.

SUMMARY: This study was undertaken as a preliminary investigation of the effects of strong stimulation of the semicircular canals on sound localization. Three observers made a series of judgments of the position of a 1024 cycle tone under two conditions: (1) While they sat quietly in a Barany chair which remained fixed, and (2) for 45 seconds following abrupt deceleration from rpm. The subjects showed a constant error in localization of the sound in a direction opposite to the postrotational sensations of rotation. The error was of the order of 14 degrees immediately following deceleration and gradually decreased to approach zero between 20 and 35 seconds after deceleration. This error was consistently greater than the errors during the stationary trials. Substantial individual differences were observed. When the data were analyzed in terms of the apparent shift in position during each trial, the average displacement was found to be approximately 17 degrees. The hypothesis is suggested that the errors in localization are to be attributed to the subjects' sensations of rotation. (Author)

932

Clark, B., A. Graybiel, & K. MacCorquodale 1948 THE ILLUSORY PERCEPTION OF MOVEMENT CAUSED BY ANGULAR ACCELERATION AND BY CENTRIFUGAL FORCE DURING FLIGHT. II. VISUALLY PERCEIVED MOVEMENT OF A FIXED TARGET DURING TURNS.
J. Exp. Psychol. 38(3):298-309, June 1948
See also (Naval School of Aviation Medicine, Pensacola, Fla.) MR005.13-6001.1.8., 5/16/46

933

Clark, B., and A. Graybiel 1948 THE EFFECT OF ANGULAR ACCELERATION ON SOUND LOCALIZATION (THE AUDIOGYRAL ILLUSION). (U.S. Naval School of Aviat. Med. and Research, Pensacola, Fla.) Project X-148, Rept. 21, July 2, 1948. ASTIA AD- 35810

ABSTRACT: This study was undertaken as a preliminary investigation of the effects of strong stimulation of the semicircular canals on sound localization. Three observers made a series of judgments of the position of a 1024 cycle tone under two conditions: (1) while they sat quietly in a Barany chair which remained fixed, and (2) for 45 seconds following abrupt deceleration from 20 rpm. The subjects showed a constant error in localization of the sound in a direction opposite to the postrotational sensations of rotation The error was of the order of 14° immediately following deceleration and gradually decreased to approach zero between 20 and 35 seconds after deceleration. This error was consistently greater than the errors during the stationary trials. Substantial individual differences were observed. When the data were analyzed in terms of the apparent shift in position during each trial, the average displacement was found to be approximately 17°. The hypothesis is suggested that the errors in localization are to be attributed to the subject's sensations of rotation.

934

Clark, B., A. Graybiel, & K. MacCorquodale 1948 ILLUSORY ROTATION OF A TARGET DURING TURNS IN AN AIRCRAFT.
Amer J. Psychol. 61(1):50-58, Jan. 1948.
NOTE: Reel 7, Flash 6, Item 32

SUMMARY: This study was designed to collect additional evidence on the apparent motion and displacement of a fixed target in the dark while the aircraft, in which four Ss observed, executed turns at varying degrees of bank. Instead of attempting to report all of the illusory effects present, S confined his report to a single aspect; namely, an apparent rotation of the collimated star about its central point. The verbal reports were inscribed on an airborne wire-recorder, and later analyzed. Laboratory observations were likewise made to clarify the stimulus-response relationships.

Both apparent motion and displacement of the target occurred at all degrees of bank from 10 degrees to 60 degrees. This happened both on entering a bank and during recovery to straight and level flight. The illusory motion was in the direction of the banking motion of the plane and the motion and displacement waned a few seconds after the plane had assumed the new direction.

The percental occurrence and the degree of apparent rotation increased with the angle of bank until there was great assurance of them at 40 degrees. Maximal rotary displacement reported was 15 degrees. Apparent rotation and displacement did not, however, necessarily occur concomitantly. Very frequently the target would appear to have a rotatory motion without an associated displacement, while occasionally the target suddenly appeared in a new position without rotary motion. The lag in time from the beginning of a maneuver to the first report of

rotation averaged 4-6 sec. The average duration varied from 8.8 sec. dur g the 10 degree banks to 27.8 sec. during 60 degree banks.

Laboratory observations demonstrated similar illusory changes in the same rget during turns in a Link Trainer when the head was so placed that stimulati of the anterior and posterior vertical semicircular canals produced a rotati nystagmus. They also occurred during Coriolis acceleration when a man, t ing in a Link Trainer, tilted his head backward or forward while continuously ot ving the target.

The evidence both during flight and in the laboratory indicates that this lusory rotation of a fixed target is a special case of the oculo-gyral illusion. ffects such as these will occur in the air at night during maneuvers involving a lar accelerations above the threshold. These results give further evidence c er- ceptual confusions in the air at night, particularly when visual cues are mited. (Author)

935

Clark, B. & A. Graybiel 1949 STUDIES OF HUMAN ADAPTATION TO CENTRIFUGA FORCE. I. VISUAL PERCEPTION OF THE HORIZONTAL. (U.S. Naval School of Aviation Medicine, Pensacola, Fla.) Rept. NM 001 059.01.22.

ABSTRACT: Four experienced subjects were exposed to a series of radial e elera- tions on a human centrifuge to test the hypothesis that adaptive processe ccur in the perception of the horizontal during and following stimulation by r al acceleration.

936

Clark, B., & A. Graybiel 1949 LINEAR ACCELERATION AND DECELERATION AS TORS INFLUENCING NONVISUAL ORIENTATION DURING FLIGHT. J. Avia. Med. 20(92-101 See also (Naval School of Aviation Medicine, Pensacola, Fla.) Rept. 18. NM 001 059.01.18., 25 Sept. 1947

ABSTRACT: This study was designed to determine the effects of linear acc ation and deceleration on the flyer s spatial orientation in the absence of vis per- ception. All observations were made during flight in an SNJ-6 aircraft e quipped that all visual cues could be eliminated. During one series of trials th bject faced forward and in another series he faced to the left in the cockpit. gave a running account of his perceptions of bodily position during each trial ing a throat microphone which was connected tc a wire recorder.

The accelerations and decelera ions were produced by the pilot who change the settings of power and flaps (brakes) to give a range of forces which cove those occurring in the normal operation of the aircraft. The forces were measu by a three component accelerometer. The records showed that the forces built quickly to a maximum and shortly thereafter began to drop off to zero. T et result of these linear accelerations was to change the magnitude and dire ion of the resultant force acting upon the body.

The subjective reports showed clearly that the observers did not merely have sensations of change in velocity, but they also reported that they perceived a strong sensation of tilt. These reports of tilt showed that the observer reorients himself to the resultant force acting on the body as if it were the true vertical, but the estimates of tilt in degrees, were substantially greater than the change in direction of the resultant force. The frequency of the reports of tilt during acceleration increased with the magnitude of the force while the observer faced both forward and to the side, the threshold being of the order of 0.02 G for forces acting in a direction fore and aft with respect to the plane. This involved a change in resultant force of approximately 0.0002G and a change in the direction of the force of approximately 1 degrees. The number of degrees of tilt reported and the duration of the perception of tilt also increased with the strength of the stimulus.

The reports during deceleration exhibited essentially the same characteristics as those during acceleration. The thresholds were somewhat higher and the degree and duration of tilt reported increased with the strength of the stimulus.

These results show that the perception of position in space is a function of the resultant of the force of gravity and the accelerative force acting on the body. The subjects reported clear perceptions of being tilted which would be interpreted as climbing or diving as far as the behavior of the aircraft is concerned. This is an added source of confusion in orientation resulting from accelerative forces acting on the body during normal flight. These confusions result in disorientation in space which have important implications for flying particularly when visual cues are lacking and the pilot must rely on the secondary cues presented by the instruments. (DACO)

937

Clark, B., & K. MacCorquodale 1949 THE EFFECTS OF REPEATED ROTARY ACCELERATION ON THE OCULOGYRAL ILLUSION. J. Exp. Psychol. 39(2):219-227, Apr. 1949 See also (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13 6001.1.20.; X-148 (Av-4-3); 3/18/48. ASTIA ATI-35810

ABSTRACT: The effects of repeated angular acceleration and deceleration on visual perception were studied in three subjects to establish whether any change in the oculogyral illusion would occur. The subjects were rotated while they sat in a Link Trainer which rotated only about a vertical axis. Measures of angular acceleration and deceleration were available at the slower speeds of rotation, and the subjects observed a complex target in the dark and reported the onset and offset of the oculogyral illusion following both acceleration and deceleration. Immediately after acceleration and deceleration, the subjects reported apparent motion of the target (first effect), and a reversal of this motion (second effect). A detailed analysis of the effects showed no reduction in any one of them for the duration of the apparent motion. The results support the theory that the nystagmus remained unchanged.

938

Clark, B., & A. Graybiel 1949 APPARENT ROTATION OF FIXED TARGET ASSOCIATED WITH LINEAR ACCELERATION IN FLIGHT. American J. Ophthalmology 32(4):549-557. NOTE: Reel 7, Flash 6, Item 22

ABSTRACT: The purpose of this study was to determine the effects of linear acceleration and deceleration on the visual perception of a target in the dark. Three subjects observed a collimated "star" in the dark while the pilot of an SNJ-6 aircraft executed various degrees of linear acceleration. The subjects gave a running account of the behavior of the "star" using a throat microphone connected to a wire recorder.

The forces produced represented the range of accelerations and decelerations occurring in the normal operation of the aircraft. The forces were measured by a three component accelerometer which showed that accelerative and decelerative forces built up to a maximum in approximately 5.5 seconds and within 2 to 3 seconds began to drop off slowly to zero.

The net result of these accelerations and decelerations was to change both the magnitude and the direction of the resultant force acting on the subject. The magnitude of the maximum resultant forces varied between 1.0004G and 1.0925G., and its change in direction varied between 1.7 degrees and 23.7 degrees. When the subjects faced to the left in the aircraft, the radiating lines of the star appeared to rotate about the central point to a new position. This rotation was clockwise during deceleration and counterclockwise during acceleration. As the force became smaller, the star appeared to rotate back to its normal position. This illusory rotation occurred at all stimulus levels.

The thresholds of linear deceleration for motion and displacement were 0.067G and 0.078G., respectively. All of the linear accelerations used were above threshold. The mean maximum rotation during deceleration increased as the decelerative force increased, the maximum estimated rotation reported being 15 degrees.

There was also a positive relation between the maximum force and the duration of the illusory effect. The accelerative effects did not show a consistent variation with the maximum change in the accelerative force.

The results are similar to those observed on a human centrifuge and show that linear acceleration and deceleration during flight have a marked influence upon visual perception in the dark. Although the observed rotations were small, they were clearly defined and may be considered to be factors contributing to disorientation in pilots. (AUTHOR)

939

Clark, B., & A. Graybiel 1950 STUDIES OF HUMAN ADAPTATION TO CENTRIFUGAL FORCE. I. VISUAL PERCEPTION OF THE HORIZONTAL.

ABSTRACT: Four subjects were rotated on a human centrifuge while facing the direction of rotation. They observed a horizontal line in the dark and reported its apparent rotation or maintained it in a horizontal position throughout the trials. The settings of the line closely approximated the deviation of the resultant force acting on the subject, but adaptation was not found. (The American Psychologist 5:465)

940

Clark, .B. & A. Graybiel 1950 THE LAG EFFECT ASSOCIATED WITH STIMULATION OF THE SEMI-CIRCULAR CANALS AS INDICATED BY THE OCULOGYRAL ILLUSION. (U.S. Naval School of Aviation Medicine, Pensacola, Fla.) Proj. Report No. NM 001 059.01.25, Nov. 17, 1950. ASTIA ATI 94153.

ABSTRACT: The purpose of this experiment is to measure the amount of inhibition of the oculogyral illusion produced by the lag effects of previous stimulation by angular acceleration. Each of six subjects observed the postrotational oculogyral illusion in a dark room for a series of 45 observations at three rates of rotation and for five intervals between acceleration and deceleration. The lag effect was observed for all subjects at the three rates of rotation used. The interference was most marked when the deceleration followed the acceleration by a short interval of time; in some cases the decelerative effects were completely eliminated. The curves showing the interference were all negatively accelerated leveling off between 30 and 60 seconds of delay. One subject on a special series of observations gave evidence to indicate that other factors than time may be significant in causing changes in the oculogyral illusion under these circumstances. In general these data show a marked lag effect between angular accelerations and illustrate a factor which tends to keep these after effects small in every day life. However, when these factors do not operate in flight at night, orientation may be impaired.

941

Clark, B., & A. Graybiel 1951 VISUAL PERCEPTION OF THE HORIZONTAL FOLLOWING EXPOSURE TO RADIAL ACCELERATION ON A CENTRIFUGE. J. Comparative and Physiological Psychology 44:525-534
NOTE: Reel 7, Flash 7, Item 59

ABSTRACT: Three experienced subjects were exposed to a series of radial accelerations on a human centrifuge to test the hypothesis that changes in the perception of the horizontal will occur during and following stimulation by radial acceleration. The subjects observed a single, isolated, horizontal line in the dark while they rotated counterclockwise on a human centrifuge. In part I of the experiment the subject's task was to maintain the line at a horizontal position by means of a switch, during acceleration to a predetermined rate of rotation which was immediately followed by deceleration. In Part II the procedure was the same as in Part I except that the maximum radial acceleration was maintained for 15 mins. before deceleration began. In each experiment a comparison was made between the subject's judgment of the position of the line and the direction of resultant force determined from theoretical calculation.
Within the limits of measurement in this experiment significant changes which could be attributed to prolonged exposure to radial acceleration did not occur. Measures of the threshold of perception showed no significant change following stimulation by the radial accelerations. Settings of the line to horizontal showed no change in constant or variable errors 1 min. following rotation. There were no significant differences between the accelerative and decelerative phases with

regard to the accuracy of setting the line, but the subjects tended to set the line at an angle from the horizontal which was greater than the deviation of the resultant force from gravity. Within the limits of the measures used and for the variables studied in this experiment, prolonged exposure to radial acceleration did not produce consistent aftereffects on the perception of the horizontal. (AUTHOR)

942

Clark, B., & A. Graybiel 1951 A DEVICE TO MANIPULATE AND TO INDICATE THE POSITION OF REMOTE TEST OBJECTS IN STUDIES OF VISUAL SPACE PERCEPTION (U.S. Naval School of Aviation Medicine, Pensacola, Fla.) 6 Dec. 1951. ASTIA AD 144 336.

943

Clark, B. & A. Graybiel 1952 THE DURATION OF THE OCULOGYRAL ILLUSION AS A FUNCTION OF THE INTERVAL BETWEEN POSITIVE AND NEGATIVE ACCELERATION. (U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.) Rept. No. NM 001 059.01.28. 1 Feb. 1952. ASTIA ATI 149 274

ABSTRACT: The purpose of this investigation was to determine the nature of the effect of a preceding acceleration of the post-rotational oculogyral illusion and to determine the reliability of the test results of the oculogyral illusion in Naval aviators. Thirty-one subjects reported the duration of the oculogyral illusion during and following rotation for a series of trials with 6 different intervals of constant rotation between acceleration and deceleration. The inhibitory effect of the preceding acceleration was greatest when deceleration followed acceleration immediately; in some cases the post-rotational effect was eliminated completely. The inhibitory effect decreased rapidly up to approximately 30 seconds and very gradually beyond this up to 120 seconds.

The data indicate that the reliability of these measures in high, all reliability coefficients being 0.91 or higher. (From the authors summary)

944

Clark, B., & R. D. Malone 1952 TOPOGRAPHICAL ORIENTATION IN NAVAL AVIATION CADETS. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-6001.1.30., 2 June 1952

945

Clark, B., & R. D. Malone 1952 THE RELATIONSHIP OF TOPOGRAPHICAL ORIENTATION TO OTHER PSYCHOLOGICAL FACTORS IN NAVAL AVIATION CADETS. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-6001.1.32., 24 Sept. 1952

946

Clark, B. & A. Graybiel 1952 ILLUSORY PERCEPTION OF ROTATION FOLLOWING CONSTANT TURNS IN A LINK TRAINER. (U.S. Naval School of Aviation Medicine, Pensacola, Fla.) NM 001 059.01.31, Aug. 1952. ASTIA ATI 169 365.

ABSTRACT: Thirty-one flight students were rotated in a Link Trainer at 10 r.p.m. in a completely dark room, using six different intervals of constant turn. The subjects reported their perceptions of rotation both during and following the turns. The maximum illusory effects occurred when the constant turn was held for a relatively prolonged period of time. The duration of the illusion increased sharply as the period of constant turn increased up to approximately 30 seconds and, thereafter, increased slowly up to 60 seconds with a slight increase evident up to two minutes. In most cases the illusory effects were not observed when the period of constant turn was near zero. These results show that pilots who hold prolonged constant speed turns in an aircraft without adequate visual orientation are particularly susceptible to illusory perceptions of rotation. These illusory effects can be expected in normal Naval Aviators and they should be made familiar with the fact that such illusory perceptions are normal and may be expected following prolonged constant speed turns in flight. (From the author's summary)

947

Clark, B. and A. Graybiel 1960 HUMAN PERFORMANCE DURING ADAPTATION TO STRESS IN THE PENSACOLA "SLOW ROTATION ROOM".
Paper: 31st Annual Meeting of theAerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960.

ABSTRACT: In a previous report the symptoms experienced by human subjects living in a slow rotation room for periods up to two days were briefly summarized. It was pointed out that the significant stimulus was the aperiodic angular accelerations associated with movements of the head out of the plane of the constant rotation. The cardinal subjective symptoms included headache, dizziness, sleepiness, depression. visual illusions, nausea, and vomiting. The cardinal signs were pallor, sweating, difficulty in walking and oliguria. Because these symptoms had their origin in stimulation of the semi-circular canals, the term canal sickness was considered to be a useful and proper designation. Adaptation occurred after a period of hours to days, and the symptoms either disappeared or were reduced in severity. Following cessation of rotation, certain after-effects appeared, but these were neither as severe nor as long lasting as the symptoms during rotation. The present report deals with a number of physical, psychological, and psychomotor tasks which these persons carried out before, during, and after rotation. At angular velocities of 5.44 or lower, any initial decrement in performance disappeared in the course of their adaptation to the stress. However, subjects exposed to rotation at 10 rpm were severely handicapped, and over a period of two days, their general fitness declined despite some degree of adaptation. The application of these findings to space medicine is brought out.

948

Clark, B., & A. Graybiel 1960 HUMAN PERFORMANCE DURING ADAPTATION TO STRESS IN THE PENSACOLA SLOW ROTATION ROOM. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-6001.1.52., 18 May 1960; ASTIA AD-244 935
See also Aerospace Medicine 32(2):93-106, Feb. 1961

ABSTRACT: One control subject with effectively no vestibular function and five healthy subjects were subjected to constant rotations varying from 1.71 to 10.00 rpm for two days to determine any changes in performance on a variety of tasks. The control subject showed insignificant changes in performances associated with rotation. The most prominent change in the normal subjects was a change in motivation toward the tasks. Performance on tests of walking and body steadiness decreased substantially both during and immediately following rotation. No significant decrement was observed for strength of grip, ball throwing, dart tossing, head steadiness, card sorting, and dial setting. These findings have practical implications inasmuch as the angular velocities used were within the range proposed to generate artificial gravity on space platforms. (ASTIA)

949

Clark, B. and A. Graybiel 1960 VISUAL PERCEPTION OF THE HORIZONTAL DURING PROLONGED EXPOSURE TO RADIAL ACCELERATION ON A CENTRIFUGE
(Naval School of Aviation Medicine, Pensacola, Fla.) ASTIA AD 262 778
Proj. MR005.13-6001, Subtask 1, Report No. 54, 1960
Also see J. Exp. Psychol. 63:294-301, March 1962

ABSTRACT: Four subjects were studied in a special seat in the Pensacola Slow Rotation Room to determine whether any change in the visual perception of the horizontal would occur. The method involved maintaining a constant change in magnitude and direction of force on the subjects throughout the experimental period. No significant, systematic changes in the visual perception of the horizontal occurred during this experimental period. It is concluded that adaptation to this experimental situation does not occur.

950

Clark, B. and A. Graybiel 1961 HUMAN PERFORMANCE DURING ADAPTATION TO STRESS IN THE PENSACOLA SLOW ROTATION ROOM (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR 005.13-6001, Subtask 1, Rept. no. 52, 18 May 1960.
ASTIA AD 244 935
Also see; Aerospace Med. 32(2):93-106, Feb. 1961.

ABSTRACT: Tests of performance on simple motor tasks were conducted on five normal subjects and on one subject with no vestibular function during and after rotation in a centrifuge room for two days at speeds from 1.71 to 10 r.p.m. Insignificant changes in performance were observed in the subject with bilateral destruction of the inner ears. The most prominent change in per-

formance of normal subjects was in motivation toward the tasks; when symptoms of canal sickness were reduced, however, most tests were performed adequately. Performance on tests of walking and body steadiness decreased substantially during and immediately after rotation. No significant decrement in performance was observed for strength of grip, ball throwing, dart tossing, hand steadiness, card sorting, and dial setting.

951

Clark, B., & A. Graybiel 1961 PERCEPTION OF THE POSTURAL VERTICAL AS A FUNCTION OF PRACTICE IN NORMAL PERSONS AND SUBJECTS WITH LABYRINTHINE DEFECTS. (U.S. Naval School of Aviation Medicine, Pensacola, Fla.) BuMed Project MR005.13 6001, Subtask 1, Rept. No. 63, NASA Order No. R-37, 15 Nov. 1961.

ABSTRACT: The effects of practice on ability to set themselves to the postural vertical were compared in nine normal subjects and ten subjects with defective vestibular function. All of the latter had lost the function of the semicircular canals and 6 did not perceive the oculogravic illusion, a test of otolith function. The normal subjects exhibited smaller average error than those with vestibular defects. It was concluded that pressure cues appear to be adequate to produce good performance, but the nonacoustic labyrinth also contributes to the judgment in normal subjects. The data also support the notion that the tilt chair, as used in this study, is not useful in identifying subjects without otolith function. (Author)

952

Clark, B., & A. Graybiel 1961 ANTECEDENT VISUAL FRAME OF REFERENCE AS A CONTRIBUTING FACTOR IN THE PERCEPTION OF THE OCULOGRAVIC ILLUSION. (USN, SAM, Pensacola, Fla.) BuMed Project MR005.13-6001, SubTask 1, Rept. No. 56, and NASA Order No. R-1 ; 8 February 1961

ABSTRACT: A study is made of the effect of an antecedent visual frame of reference on the perception of the horizontal when direction and magnitude of the gravitational force acting on the body are changed. Changes in the amount of oculogravic illusion serve as the criterion of change in perception of the horizontal. Observations are made following prolonged exposure and following varied short exposures to a visual frame work. Results show deviation of the perceived horizontal from the static line-of-subjective-horizontal increases fairly rapidly to about sixty seconds and more slowly for an equal time thereafter under each observation condition. A gradual, though not a simple, continuous, change occurs in the frame of reference from visual to gravitational cues.

953

Clark, B., & A. Graybiel 1961 HUMAN PERFORMANCE DURING ADAPTATION TO STRESS IN THE PENSACOLA SLOW ROTATION ROOM. Aerospace Medicine 32(2):93-106, Feb. 1961
See also (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005. 13-6001.1.52., 18 May 1960; ASTIA AD-244 935

ABSTRACT: One control subject with effectively no vestibular function and five healthy subjects were subjected to constant rotations varying from 1.71 to 10.00 rpm for two days to determine any changes in performance on a variety of tasks. The control subject showed insignificant changes in performances associated with rotation. The most prominent change in the normal subjects was a change in motivation toward the tasks. Performance on tests of walking and body steadiness decreased substantially both during and immediately following rotation. No significant decrement was observed for strength of grip, ball throwing, dart tossing, head steadiness, card sorting, and dial setting. These findings have practical implications inasmuch as the angular velocities used were within the range proposed to generate artificial gravity on space platforms. (ASTIA)

954

Clark, B. and A. Graybiel 1962 VISUAL PERCEPTION OF THE HORIZONTAL DURING PROLONGED EXPOSURE TO RADIAL ACCELERATION ON A CENTRIFUGE.
In J. Exp. Psychol. 63:294-301, March 1962
Also see Naval School of Aviation Medicine, Pensacola, Fla. Proj. MR005.13-6001, Subtask 1, Report No. 54, 1960

955

Clark, B. & J. Stewart 1962 PERCEPTION OF ANGULAR ACCELERATION ABOUT THE YAW AXIS OF A FLIGHT SIMULATOR: THRESHOLDS AND REACTION LATENCY FOR RESEARCH PILOTS. (Paper presented at 33rd annual meeting of the Aerospace Medical Association, 9-12 April 1962, Atlantic City)

ABSTRACT: Thresholds for the perception of angular acceleration and reaction latencies for accelerations in the region of the threshold were determined using the Ames Three-Degrees-of-Angular-Freedom Simulator. The simulator was controlled by an analog computer signal and each angular acceleration was measured throughout its ten second duration by an angular accelerometer. A forced choice procedure was used for angular acceleration and reaction latencies for angular acceleration from $0.06^{o}/sec.^{2}$ will be reported and compared with earlier studies. (Aerospace Med. 33(3):333, March 1962)

956

Clark, B. & A.Graybiel 1963 CONTRIBUTING FACTORS IN THE PERCEPTION OF THE OCULOGRAVIC ILLUSION.
Amer. J. Physiol. 76:18-27, March 1963.

957

Clark, C.C. & R.J. Crosbie 1957 CENTRIFUGE SIMULATION OF FLIGHT ACCELERATIONS: OPEN-LOOP COMPUTER CONTROL AND CLOSED-LOOP SUBJECT COMPUTER CONTROL OF THE HUMAN CENTRIFUGE. (U.S. Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-LR30, Sept. 17, 1957.

ABSTRACT: This report explains a new technique of flight simulation under acceleration which has been developed at AMAL by utilizing the human centrifuge in hook-up with the large Typhoon analog computer at the aeronautical Computer Laboratory. With this increased capability, the subject undergoing acceleration can serve not only as a passenger during a simulated flight but as the pilot of a simulated flight through a specified flight maneuver. The pilot-aircraft interactions can be evaluated under G for the first time on a centrifuge, thus providing a more realistic assessment of the pilot performance and physiological changes during flight. The closed-loop system works in this manner: the control stick, rudder pedal, and throttle settings made by the subject in the gondola of the centrifuge are transmitted as electrical signals over telephone lines connecting the centrifuge with the computer. The centrifuge control signals are returned to AMAL through the special telephone lines to drive the centrifuge and gimbals and provide the accelerations that would have been provided by similar control setting changes in the particular aircraft represented by the analog circuit.

958

Clark, C.C. & R.J. Crosbie 1957 ACCELERATION PROBLEMS ASSOCIATED WITH PROJECTED RESEARCH AIRCRAFT; INVESTIGATION OF HUMAN TOLERANCES AND PERFORMANCE CONCERNING (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR18, Feb. 25, 1957

ABSTRACT: This report details some preliminary considerations affecting the centrifuge program for the X-15 research aircraft. The purpose of this program is to: (1) compare tracking performance during the simulation of the flight pattern associated with the projected research aircraft using a floor control stick with that using a right hand control stick, (2) determine the extent of involuntary pilot input to the control system with the proposed restraint and arm rest, and (3) determine whether physiological tolerances are surpassed.

959

Clark, C. C. 1958
PROPOSED STUDY OF ACCELERATION PATTERNS IN FLIGHT
(Naval Air Development Ctr., Johnsville, Pa.) Letter Rept. TED ADC AE1410, Serial 3072, 18 Apr. 1958

ABSTRACT: A listing is presented of projects being carried out at AMAL in which accelerations, measured or predicted in flight are reproduced on the ground. Sources of the flight acceleration measurements and recent AMAL reports are given. The importance of obtaining both linear and angular accelerations of flight (three components of each) in order to make possible an optimum simulation is emphasized.

960

Clark, C.C. 1958 PLANS FOR THE JUNE CENTRIFUGE SIMULATION OF THE X-15 (U.S. Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-LR56 May 27, 1958. (Confidential)

961

Clark, C.C. 1959 FILM REPORT ON NAVY CENTRIFUGE STUDIES FOR THE NASA PROJECT MERCURY, PROGRAM 1, AUGUST 1959 (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-L6014.

ABSTRACT: This letter report contains a scene description of the film "Navy Centrifuge Studies for NASA Project Mercury, Centrifuge Program 1, August, 1959" as an enclosure, along with the film itself.

962

Clark, C. C. 1959 NAVY CENTRIFUGE SIMULATION OF THE NASA PROJECT MERCURY VEHICLE PROGRAM I (Naval Air Development Ctr., Johnsville, Pa.) Letter Rept. No. TED ADC AE-1412, Serial 0890, 7 Oct. 1959

963

Clark, C.C. 1959 JOHNSVILLE CENTRIFUGE BRACKET FOR ATTACHING THE NASA MERCURY CAPSULE (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR87, May 28, 1959

ABSTRACT: This report discusses the possibility of mounting an actual Mercury capsule on the arm of the AMAL centrifuge for use in high acceleration training of the Mercury astronauts. A special bracket and a third gimbal drive is proposed to mount the capsule on the centrifuge.

964

Clark, C.C., and R.F. Gray 1959 RESTRAINT AND PROTECTION OF THE HUMAN EXPERIENCING THE SMOOTH AND OSCILLATING ACCELERATIONS OF PROPOSED SPACE VEHICLES (Naval Air Development Center, Johnsville, Pennsylvania, Paper presented at the AGARD Aeromedical and Flight Panels, Athens, Greece) 11-15 May 1959.

965

Clark, C. C., J. D. Hardy, and R. J. Crosbie 1959 A SUGGESTED STANDARD ACCELERATION TERMINOLOGY. (USN, Air Dev. Ctr , Aviat. Med. Accel. Lab., Johnsville, Pa.) 10 July 1959.

966

Clark, C.C. & J.D. Hardy 1959 PREPARING MAN FOR SPACE FLIGHT
Astronautics 4: 18

ABSTRACT: A discussion of the various aspects of space flight on biological systems is presented with special emphasis on the effects of acceleration and methods of protection against it. The NASA contour couch studies performed at AMAL and the water fill G-capsule studies are described in relation to tolerance limits for acceleration stress. The use of the centrifuge in conjunction with electronic computers to form a dynamic simulator is discussed and some of the recent simulations described. As an example of this kind of research, the author tells about his experience riding the centrifuge at 2 G for 24 hours to study the consequences of long duration acceleration, which had been determined before. During this time, he cooked, ate, slept, stood up, wrote and typed, and made medical observations on himself.

967

Clark, C.C., & R.F. Gray 1959 A DISCUSSION OF RESTRAINT AND PROTECTION OF THE HUMAN EXPERIENCING THE SMOOTH AND OSCILLATING ACCELERATIONS OF PROPOSED SPACE VEHICLES. (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-5914, Oct. 1959. ASTIA AD 234 597.

ABSTRACT: The thesis of this paper is that it is not the forces generated by acceleration or deceleration (at least to somewhat beyond 30 G) which damage man, but rather the body distortions which can result from an unbalanced action of these forces. By proper "packaging" of the human tolerance will depend on the consequences of local tissue compression or extension rather than on the consequences of gross tissue and organ displacements or distortions. The acceleration time histories to accelerate to and decelerate from the velocities suitable for space travel are presented with emphasis that presently attained velocities are only a beginning. Minimum travel time involves acceleration for half the trip and deceleration for the other half. Techniques of centrifuge simulation of these accelerations are presented. The dependence on vehicle configuration of vehicle deceleration by reentry into an atmosphere is noted. Vehicle oscillations induced by motor and by lift misalignments are described. The ability of the human to make body motions while under acceleration determines the minimum necessary restraint for the head and limbs. To minimize involuntary pilot control inputs, a simultaneous designing of restraints and controls is necessary. A moulded body form "contour couch" provides a broadened support and reduces body distortion. In such a couch a man has reached +25Gx (chest-to-back) as the peak acceleration of a versine waveform with a 40-second period. Tight bandaging of the body and particularly training in techniques of complete body straining are important aspects of these experiments.

968

Clark, C.C., & C.E. Woodling 1959 CENTRIFUGE SIMULATION OF THE X-15 RESEARCH AIRCRAFT. (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA 5915, 10 Dec. 1959. ASTIA AD 233 340.

ABSTRACT: In the period March 1957 to July 1958, three X-15 centrifuge programs were carried out as a cooperative effort of the North American Aviation, Inc., the NASA, the USAF, and the USN. The first program involved 168 runs under cam control, with the subject receiving accelerations predicted for the X-15 as if he were a passenger. For the other two programs, the newly developed technique of pilot-computer "closed-loop" control of the centrifuge, or centrifuge dynamic control flight simulation, was utilized with the pilot receiving accelerations computed for the X-15 under his own control while he carried out the assigned flight mission, involving re-entries at various angles of attack and peak normal loads with and without speed brakes, and with or without control augmentation (dampers). During these two programs, 991 "static" flights (centrifuge at rest) and 433 "dynamic" flights (centrifuge in motion) were made on the centrifuge simulator. Pilots who were properly fitted into the seat and restraints; had at least 10 hours of static simulator practice; and had previous high acceleration experience could control the X-15 centrifuge simulator through parts of the design missions (computed aircraft speeds greater than Mach 2) while receiving the accelerations greater than 1 G continuously computed in magnitude and direction as a consequence of their control and used as centrifuge drive signals. Pilots who did not meet these specifications did notably less well dynamically than statically, a consequence attributed to their incorrect control responses while under acceleration or to their less rapid detection of an correction for the involuntary pilot inputs produced by the flight loads. Even the pilots who were scheduled to first fly the X-15 "crashed" the centrifuge simulator on their first experiences with certain of the more difficult flight conditions involving unaugmented controls. During these programs, improvements in instrument arrangement, kinematic design and grip of the right hand console control stick, and pilot restraint, notably a head support and seat design, were made. The final cockpit configuration and the dynamic control characteristics were acceptable to the pilots who will first fly the X-15. (Author)

969

Clark, C.C. & J.D. Hardy 1960 GRAVITY PROBLEMS IN MANNED SPACE STATIONS (In, Institute of Aeronautical Sciences, NASA, and The Rand Corporation, Proceedings of the Manned Space Station Symposium, Los Angeles, Calif., April 20-22, 1960, pp. 104-113.

ABSTRACT: If man is to live in space stations, the problems of living in a weightless environment must be resolved. First, restraint systems must be developed. Next, movements of the head must be kept to low magnitude to avoid disorienting illusions and nausea. Third, normal repair of bone and muscle may require artificial gravity. And last, it may be necessary to develop exercises to use prior to changes of acceleration level.

970

Clark, C., & J. Hardy 1960 GRAVITY PROBLEMS IN MANNED SPACE STATIONS. (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-6033, 29 March 1961. ASTIA AD 255 592.

ABSTRACT: Unpowered flight above an atmosphere will produce weightlessness throughout a non-rotating space vehicle or along the axis of rotation of a rotating vehicle and if man is to live in space stations the relative merits and problems of living in a gravitational or in a weightless environment must be resolved. Four points concerning this problem are emphasized: (1) restraint systems, both for man and for movable objects will have to be developed for use in the weightless (zero G) state; (2) in a rotating space station, velocities of linear or angular motions of the head may have to be kept of low magnitude by using restraints and possibly eye prism devices, mirror walls, etc., to reduce the need for head motions, to avoid disorienting illusions and nausea; (3) normal growth of the embryo and the young and normal repair of adult tissues, such as bone and muscle, which are affected in cellular patterns by force distributions, may require artificial gravity; and (4) it may be necessary to develop exercises and other procedures to use prior to changes of acceleration level to restore or develop tolerance to the new level in spite of acclimatization to the old level. (Author)

971

Clark, C.C. 1960 OBSERVATIONS OF A HUMAN EXPERIENCING 2G FOR 24 HOURS. (Paper presented at 31st annual meeting of the Aerospace Medical Assoc., 9-11 May 1960, Miami, Fla.)

ABSTRACT: Details particulars concerning a subject's 24-hour ride on the Johnsville centrifuge. Acceleration was 2 g, mostly in the direction chest to back, though direction varied when subject moved from couch or walked. Subject cooked, ate, slept, and made observations of his pulse rate, blood pressure and temperature, and looked for handwriting and speech changes. Subject experienced some mild discomfort from dimming of peripheral vision and nausea during the first two hours, and an anesthesia sensation in the ring and little fingers of the left hand which began in the sixteenth hour and which left some tingling sensation for about 2 months after the experiment. During the run, the white blood cell count increased from 11,300 to 22,000 per cu. mm. A feeling of lightness persisted for thirty minutes after the centrifuge stopped. An abrupt head motion thirty minutes after the run induced retching, but other recovery seemed uneventful.

972

Clark, C.C. 1960 NAVY CENTRIFUGE SIMULATION OF LOW ALTITUDE FLIGHT OF THE A2F, PROGRAM 1; REPORT ON THE CENTRIFUGE PROGRAM AND THE CONFERENCES OF. (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-L6005, March 29, 1960 CONFIDENTIAL

973

Clark, C. C. and J. D. Hardy 196- GRAVITY PROBLEMS IN MANNED SPACE STATIONS In: Proceedings of the MANNED SPACE STATIONS SYMPOSIUM, Los Angeles, Calif. (Publ. by IAS, New York, 1960)
Also: Naval Air Development Center, Aviation Medical Acceleration Lab., Johnsville, Pa. Rept. No. MA-6033 ASTIA AD 255 592

ABSTRACT: Unpowered flight above an atmosphere will produce weightlessness throughout a non-rotating space vehicle or along the axis of rotation of a rotating vehicle and, if man is to live in space stations, the relative merits and problems of living in a gravitational or in a weightless environment must be resolved. Four points concerning this problem are emphasized: (a) Restraint systems, both for man and for moveable objects, will have to be developed for use in the weightless (zero G) state; (b) In a rotating space station, velocities of linear or angular motions of the head may have to be kept of low magnitude by using restraints and possibly eye prism devices, mirror walls, etc., to reduce the need for head motions to avoid disorienting illusions and nausea; (c) Normal growth of the embryo and the young and normal repair of adult tissues, such as bone and muscle, which are affected in cellular patterns by force distributions, may require artificial gravity; (d) It may be necessary to develop exercises and other procedures to use prior to changes of acceleration level to restore or develop tolerance to the new level in spite of acclimatization to the old level.

974

Clark, C. C., & R. F. Gray 1961 A DISCUSSION OF RESTRAINT AND PROTECTION OF THE HUMAN EXPERIENCING THE SMOOTH AND OSCILLATING ACCELERATIONS OF PROPOSED SPACE VEHICLES. In Bergeret, P., ed., Bio-Assay Techniques for Human Centrifuges and Physiological Effects of Acceleration. (London, New York, Paris: Pergamon Press, 1961) AGARDograph 48. Pp. 65-95

ABSTRACT: The authors discuss the acceleration times necessary for achieving either acceleration or deceleration in the case of the velocities required in space travel; they emphasize the fact that the speeds actually attained are only a start. In order to reduce to a minimum the duration of the journey, it is important to achieve an acceleration during the first half and a deceleration during the second half. The authors describe methods of reproducing these accelerations by means of centrifuges. They emphasize that the deceleration at the moment of re-entry into the atmosphere depends on the shape of the vehicle. They also describe the oscillations caused by a fault in the adaptation of the propulsion system to provide lift.
So that man may be able to move when he is subjected to acceleration, the constraints on the head and limbs must be reduced to a minimum. In order to minimize an involuntary action by the pilot on the controls, the study must be conducted

simultaneously of the attachments and the controls. A couch moulded to the shape of the body constitutes a support and reduces distortions. Due to a couch of this kind, a subject was able to withstand 25g (in the chest-back direction) as a peak value of a sinusoidal variation of acceleration having a period of 40 sec. Bandaging fastened to the body and especially adequate training in the technique of general muscular tension are important aspects of these experiments. Immersion in water can contribute to a reduction of the body distortions during the acceleration phase especially if the lungs are pressurized. In an anti-g capsule cast in aluminum and filled with water, a subject was able to withstand up to 31 g (in the back-chest direction) as the peak value of a sinusoidal variation of acceleration having a period of 25 sec., the peak value being held, moreover, for 5 sec. Thanks to these protective methods, the visual indications afforded by the greyout or the blackout of the limit or tolerance to acceleration are not observed. The subject's experiencing of pain is not sufficient to predict exactly the advent of trouble. Additional tests are actually being perfected on the physiological, psychological and biochemical aspects with the aim of observing the effects of acceleration both immediately and later. Work on the effects of long duration accelerations continues; a human being was able to withstand 2g for 24 hours. (Editors Summary)

975

Clark, C. 1961 ACCELERATION AND BODY DISTORTION. (The Martin Company, Baltimore, Md.) Rept. ER 12138

ABSTRACT: I urge the point of view that tolerance to acceleration depends more on the extent of body distortion as a consequence of the interaction of the reactive forces due to the acceleration and the opposing forces due to tissue displacements and to the restraint system than on the reactive force due to acceleration alone.

976

Clark, Carl 1961 PHYSIOLOGICAL ASPECTS OF LOW ALTITUDE FLIGHT. (Paper, Panel on Acceleration Stress of the Armed Forces-NRC Committee on Bio-Astronautics, 6-11 March 1961, NASA Ames Research Ctr., Moffett Field, Calif.)

977

Clark, Carl 1961 CENTRIFUGE SIMULATION OF THE X-15 RESEARCH AIRCRAFT (Paper, Panel on Acceleration Stress of the Armed Forces-NRC Committee on Bio-Astronautics, 6-11 March 1961, NASA Ames Research Ctr., Moffett Field, Calif.)

978

Clark, C.C. 1961 SOME BODY DISPLACEMENTS AND MEDICAL EFFECTS OF LATERAL ACCELERATIONS DURING NAVY CENTRIFUGE SIMULATION OF EJECTION CAPABILITIES FROM THE ARMY AO AIRCRAFT. (Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.) Final Report. NADC-MA 6044, 11 April 1961. ASTIA AD 257 371.

ABSTRACT: For steadily applied lateral loads in the Martin-Baker Mark J5 Ejection Seat and restraint system in use in the YAO-1 aircraft, lateral displacement of the pilot is such as to make questionable safe ejection at 2 G past the canopy beam located 12.5 in from the seat center, even with the restraint harness tighter than would be the case in general flying. With additional equipment on the pilot inside of the restraint harness, lateral displacements will probably be increased. For steadily applied lateral loads above 2 G, this study indicates that lateral displacements of the pilot would preclude safe ejection. The theoretical discussion in the previous section indicates that either body motion damping effects, reducing displacements, or resonance overshoot effects, increasing displacements misht occur for the shorter duration acceleration pulses of air-craft in-flight accidents.

979

Clark, C.C. & J.D. Hardy 1961 MAN UNDER ACCELERATION: A PHYSIOLOGICAL ACCELERATION TERMINOLOGY. (Aviation Acceleration Lab., U.S. Naval Air Development Ctr., Johnsville, Pa.). A Brochure.

ABSTRACT: As man attains increasing speeds as he is borne into the vast expanses of space, having cracked out from his nurturing shell of earth atmosphere, his real or potential accelerations increase. In connection with the work of the Acceleration Panel a "physiological acceleration terminology" has been developed to insure an adequate acceleration description of these experiences. A detailed discussion is presented in the work "Reports on Human Acceleration: Future Magnitudes, Medical Safety, An Indexing Method for Bibliography, and Terminology", edited by Dr. James D. Hardy, Chairman of the Acceleration Panel, to be published for the panel by the National Research Council. (See Bates, George, et al. NAS-NRC Publication 913, 1961). This brochure summarizes the recommended physiological acceleration terminology. (1) The unit for the physiological acceleration shall be G to distinguish this acceleration from the "true" displacement acceleration, generally designated by aerodynamicists with the unit g. The physiological acceleration represents the total reactive force divided by the mass, and hence includes both displacement and resisted gravitational acceleration effects. (2) The physiological acceleration axes represent directions of the reactive displacements of organs and tissues with respect to the skeleton. The Z axis is down the spine, with +Gz (unit vector) designations for accelerations causing the heart, etc. to displace downward (caudally). The X axis is front to back, with +Gx designations for accelerations causing the heart to be displaced to the left. (3) Angular accelerations which cause the heart to rotate (roll) to the left within the skeleton shall be specified by the Rx unit vector, representing radians/sec^2 about the X axis. Angular velocities in the same sense shall be specified by the +Rx unit vector, representing radians/sec about the X axis.

Similarly, +Rx represents an angular acceleration producing a pitch down of the heart within the skeleton, and +Rz represents yaw right of the heart within the skeleton. (4) Whenever rotations accompany linear accelerations, the reference point for the linear accelerations should be specified, and the time histories of the angular velocities and angular accelerations should be specified, and the time histories of the angular velocities and angular accelerations should accompany the time histories of the linear accelerations, to allow the computation of linear accelerations at other points. (Author)

980

Clark, C.C., J.D. Hardy & R.J. Crosbie 1961 A PROPOSED PHYSIOLOGICAL ACCELERATION TERMINOLOGY WITH AN HISTORICAL REVIEW. (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-6118. Also in George Bates et al. Human Acceleration Studies (National Academy of Sciences - National Research Council, Washington, D.C.) Publication 913, 1961. Pp. 7-65.

981

Clark, C. C. 1961 SOME BODY DISPLACEMENTS AND MEDICAL EFFECTS OF LATERAL ACCELERATIONS DURING NAVY CENTRIFUGE SIMULATION OF EJECTION CAPABILITIES FROM THE ARMY AO AIRCRAFT. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-6044; ASTIA AD-257 371 11 April, 1961

SUMMARY: A Martin-Baker Mark J5 seat, used in the Army YAO-1 "Mohawk" prototype aircraft, was mounted facing tangentially on the Navy Johnsville Human Centrifuge at a radius of 41 feet from the centrifuge center. A beam was installed 12.5 inches laterally from a plane through the seat center to the subject's upper right, simulating the canopy beam of the aircraft past which the pilot must clear on an ejection. Motion picture cameras centered in the vertical plane through the beam viewed the subject from the front and from the top (Bureau of Medicine and Surgery Technical Film Report Med. [illegible]-60). Centrifuge runs with four subjects, one wearing a life vest and one a heavy flight jacket and life vest were filmed at 2 G, 3 G, 4 G (3 subjects), and 5 G (1 subject) of radial acceleration. Seat pan heights were not adjusted for the individual subjects. The restraint harness was worn in a very tight condition. The Martin-Baker leg restraint was worn in the flight condition, providing some lateral leg restraint. For steadily applied lateral loads, lateral displacement of the pilot is such as to make questionable, safe ejection past the canopy beam at 2 Gy. With additional equipment on the pilot inside of the restraint harness, lateral displacements will probably be increased. For steadily applied lateral loads above 2 Gy, lateral displacements of the pilot would preclude safe ejection. Except when bulky equipment is worn, shoulder displacements are minimally damped, reaching maximum values essentially synchronously with peak G. At 4 Gy the head may be tipped involuntarily under the canopy beam after several seconds at peak G. At 5 Gy the head is further tipped involuntarily; the one subject experienced a scleral hemorrhage on this run. (AUTHOR)

982

Clark, C.C & W. Augerson, 1961 HUMAN ACCELERATION TOLERANCE WHILE BREATHING 100 PER CENT OXYGEN AT 5 PSIA PRESSURE.
(Paper presented at 32nd annual meeting, Aerospace Medical Association, 24-27 April 1961, Chicago, Ill.)

ABSTRACT: Low pressure gas provides less support against collapse of the chest under acceleration than atmospheric pressure gas. When breathing pure oxygen, the collapsed lung structures may not reinflate as rapidly after acceleration. Preliminary low pressure studies indicate individual variations in response to $+G_x$ or $+G_x$ tumbling to $-G_x$ acceleration, ranging from severe chest pain, to temporary post-run dyspnea, to no unusual sensations but with minor atelectasis detectable by x-rays or moderate temporary post-run vital capacity reduction, to no detectable responses. Injury may be more severe at lower G for longer duration, with respiration, than at higher G for shorter durations, with straining, including the valsalva maneuver with an inflated chest above $+8G_x$. With training in the breathing and straining procedure, no subject was incapacitated by acceleration at low pressure. (Aerospace Med., 32(3):226, March 1961)

983

Clark, C.C. 1961 MOTION PICTURES, SCENE DESCRIPTIONS, AND SAFETY PROCEDURES OF NAVY, CENTRIFUGE SIMULATIONS OF THE X-15 RESEARCH AIRCRAFT: PROGRESS REPORT CONCERNING (Naval Air Development Center, Johnsville, Pa.) NADC-MA L6126, 26 July 1961. ASTIA AD 271 927.

ABSTRACT: This is a series of memorandums concerning the progress of the Navy centrifuge simulations of the X-15 research aircraft.

984

Clark, C.C. and D. Faubert 1961 A CHRONOLOGICAL BIBLIOGRAPHY ON THE BIOLOGICAL EFFECTS OF IMPACT
(The Martin Co., Baltimore, Md.) Engineering Report no. 11953, Sept. 27, 1961

ABSTRACT: This bibliography (with items covering the period between 1914 and 1961) has been compiled as a preliminary effort to develop a more complete bibliography on the biological effects of acceleration. A chronological index (sequenced within each year alphabetically by author) is the principal index; however, author and organizational indexes are also included. Works selected for inclusion were limited to those with accelerations greater than 10 g and rates of accelerations greater than 20 g/sec.

985

Clark, C.C. 1961 ADDITIONS TO A CHRONOLOGICAL BIBLIOGRAPHY ON THE BIOLOGICAL EFFECTS OF IMPACT
(The Martin Co., Baltimore, Md.) Engineering Report No. 11953-Appendix, Nov. 22, 1961. 55 p.

ABSTRACT: These additions to the bibliography were submitted by several authors and organizations participating in the Symposium on Impact Acceleration Stress at San Antonio, Texas, November 27-29, 1961.

986

Clark, C.C., D. Faubert & B. Cooper 1962 A CHRONOLOGICAL BIBLIOGRAPHY ON THE BIOLOGICAL EFFECTS OF IMPACT.
In Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council Publication No. 977, pp. 373-458.

ABSTRACT: A chronological bibliography on the biological effects of impact acceleration is described. Achronological index, an author index and an organization index is included.

987

Clark, C.C. 1962 TECHNICAL FILM REPORTS AND SCENE DESCRIPTIONS ON CENTRIFUGE STUDIES OF HUMAN ACCELERATION TOLERANCE AND PROTECTION (MED 9-61) AND FLIGHT SIMULATION AND TRAINING WITH THE NAVY CENTRIFUGE, 1957-1960 (MED 8-61). (U.S. Naval Air Development Center, AMAL, Johnsville, Pa.) NADC-MA-L6127. 22 Jan. 1962.

988

Clark, C.C. 1962 HUMAN CONTROL PERFORMANCE AND TOLERANCE UNDER SEVERE COMPLEX WAVEFORM VIBRATION WITH A PRELIMINARY HISTORICAL REVIEW OF FLIGHT SIMULATION.
(The Martin Co., Baltimore, Md.) Engineering Report no. 12406, April 1962.

ABSTRACT: Problems of terminology of acceleration and flight simulation are reviewed, with a preliminary historical review of particularly moving base flight simulation. The capabilities and limitations of the Navy Johnsville human centrifuge and the North American Aviation (Columbus) "G-seat" for jostle simulation are presented; the latter is more realistic. Potential developments of restraints, displays, and controls for use in severe jostle environments are noted. A "relative jostle biological effectiveness" concept is suggested for test as a means of comparing the biological effects of jostle environments with different frequency components.

989

Clark, C., B. Cooper, & C. Blechschmidt 1963 HUMAN VIBRATION AND IMPACT ISOLATION WITH A PROTOTYPE FULL LENGTH AIR BAG RESTRAINT SYSTEM. (Life Sciences & Structures Departments, Martin Company, Baltimore, Md.) Engineering Rept. No. 12799, Feb. 1963.

ABSTRACT: A preliminary air bag restraint system has been developed, with the subject supported in front and back by full length air bags inflated within a box container of 22 x 34 x 84 inches at pressures up to 10 inches of water. An opening through the top bag and box allows respiration. By November 1, 1962, 95 vibration tests and 68 impact tests with three subjects had been carried out. With a box vibration of $1G_x \pm 3G_x$ (sine wave) at 11 cps and a lower bag pressure of 3.5 inches of water, the subject experienced $1G_x \pm 0.4G_x$ (sine wave) at 11 cps, for five minutes with only slight discomfort. To prevent waist flexure during impact, the subject lay on a back board. With a box impact into sand from four feet up, hitting at 16 feet per second with a peak deceleration recorded of $310G_x$, and with the lower air bag at 10 inches of water pressure and the upper at 7 inches of water pressure, the accelerometer on the hip of the subject peaked at $17.2G_x$. A valve system for dumping the bag pressure at maximum displacement, to prevent rebound, is under development. Technical developments of means of control to prevent "bottoming" and to vary resonance frequencies warrant further exploration of acceleration isolation restraint systems. (Aerospace Medicine 34(3) 250, March 1963)

990

Clark, Carl & Carl Blechschmidt 1963 HUMAN VIBRATION AND IMPACT ISOLATION WITH A PROTOTYPE FULL LENGTH AIR BAG RESTRAINT SYSTEM
Paper: 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 28 - May 2, 1963

ABSTRACT: A preliminary air bag restraint system has been developed, with the subject supported in front and back by full length air bags inflated within a box container of 22 x 34 x 84 inches at pressures up to 10 inches of water. An opening through the top bag and box allows respiration. By November 1, 1962, 95 vibration tests and 68 impact tests with three subjects had been carried out. With a box vibration of $1G_x \pm 3G_x$ (sine wave) at 11 cps and a lower bag pressure of 3.5 inches of water, the subject experienced $1G_x \pm 0.4G_x$ (sine wave) at 11 cps, for five minutes with only slight discomfort. To prevent waist flexure during impact, the subject lay on a back board. With a box impact into sand from four feet up, hitting at 16 feet per second with a peak deceleration recorded of $310G_x$, and with the lower air bag at 10 inches of water pressure and the upper at 7 inches of water pressure, the accelerometer on the hip of the subject peaked at $17.2G_x$. A valve system for dumping the bag pressure at maximum displacement, to prevent rebound, is under development. Technical developments of a means of control to prevent "bottoming" and to vary resonance frequencies warrant further exploration of acceleration isolation restraint systems.

991

Clark, D.C. 1960 THE TURNING BEHAVIOR OF ARTICULATED TRACK-LAYING VEHICLES. (Ordnance Tank-Automotive Command, Detroit, Mich.) Rept. no. RR-16 March 1960. ASTIA AD 256 336.

ABSTRACT: The turning behavior of articulated vehicles was investigated to determine the optimum configuration for a two-unit articulated vehicle performing on hard ground at low centrifugal accelerations. It was found that for these conditions, vehicle response is linear and a function of geometry only. (Author)

992

Clark, E. 1960 NEW METHODS PROBE SPACE FLIGHT HAZARDS. Aviation Week and Space Technology 72(21):54-59, 23 May 1960.

ABSTRACT: Current and projected investigations on the effects of radiation and weightlessness on humans in space are discussed. Results obtained from altitude studies of the effects of heavy particles on bread mold (Neurospora crassa) promise a more detailed understanding of the effects of radiation damage to living tissue. Shielding studies, to date, still indicate the need for very heavy shielding to protect a manned space vehicle against heavy solar and galactic radiation. The development of a null-gravity simulator, which allows test subjects to be suspended in a spinning tank of water, is expected to promote further understanding of the effects of weightlessness by depriving the subject of proprioceptive cues from the muscles, cues from the vestibule of the ear, and any visual indication of vertical or horizontal. The physiologic effects resulting from a 24-hour exposure to a constant acceleration force of 2 g in the human centrifuge are also summarized, as well as preliminary data from noise tests and experimental life support systems.

993

Clark, R. T. et al 1960 BASIC RESEARCH PROBLEMS IN SPACE MEDICINE: A REVIEW
Aerospace Medicine 31(7):553-577 July 1960

ABSTRACT: This article contains information on the following subjects: Studies of the Subgravity State During Parabolic Flight; Bio-Packs for Satellites; Disorientation in Pilots; Photosynthetic Gas Exchangers and Recyclers in Closed Ecological System Studies; Survival of Terrestrial Organisms under Extreme Environmental Conditions; and Physiological Aspects of Training and Selection for Manned Extraterrestrial Flights.

994

Clark, W.G., J.P. Henry, & D.R. Drury 1944 DETERMINATION OF THE MOST SATISFACTORY SINGLE CONSTANT PRESSURE WITH WHICH TO INFLATE THE STANDARD GRADIENT PRESSURE SUIT. (National Research Council, Committee on Aviation Medicine, Washington, D.C.) CAM No. 366. 1 Sept. 1944.

ABSTRACT: (a) A quantitative measure in terms of "g" units of the protection offered by the Navy Gradient Pressure Suit (inflated to uniform constant pressures of 1 to 10 psi) against visual symptoms was made by 400 centrifuge runs on 14 subjects. (b) These protections were contrasted with subjective estimations of comfort at rest, at 2.5 "g", and at maximum acceleration. (c) The highest single pressure throughout the suit which was comfortable to the average subject during acceleration at 2.5 "g" was 5 psi. (d) The average protection afforded by 5 psi was 1.3 "g". (e) Protections of 1.85 "g" are obtainable by using pressures of 7 to 10 psi.

995

Clark, W.G., J.P. Henry, P.O. Greeley and D.R. Drury 1945 STUDIES ON FLYING IN THE PRONE POSITION. (National Research Council, Committee on Aviation Medicine) Contract No. OEMcror-288, CAM Report No. 466, 20 August 1945.

ABSTRACT: Seven subjects in a prone position installation on the centrifuge were exposed to high dorso-ventral acceleration. Five of them experienced 12 g for from 10 to 30 seconds. The unsupported head cannot be lifted above 9 g. The body, legs, and arms cannot be lifted at 8 g. At 12 g there is little or no impairment of, 1) vision, 2) muscular ability to pull against controls with the arms, 3) ability to flex and extend the ankles against rudder pedals, 4) movements of the forearms, hands, and fingers, such as in removing and replacing an object hanging on a hook, adjusting an oxygen mask, and pushing or pulling controls and signal buttons. A padded chin rest is uncomfortable above 6 g. When it alone is employed, speech is impossible above 8 g except through clenched teeth. Breathing can be maintained at 12 g. A counter-weighted headgear is described which permits free head movements and speech at 12 g, and which relieves pressure on the chin. Visual symptoms including blackout, occur at 10-12 g if the head is lifted 4-6 inches above the chin rest.

A body rest described which consists of a laced canvas hammock. With the counter-weighted headgear described, and this bed installed in a wooden prone position mockup, 10 subjects tested up to 2 hours experienced no discomfort which theoretically could not be relieved by proper modifications of the devices. It is concluded that the prone position is quite feasible for flights of at least two hours duration.

996

Clark, W.G. & H. Jorgenson 1945 EFFECT OF INGESTION OF FOOD AND FLUID ON TOLERANCE OF HUMAN SUBJECTS TO POSITIVE ACCELERATION.
(National Research Council, Committee on Aviation Medicine, Washington, D.C.) CAM Rept. No 502
See also Fed. Proc. 5:17. 1946.

ABSTRACT: The effects on g tolerance of the ingestion of 1.5-2.0 liters of water or milk, or a heavy meal were studied in eight centrifuge-trained subjects during the course of 200 centrifuge runs. The centrifuge attained maximum acceleration at the rate of 3 g's per second and maintained it for 15 seconds. Tolerance to g was determined from recorded responses to visual and auditory signals and to changes in ear opacity (blood content of the ear). In addition, intrarectal pressure changes were recorded.

A small increase in g tolerance was induced by a full stomach which averaged 0.3-0.4 g (range from 0.0 to 1.1 g). In relaxed subjects with an empty stomach, the average increase per g in intrarectal pressure was 18.5 mm. Hg. The increase due to fluid ingestion is slightly greater, being 7-9 mm. Hg at 3 and 4 g, respectively. The intrarectal pressure increase induced by voluntary muscular and respiratory straining is of the order of 40 mm. for 1 g protection. When divided into 7-9 mm., this gives 0.2 protection at this level of g, which is good agreement.

From the work of others, blood pressure increases due to fluid or food ingestion are too slight to explain the effect. Fluid and food ingestion has been shown by others to increase cardiac output without evoking vasomotor mechanisms or causing displacement of blood from the somatic tissues to the visceral organs. Increase in intra-abdominal pressure caused by the ingestion seems the logical explanation of the effect, just as g tolerance can be enhanced 0.5-0.8 g by increasing intra-abdominal pressure by pressurized abdominal belts and bladders in anti-blackout suits.

997

Clark, W.G., K.D.R. Gardiner, A.K. McIntyre, & H. Jorgenson 1945 THE EFFECTS OF POSITIVE ACCELERATION ON FLUID LOSS FROM BLOOD AND TISSUE SPACES IN HUMAN SUBJECTS ON THE CENTRIFUGE.
(National Research Council, Committee on Aviation Medicine, Washington,D.C.)
CAM Rept. No. 468. Oct. 1945.
See also Fed. Proc. 5:17. 1946.

ABSTRACT: As estimated by hematocrits and plasma protein determinations, fluid loss from blood to tissue spaces occurred in six seated human subjects on the centrifuge. At near blackout levels of G (3.5 to 5.0 G) maintained for 3-5 minutes, a significant loss of fluid (3.6-4.5 cc./100 cc. blood; or 216-270 cc. total) was found. The loss in four subjects exposed to 4 G for 5 minutes was reduced by anti-G suits to an average of 75% (ranges 28-96%) of their loss when unprotected. In two cases subjected to 3.5 G for 5 minutes, the loss was less than that of the four subjects exposed to 4.0 G for 5 minutes. In one subject submitted to 5 G for 3 minutes, the loss was less than that he obtained at 4 G for 5 minutes, although after-effects were noticed in vision. A smaller loss (132 cc. total) occurred in one of the subjects who had 30 runs of 4.7 G for 10 seconds with a 2 minute interval between runs, than occurred in the same subject after a 5 minute uninterrupted run at 4.0 G (288 cc.).

At 4.0G, the fluid losses observed were much less than those reported elsewhere for centrifuged dogs, but recovery occurred more rapidly. The losses also were less than those reported elsewhere for postural changes of humans from the recumbent to the upright positions. It is unlikely that fluid losses due to G contribute to any fatiguing effects or detrimental residual effects possibly resulting from positive acceleration experienced by test pilots or fighter pilots in combat.

998

Clark, W.G. & H. Jorgenson 1945 STUDIES OF SELF-PROTECTIVE ANTI-BLACKOUT MANEUVERS. (National Research Council, Committee on Aviation Medicine, Washington, D.C.) CAM Rept. No. 488, Oct. 1945.

999

Clark, W.G., I.D.R. Gardiner, A.K. McIntyre & H. Jorgenson 1945 EFFECT OF HYPERGLYCEMIA AND INSULIN HYPOGLYCEMIA ON MAN'S TOLERANCE TO POSITIVE ACCELERATION.
(National Research Council, Committee on Aviation Medicine, Washington, D.C.) CAM Rept. No. 486. 29 Oct. 1945.
See also: Fed. Proc. 5(1):17, 1946.

ABSTRACT: Hyperglycemia induced by the ingestion of two grams of sugar per kilogram body weight, and insulin hypoglycemia at a level of 50-55 mg.% blood sugar concentration, had no significant effect on the g tolerance of three trained centrifuge subjects, studied during the course of 43 centrifuge runs. The centrifuge attained maximum acceleration at the rate of 3 g's per second and maintained it for 15 seconds. The sugar or insulin was administered after a 12 hour fast. The centrifuge assays of g tolerance were performed during the normal state after a 12 hour fast, followed by the hyperglycemic state. The average units of plain insulin injected subcutaneously per kilogram per hour averaged 0.17. Tolerance to G was determined during a series of centrifuge runs at levels of g which kept vision clear, up through those which caused blackout, by changes in recorded responses to visual and auditory signals and by changes in ear opacity (blood content of the ear).

1,000

Clark, W. G., I.D.R. Gardiner, A. K. McIntyre & H. Jorgenson 1946 THE EFFECT OF POSITIVE ACCELERATION ON FLUID LOSS FROM BLOOD TO TISSUE SPACES IN HUMAN SUBJECTS ON THE CENTRIFUGE.
Fed. Proc. 5:17-18

ABSTRACT: As estimated by hematocrits and plasma protein determinations, fluid loss from blood to tissue spaces occurred in six seated human subjects on the centrifuge. At near blackout levels of G (3.5 to 5.0 G) maintained for 3-5 minutes, a significant loss of fluid (3.6-4.5 cc./100 cc. blood; or 216-270

cc. total) was found. The loss in four subjects exposed to 4 G for 5 minutes was reduced by anti-G suits to an average of 75% (range 28-96%) of their loss when unprotected. In two cases subjected to 3.5 G for 5 minutes, the loss was less than that he obtained at 4 G for 5 minutes, although after-effects were noticed in vision. A smaller loss (132 cc. total) occurred in one of the subjects who had 30 runs of 4.7 G for 10 seconds with a 2 minute interval between runs, than occurred in the same subject after a 5 minute uniterrupted run at 4.0 G (288 cc.).

At 4.0 G, the fluid losses observed were much less than those reported elsewhere for centrifuged dogs, but recovery occurred more rapidly. The losses also were less than those reported elsewhere for postural changes of humans from the recumbent to the upright positions. It is unlikely that fluid losses due to G contribute to any fatiguing effects or detrimental residual effects possibly resulting from positive acceleration experienced by test pilots or fighter pilots in combat.

1,001

Clark, W.G., I.D.R. Gardiner, A.K. McIntyre, and H. Jorgenson 1946 EFFECT OF HYPERGLYCEMIA AND INSULIN HYPOGLYCEMIA ON MAN'S TOLERANCE TO POSITIVE ACCELERATION. Fed. Proc. 5(1):17
See also (National Research Council, Committee on Aviation Medicine, Washington, D.C.) CAM Rept No. 486, 1945.

ABSTRACT: Hyperglycemia induced by the ingestion of two grams of sugar per kilogram body weight, and insulin hypoglycemia at a level of 50-55 mg.% blood sugar concentration, had no significant effect on the g tolerance of three trained centrifuge subjects, studied during the course of 43 centrifuge runs. The centrifuge attained maximum acceleration at the rate of 3 g's per second and maintained it for 15 seconds. The sugar or insulin was administered after a 12 hour fast. The centrifuge assays of g tolerance were performed during the hypoglycemic state and were repeated after return to normal; and during the normal state after a 12 hour fast, followed by the hyperglycemic state. The average units of plain insulin injected subcutaneously per kilogram per hour averaged 0.17. Tolerance to G was determined during a series of centrifuge runs at levels of g which kept vision clear, up through those which caused blackout, by changes in recorded responses to visual and auditory signals and by changes in ear opacity (blood content of the ear).

1,002

Clark, W.G. and H. Jorgenson 1946 EFFECT OF INGESTION OF FOOD AND FLUID ON TOLERANCE OF HUMAN SUBJECTS TO POSITIVE ACCELERATION.
Fed. Proc. 5:17
See also (National Research Council, Committee on Aviation Medicine, Washington, D.C.) CAM Rept. 502, 1945.

ABSTRACT: The effects on g tolerance of the ingestion of 1.5-2.0 liters of water or milk, or a heavy meal were studied in eight centrifuge-trained subjects during the course of 200 centrifuge runs. The centrifuge attained maximum

acceleration at the rate of 3 g's per second and maintained it for 15 seconds. Tolerance to g was determined from recorded responses to visual and auditory signals and to changes in ear opacity (blood content of the ear). In addition, intrarectal pressure changes were recorded.

A small increase in g tolerance was induced by a full stomach which averaged 0.3 - 0.4 g (range from 0.0 to 1.1 g). In relaxed subjects with an empty stomach, the average increase per g in intrarectal pressure was 18.5 mm. Hg. The increase due to fluid ingestion is slightly greater, being 7-9 mm. Hg at 3 and 4 g, respectively. The intrarectal pressure increase induced by voluntary muscular and respiratory straining is of the order of 40 mm. for 1 g protection. When divided into 7-9 mm., this gives 0.2 g protection at this level of g, which is good agreement.

From the work of others, blood pressure increases due to fluid or food ingestion are too slight to explain the effect. Fluid and food ingestion has been shown by others to increase cardiac output without evoking vasomotor mechanisms or causing displacement of blood from the somatic tissues to the visceral organs. Increase in intra-abdominal pressure caused by the ingestion seems the logical explanation of the effect, just as g tolerance can be enhanced 0.5-0.8 g by increasing intra-abdominal pressure by pressurized abdominal.

1,003

Clark, W.G., & R.L. Christy 1946 USE OF THE HUMAN CENTRIFUGE IN THE INDOCTRINATION OF A NAVY FIGHTER SQUADRON IN THE USE OF ANTIBLACKOUT EQUIPMENT. J. Aviation Med. 17:394-398

ABSTRACT: Tests were conducted to determine if the use of human centrifuges would be practicable and useful for selecting and testing pilots with respect to their inherent "G tolerance," and for indoctrinating them in the use of anti-blackout equipment and self-protective maneuvers. The studies failed to show any significant difference in G protection on the centrifuge between the z-1 and z-2 suits. An increase in suit pressurization up to the limits of comfortably tolerable pressures, gave more protection both on the centrifuge and in the airplanes. The majority of the pilots liked the centrifuge indoctrination and tests. None of the pilots tested could point out any of their member who blacked out more or less easily in dog-fights and section tactics in spite of the fact that individual inherent blackout thresholds on the centrifuge varied from 3.0 G to 5.5 G. Apparently this was a result of compensation by self-protective maneuvers. Pilots wearing the suit report that they are not straining as much as without the suit, and that they are able to fly two to three times as much in combat tactics and gunnery practice as formerly because of the anti-fatigue benefits of the suit. For this reason, centrifuge indoctrination and training would seem to be important in order to assure that each pilot has a normal G tolerance and that he receives an adequate protection from antiblackout suits.

1,004

Clarke, A.C. 1950 INTERPLANETARY FLIGHT. AN INTRODUCTION TO ASTRONAUTICS (New York: Harper)

ABSTRACT: Ch. 6, Interplanetary flight; ch. 7, The atomic rocket; and ch. 8, Space ships and space stations.

1,005

Clarke, A.E. & R.L. Maltby 1954 THE VERTICAL SPINNING TUNNEL AT THE NATIONAL AERONAUTICAL ESTABLISHMENT, BEDFORD (Royal Aircraft Establishment Gt. Brit.) September 1954, ASTIA AD-48 610

ABSTRACT: The Spinning Tunnel at the National Aeronautical Establishment is described. The choice of size and type of tunnel as well as some of the more interesting features of the design are discussed. The description has been made before the tunnel was completed and some of what has been written may need revision in the light of experience.

1,006

Clarke, N.P. & S. Bondurant 1958 HUMAN TOLERANCE TO PROLONGED FORWARD AND BACKWARD ACCELERATION.
(Aero Medical Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TR 58-267. ASTIA AD 155 749.
CF: J. Aviation Med. 30(1):1-21, 1959.

ABSTRACT: The imminence of manned space flight necessitated studies of human tolerance to the anticipated accelerations of exit and reentry. This report extends previous observations by defining optimal body positions for both forward and backward acceleration. Using a rate of onset of 0.5 g per second, plateaus between 2 and 12 g were maintained with subjects optimally positioned, until subjective loss of a critical faculty occurred. Forward acceleration of the seated subject with trunk inclined 25 degrees in the direction of acceleration was limited above 10 g by blackout. Below 10 g, tolerance was defined by inspiratory dyspnea and substernal pain. Using an especially designed restraint suit, backward acceleration of the seated subject with trunk and head erect was limited above 10 g by discomfort of restraint and increases in vascular pressure in the legs. Below 10 g, these same factors along with dyspnea defined tolerance. Three-stage rocket-like profiles of forward acceleration, using constant rates of onset calculated to give orbital velocity at the termination of the third stage, were found tolerable by selected subjects at peak accelerations of 8, 10, and 12 g. Spatial vector cardiography, respiratory rate, changes in functional residual capacity and pulmonary compliance were observed during both forward and backward acceleration. (Author)

1,007

Clarke, N.P., S. Bondurant, S.D. Leverett & P. Yudkofsky 1958 PHYSIOLOGIC RESPONSE TO "BACK TO CHEST" G FORCES ON SEATED HUMAN SUBJECTS. (Paper, 1958 Meeting of Aero Medical Association, Statler Hotel, Washington, March 24-26, 1958)

ABSTRACT: Transverse G patterns have previously been studied on human subjects in the standing, prone, supine and semi-supine positions. The present study involves an evaluation of the effects of prolonged back to chest G (longer than 5 seconds) acting on seated subjects on the human centrifuge. This attitude differs in that, with the arms and legs extended, there will be a pooling of blood in the extremities which simulates the effects of positive G loadings. Subjective symptoms, performance ability and bioelectric measurements were used as criteria for evaluation of changes occurring during a series of experiments in which both the magnitude and duration of acceleration were varied. Human tolerance to G of this type is limited by the development of petechial hemorrhages in the extremities, subject fatigue, tachycardia and dyspnea. Tentative tolerance limits for the unprotected subject appear to be on the order of 2 G for 30 minutes, 3 G for 7 minutes and 5 G for 7 to 10 seconds. Protective devices may significantly increase human tolerance to this type transverse G force. (J. Aviation Med. 29(3):233)

1,008

Clarke, N.P. 1959 STUDIES OF PRIMATE TOLERANCE TO SOME COMPLEX ACCELERATIONS. (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: Theoretical calculations and preliminary experiments have shown that stabilized ejection seat and capsule escape systems as well as other aerodynamically unstable bodies reentering the denser portion of the atmosphere will oscillate during the early stages of deceleration. To stimulate a portion of the acceleration pattern, experiments were done in which small primates were subjected to oscillations of up to 40° amplitude about their center of gravity at frequencies up to and including five cycles per second. The animals were exposed to simulated linear decelerations of up to 20g during the oscillation. Calculations show the animals sensed alternating headward footward accelerations of 6.8 g (at head level) and alternating backward accelerations of 34 g and 3.5 g during maximum amplitude and frequency of the unanesthetized subjects and later post mortem examination revealed no changes of magnitude to indicate permanent damage.
(J. Aviation Med. 30(3):179-178, March 1959.)

1,009

Clark, N.P. 1959 HUMAN ACCELERATION EFFECTS FOR ROCKET FLIGHT. (Paper presented at ARS semi-annual meeting, 8-11 Jun.'59, San Diego) ARS paper no. 804-59, June 1959

ABSTRACT: This paper summarizes a portion of recent research pertinent to these acceleration forces, particularly of the prolonged accelerations which can be simulated with large centrifuges. The paper reviews subjective tolerance limits to prolonged acceleration and human response to prolonged acceleration using net support.

1,010

Clarke, N. P., & R. N. Headley 1959 STUDIES OF PRIMATE TOLERANCE TO SOME COMPLEX ACCELERATIONS. Aerospace Medicine 30(11):825-831
See also WADC TR 59-630; ASTIA AD 233 464
See also (Paper, Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Material Center, Philadelphia, Pa., June 14-15, 1961)
See also (Paper, 30th Annual Meeting of Aero Medical Association, Los Angeles, Calif., April 29, 1959)

ABSTRACT: Satellite vehicles during unstable re-entry into the denser portions of the earth's atmosphere may be subjected to complex accelerations. Five primates were exposed to simulated deceleration in the forward facing position of up to 20 G combined with sine wave pitch oscillations through half amplitudes of 20 degrees at 3 and 5 cps. Accelerometer readings from the skull of one animal revealed maximum resultant backward acceleration of 40 G, footward acceleration of 10 G, and headward acceleration of 15 G. All animals were able to make coordinated movements almost immediately after centrifugation. Post-mortem examinations were made and are reported. (AUTHOR)

1,011

Clarke, N. P., A. S. Hyde and N. S. Cerniack, F. Lindberg 1959
A PRELIMINARY REPORT OF HUMAN RESPONSE TO REARWARD FACING RE-ENTRY ACCELERATIONS. (Wright Air Development Center, Aero Medical Laboratory, Wright-Patterson Air Force Base, Ohio)
WADC Tech Note 59-109 Proj. 7222 ASTIA AD 231 651

ABSTRACT: Tidal volume, electrocardiographic changes, tracking performance ability, and subjective response were evaluated during an acceleration profile designed to encompass several possible rearward facing re-entry patterns. A maximum acceleration of 16.5 g and a total time of 170 seconds were employed. Subjects faced the center of rotation with the trunk and head inclined 12° in the direction of the centrifuge axis. The subjects were supported with a contoured net system. Two of seven subjects repeated the experiments wearing the MC-2 full pressure suit, both pressurized and unpressurized.

1,012

Clark, N. P. 1963 BIODYNAMIC RESPONSE TO SUPERSONIC EJECTION. (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 28 - May 2, 1963)

ABSTRACT: Six supersonic test ejections of the B-58 escape capsule were made from a specially modified Hustler. Five black bears and one chimpanzee were used as subjects. Ejection altitude was between 35,000 feet and 47,000 feet and speed varied between Mach 1.3 and 2.0. In the second test ejection, made from 45,000 feet at Mach 1.6, excessive positive pitching of the capsule induced unstable flight producing cyclic high amplitude lateral acceleration associated with oscillation in yaw. The bear subject sustained bilateral complete fractures of the acetabular branch of the ischium. In the following ejections, a change in orientation of the rocket thrust vector to prevent excessive pitching was tested and shown to be successful. In addition to the supersonic ejections, three subsonic ejections using bear subjects, one from 40,000 feet at Mach 0.8, one from 5,100 feet at Mach 0.9 and one rolling runway ejection at 100 knots were done to validate satisfactory performance of the capsule over the flight envelope of the aircraft after the change in rocket thrust vector. The results of these ejections will be discussed using engineering test motion pictures to illustrate capsule performance and to relate capsule motions and acceleration to the response of the subjects.

1,013

Clemedson, C.J., H. Hartelius & G. Holmberg THE EFFECT OF HIGH EXPLOSIVE BLAST ON THE CEREBRAL VASCULAR PERMEABILITY. Acta Pathologica et Microbiologica Scandinavica 40:89-95

1,014

Clemedson, C-J. 1949 EXPERIMENTAL STUDY ON AIR BLAST INJURIES. Acta Physiol. Scand. Vol. 18; Suppl. 61, pp. 1-200

1,015

Clemedson, C.J. & S.A. Granstom 1950 STUDIES ON GENESIS OF "RIB MARKINGS" IN LUNG BLAST INJURY Acta physiol. scand. 21:131-144.

1,016

Clemedson, C.J. & H. Petterson 1953 GENESIS OF RESPIRATORY AND CIRCULATORY CHANGES IN BLAST INJURY Amer. J. Physiol. 174:316-320

1,017

Clemedson, C-J., H. Hultman & B. Gronberg 1953 RESPIRATION AND PULMONARY GAS EXCHANGE IN BLAST INJURY. J. Appl. Physiol. 6:213-220

ABSTRACT: Pulmonary ventilation and gas exchange capacity in blast injury were studied in urethane-anesthetized rabbits which had been exposed to high explosive shock waves in a detonation chamber.

In slight as well as in severe lung blast injury the respiratory minute volume usually is considerably increased, and in lethally injured animals the hyperventilation is generally maintained until just before death. The oxygen consumption will at first decrease a little, but then it increases gradually except in lethally injured animals, where it is greatly lowered from the very beginning after the exposure. The arterial oxygen saturation rapidly declines after the explosion in both slightly and severely injured rabbits but it can, in the early phase, usually be normalized by having the animal breathe pure oxygen. In slightly injured animals there is an increased carbon dioxide elimination and a shift to alkalinity in the arterial blood. Severe lung blast injury on the other hand causes a decrease in carbon dioxide elimination and lowering of the blood pH.

1,018

Clemedson, C-J., & H. Hultman 1954 AIR EMBOLISM AND THE CAUSE OF DEATH IN BLAST INJURY.
The Military Surgeon 114(6):424-437.

ABSTRACT: The occurrence of air embolism and the cause of death in blast injury has been studied in anesthetized rabbits exposed to high explosive blast in the open field and in a specially constructed detonation chamger.

Intravascular air was found in a fairly great number of animals that died within 15 to 20 minutes after the exposure. Air embolism was rare in animals dying later on.

By recompressing the animals to 4 atm. overpressure, immediately after the detonation, it was possible to reduce considerable the occurrence of intravascular air bubbles.

The electrocardiographic tracings in animals dying in close connection with the explosion show signs of severe damage to the myocardium. This can be due to an air embolism or a mechanical lesion to the heart muscle. The changes are often transitory. Animals dying later on generally have severe changes in the ECG which can well explain the lethal outcome.

1,019

Clemedson, C-J. 1954 CORRELATION BETWEEN RESPIRATORY PHASE AND EXTENT OF LUNG DAMAGE IN AIR BLAST INJURY.
J. Appl. Physiol. 7(1):38-42.

ABSTRACT: In rabbits exposed to high explosive shock waves in a detonation

chamber, no correlation could be found between the respiratory phase, i.e. the quantity of air in the lungs and the extent of lung injury. Exposure to a shock wave of long duration causes an expulsion of air from the lungs, that is greatest if the lungs are filled, when the animal is struck by the shock wave but is seen even if the lungs are in maximal expiration. A shock wave of very short duration causes only a slight or no expulsion of air. These findings are discussed as are the differences in the development of the lung injuries in air blast injury and in explosive decompression.

1,020

Clemedson, C-J., H. Hultman, L. Lundberg & B. Lundell 1954 REFLECTION OF A HIGH EXPLOSIVE SHOCK WAVE AGAINST A LIVING BODY. J. Aviation Med. 25:289-294

ABSTRACT: The reflection of a high explosive shock wave against the body of a living rabbit has been studied with the aid of a schlieren photography technique. Irregularities of the body surface will cause disturbances in the reflections are, however, caused by interior bone structures such as the ribs.

Photographs taken on the side of the animal turned away from the charge failed to reveal any shock wave transmission through the body.

1,021

Clemedson, C-J. & C.O. Criborn 1955 A DETONATION CHAMBER FOR PHYSIOLOGICAL BLAST RESEARCH. J. Aviation Med. 26:373-381

ABSTRACT: A detonation chamber for physiological blast injury research is described. This chamber produces great pressure and impulse forces with only very small charges of high explosive. The pressure and impulse values and the general shape and duration of the shock wave, produced under various conditions, are given, and the results discussed from a physiological point of view.

1,022

Clemedson, C-J., L. Deffet, L. Fornaeus R. Ruspoli & P. van de Wouwer 1955 HIGH SPEED RADIOGRAPHIC VISUALIZATION OF A HIGH EXPLOSIVE SHOCK WAVE IN MUSCULAR TISSUE. J. Appl.Physiol. 7(6):6[illegible]-608

ABSTRACT: With the aid of the high speed x-ray technique it has been possible to visualize a high explosive shock wave in muscular tissue. Pieces of ox or horse meat were exposed to the shock wave from a detonating fuse or from cylindrical charges of Tetryl. A zone of increased density is seen in the meat corresponding to the shock wave. The shock wave must be very strong, if it shall be able to cause an increase in density great enough to be detectable by this method.

1,023

Clemedson, C-J. & C.O. Criborn 1955 MECHANICAL RESPONSE OF DIFFERENT PARTS OF A LIVING BODY TO A HIGH EXPLOSIVE SHOCK WAVE IMPACT. Amer. J. Physiol. 181(3):471-476

ABSTRACT: The mechanical response of different parts of a living rabbit body to the impact of a high explosive shock wave has been studied.

Two different types of shock waves were employed, one short lasting generated by a TNT charge in an open field, and one multi-peak and of very long duration generated by a PETN charge in a detonation chamber. The response was recorded by means of a pencil-line strain gauge recorder. The parts of the body studied were over the thorax, on one rib, between two ribs over the abdomen and on a hind leg (femur region).

Different parts react very differently but two general types of response are found, one usually long lasting identation baused by the impulse of the shock wave and one with short-lasting deflections or oscillations caused by the pressure variations of the shock wave. The tissues in the costal interpaces and the abdomen display a typical impulse response wheras the rib and the hind leg show a more or less pure maximum pressure type curve. The curve obtained the whole thoracal wall is an intermediary between the maximum pressure and the impulse type.

The relationship between the response type of a tissue and its susceptibility to blast damage is discussed.

1,024

Clemedson, C-J. & A. Nelson 1955 EFFECTS OF COMBINED WHOLE BODY ROENTGEN IRRADIATION AND HIGH EXPLOSIVE BLAST INJURY IN MICE. Acta Radiologica 43:161-172

1,025

Clemedson, C-J & H. Petterson 1956 PROPAGATION OF A HIGH EXPLOSIVE AIR SHOCK WAVE THROUGH DIFFERENT PARTS OF AN ANIMAL BODY. Amer. J. Physiol. 184(1):119-126, Jan. - March 1956.

ABSTRACT: Anesthetized rabbits were exposed to high explosive shock waves in a detonation chamber and in a blasting range. A barium titanate crystal pressure transducer inserted into the skull, right thorax cavity, upper part of abdomen and femoral musculature was used for the recording of the pressure pattern of the tissue transmitted blast wave. Relatively homogeneous tissues such as those of the brain, abdomen, and thigh musculature were found to modify the incident shock wave only little and are not significantly affected by it. The thoracal structures, especially the lungs on the other hand, due to their elastic and damping properties, cause a marked distortion of the incident wave. Only the rain pressure peaks but not the more rapid, smaller pressure oscillations of a complex multipeak shock wave are transmitted through the lung. Generally, the peak pressure is but little changed by the passage through a tissue or

organ. An exception constitutes the thorax when exposed to a short-lasting pressure peak such as that obtained in the blasting range experiments. In this case the peak pressure was considerably reduced. (Author)

1,026

Clemedson, C-J. 1956 SHOCK WAVE TRANSMISSION TO THE CENTRAL NERVOUS SYSTEM
Acta Physiologica Scandinavica 37:204-214

1,027

Clemedson, C-J., A. Jonsson & H. Petterson 1956 PROPAGATION OF AN AIR-TRANSMITTED SHOCK WAVE IN MUSCULAR TISSUE.
Nature 177:380-381

ABSTRACT: As part of an investigation of the biophysics and physiology of blast injury, experiments were conducted in order to determine the velocity and damping of a high-explosive shock wave during propagation through a layer of muscular tissue.

Rectangular pieces of ox thigh muscles were exposed to a high-explosive shock wave in a detonation chamber. The time it takes for the wave to cover a known distance was measured. With the low-peak over-pressure used in these experiments, the mean velocity of the pressure wave in a covered muscular layer of 170-220 mm. was found to be 650 m./sec., the range being 590-710 m./sec. The relative great variations are due partly to the inhomogeneous microstructure of the muscular tissue but also to difficulties in determining exactly the arrival of the shock wave at the distal transducer owing to the gradual rise of the pressure curve. The velocity of the incident air shock wave immediately before its impact on the front surface of the meat was 510 $\pm$ 10 m./sec.

1,028

Clemedson, C-J. & A. Nelson 1957 THE EFFECTS OF A HIGH EXPLOSIVE BLAST IN MICE WITH RADIATION INJURY.
Acta Radiologica 47:79-85

ABSTRACT: Changes in respiration and heart rate were studied in rabbits which were exposed to high explosive shock waves in a detonation chamber after bilateral cervical vagotomy, or after pulmonary vagal denervation with the innervation of the sinoarortic region and heart left intact. The rapid shallow breathing occurring after the detonation in nondenervated animals was almost completely absent after cervical vagotomy or pulmonary vagal denervation. Sometimes an often very long period of apnea preceded the tachypnea after the detonation in the control animals. In the denervated animals, especially in the pulmonary vagally denervated ones, apnea was rare or of only short duration. The bradycardia that can be prevented by bilateral cervical vagotomy, was not elicited by reflexes from the lungs, as the heart rate was lowered to the same

extent in the lung vagus denervated as in the control animals. A cardiac stand-still or severe distortions of the ECG waves during the first 1-3 seconds after the detonation were common in the nondenervated and in the lung vagus denervated animals but were rare in animals in which bilateral cervical vagotomy had been made.

1,029

Clemedson, C. J. 1958 SOME BIOPHYSICAL AND MEDICAL PROBLEMS INVOLVED IN MANNED SPACE FLIGHT: A REVIEW
(Astronautik (Stockholm), 1(1):9-36 1958)

ABSTRACT: Medical and biological problems which have to be solved before space flight will be possible are reviewed. Among those reviewed are the following: the effects of loss of life-sustaining properties of the terrestrial atmosphere; the effects of gravitational stress; the problems of food and water supply and of waste disposal during long trips; and effects of the physical stresses of confinement in a narrow cabin under adverse physical conditions. If the crew is properly trained, they will be able to tolerate the necessary acceler-ation during flight. Although zero gravity causes no abnormal physiological functions of the body, orientation and co-ordination may make the performance of tasks difficult. To solve the problem of storing oxygen and air-purification chemical as well as food and water, photosynthetic air purification and food synthesis from algae material may become necessary. Another risk faced by men in space is exposure to the heavy components of primary cosmic radiation and hits by meteorites.

1,030

Clemedson, C-J. & H. Hultman 1958 CARDIAC OUTPUT IN EARLY PHASE OF BLAST INJURY IN RABBITS. Amer. J. Physiol. 194(3):601-606

ABSTRACT: Changes in cardiac output measured by the direct Fick method were studied in rabbits which had been exposed to high explosive shock waves in a detonation chamber. The maximum reflection overpressure in the shock waves ranged between 3.5 and 11 atm. for the different weights of charge used. In all exposed animals there was a decrease in cardiac output already 5 minutes after the detonation. The degree of reduction of the output of the heart is directly proportional to the weight of charge used, i.e. of the force of the detonation. The cardiac output and the lung hemorrhages seem to be two parallel effects of the pressure of the shock wave with no mutual interference between the two. The cause of the reduction seem to be complex, but the direct action of the shock wave on the heart is supposed to play a significant role. The bradycardia existing during the 1st minute after the detonation was found to be of no importance for the reduction of the output of the heart.

1,031

Clemedson, C-J. & E. Heilbronn 1958 PAPER ELECTROPHORETIC STUDIES ON SERUM PROTEIN CHANGES IN BLAST INJURY IN RABBITS. Acta Physiol. Scand. 43:216-227.

1,032

Clemedson, C-J. 1958, 1959-60. SOME BLAST STUDIES WITH APPLICATION TO EXPLOSIVE DECOMPRESSION. J. Brit. Interplanetary Soc. 17:279-285.

1,033

Clemedson, C-J. & A. Jonsson 1961 TRANSMISSION AND REFLECTION OF HIGH EXPLOSIVE SHOCK WAVES IN BONE. Acta Physiol. Scand. 51:47-61

1,034

Clemedson, C-J and J Arne 1961 TRANSMISSION OF ELASTIC DISTURBANCES CAUSED BY AIR SHOCK WAVES IN A LIVING BODY J. Appl. Physiol., 16:426-430, 1961

1,035

Clement, H. 1918 BIOLOGICAL EFFECTS OF CENTRIFUGAL ACTION. A STUDY OF THE CAUSES OF DISTURBANCE OF EQUILIBRIUM. Sci. Amer. Suppl. 85:258-259.

1,036

Clentano, J. T. and H. S. Alexander 1961 THE USE OF TOOLS IN SPACE - AN EMPIRICAL APPROACH. (Institute of the Aerospace Sciences, New York, N. Y.) Paper 61 145 1839, June 1961.

ABSTRACT: In order to predict certain aspects of man's performance in space with respect to the use of hand tools, personal propulsions devices, and other equipment for his use, the moment of inertia of man was determined experimentally. The method used was to compare the angular deceleration of objects with known moments of inertia to the deceleration of human Ss under the same conditions. Several Ss were measured about two axis: center of head through pelvis and lower abdomen through small of back. Some measures of torques applied by Ss on an air-bearing platform and the resulting reaction velocities were made and correlated with the above determinations. (Tufts)

1,037

Coakley, J. D., & J. E. Barmack 1948 A METHOD OF INCREASING THE MANEUVERABILITY OF HIGH SPEED AIRCRAFT WITHIN THE LIMITS OF HUMAN TOLERANCE TO G FORCES. (The Psychological Corporation, New York, N.Y.) Project No. 20-M-1b, 28 Feb. 1948; ATI-41 255

SUMMARY: 1) A maneuver involving a coordinated turn of 180 degrees in a horizontal plane is selected as a standard for evaluating other maneuvers. This turn is effected at constant speed and at specified, constant, radial g. The path so defined is circular in form and the end point is directly abeam at the moment the maneuver begins. This path, designated as Flight Path I, is thus semicircular and the radius of the path is determined by the elected velocity and radial g. In Flight Path II, the same velocity, radial g, and endpoint or objective are employed. The difference introduced in Flight Path II is that the craft is permitted to slow down at a specified rate before beginning the turn. After deceleration, the turn is made at a lower specified speed. When the turn is completed, the plane moves toward the objective by first accelerating to its original speed and then by flying the remaining distance at constant speed. Flight Path III differs from II in that turning commences at the beginning of the maneuver and continues throughout the period of deceleration. Thereafter, turning is completed at a reduced constant speed and the flight then continues just as described for Flight Path II. The point of termination is identical for all these pathways. 2) The required specifications for Flight Path I are velocity and radial or centrifugal g. The additional specifications for II and III are minimal speed and decelerative and accelerative g. The parameters of g (radial, decelerative, and accelerative) are selected so as to cover the range of human tolerance from low to medium high levels. The velocity parameters are assigned arbitrary values. The maximum velocities are 900, 1800, and 3600 mph and the minimal velocities are submultiples of these speeds. The several parameters are arranged in a variety of combinations to provide over 100 different paths which have been analyzed, and the results are presented for consideration. 3) Within the range of conditions studied, it was found that there was no increase in the distance to be travelled resulting from decelerations prior to or during a turn. On the contrary, flight distance to the objective was always shortened by employing deceleration. In general, there is a saving of about 25% in the flight distance. 4) Generally, there was no loss in time required to fly to the objective but rather a small saving in flight time. Savings in time of the order of 10% are found except when decelerative g does not exceed radial g. 5) Perhaps the most dramatic advantage of the pathways employing deceleration is the shortening of time of exposure to g forces and particularly exposure to radial g. For pilots seated upright in a plane banked for turning, radial g implies a force along the long axis of the body for which tolerance is not so high as for a force across the body (Tg). Thus the reduction in exposure time to radial g is especially important. The substitution of more tolerable decelerative and accelerative forces, which will appear as Tg forces to the seated pilot, makes possible a shortening of the total time of exposure to g forces. This advantage is measured by the percentage of flight time during which no g forces are present. This saving is of the order of 70% of the total time. 6) The pathways involving deceleration bring the plane to the objective from a direction different from the approach of the standard path. Whether this is an advantage or disadvantage will depend, in part, upon the subsequent course to be taken by the plane. 7) Quite generally, Flight Path III provides somewhat greater savings than Flight Path II. These advantages, however, are counterbalanced by exposure of the occupants to the vector sum of two g forces during the first part of the flight. This vector operates at a different angle and is somewhat larger than either of its components. 8) The proportion of savings

in flight time and distance and in duration of exposures is not dependent upon velocity or acceleration per se. Rather the savings depend upon (1) the ratio of maximal to minimal velocity, (2) the ratio of decelerative to radial g, and (3) the ratio of accelerative to radial g. Accordingly, proportionate savings are to be expected at any speed and this proportion represents absolute distances and times which are of greater and greater practical importance as speed is increased. Furthermore, even though the proportion of the savings increases as speed is reduced to lower and lower values, the rate of increase becomes less. Thus some of the most valuable savings may result from very modest reductions in speed. 9) The "standard pathway" is examined to make sure that its use as a standard does not exaggerate the advantages of the decelerative pathways. This examination reveals that the comparisons are fair and representative. Thus the quantitative estimates of the advantages of deceleration may be considered as representative and even conservative for a wide variety of situations. 10) It is suggested that consideration be given to the development of flight maneuvers in which deceleration is utilized to permit the pilot to turn on a smaller radius at reduced speed and remain within desired limiting values of g. Many problems must be solved before such a procedure may be considered practical. Among the problems raised are: (a) The extent to which the rate of deceleration can be controlled through either cutting power or other devices. (b) The development of means whereby a horizontal spiral flight path can be effected easily or automatically in conjunction with appropriate rates of deceleration and turn. (c) The need for more information on human tolerance to the vector sums of forces and on tolerance to the varying directions of the vectors which would develop from such spiral flight paths. (AUTHOR)

1,038

Cobb, D.B. 1959 THE TECHNIQUE OF MEASURING THE FORCE EXERTED BY A PARACHUTE DURING OPENING.
(Royal Aircraft Establishment, Farnborough) Tech. note no. Mech. Eng. 301. ASTIA AD 232 601.

1,039

Coburn, K.R. 1959 FINAL REPORT ON EVALUATION OF FRANKENSTEIN ANTI-BLACKOUT SUIT
(U.S. Naval Air Development Center, Johnsville, Pa) NADC-MA-LR98, Dec. 7, 1959

ABSTRACT: The Frankenstein suit was statically evaluated in accordance with MIL-C-5085A (Aer) and the specifications were met satisfactorily. G protection was evaluated by subjects on the centrifuge and was found to be comparable to the Z-2 and Z-3 anti-G suits. The suit appeared to be more comfortable under G stress than the Z-2 and Z-3 suits, which was due to the small belly bladder which made respiration easier during the inflation period of the suit.

1,040

Coburn, K.R. 1960 COVERALLS, ANTI-G STANDARDIZATION STUDY (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-L6022, July 7, 1960

ABSTRACT: Air CSU-3/P anti-G suits were distributed to operational U.S. Navy attack and fighter squadrons for service testing and questionnaires concerning pilot acceptance were evaluated at AMAL. A high proportion of pilots indicated a preference for the suit which reflected the subjective comfort offered by the suit while inflated under G. This is due to the bladder design. Many of the pilots felt that the suit was too hot, heavy, and bulky. The most serious and frequently mentioned objection was that the suits were poorly constructed and would give way after a few wearings.

1,041

Coburn, K.R. 1960 ANTI-BLACKOUT PROTECTION, DEVELOPMENT, TEST, EVALUATION AND SERVICE ENGINEERING (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-L6011, April 18, 1960

ABSTRACT: Four anti-G coverall garments, three made of cotton-fortisan and one from HT-1 material, were tested at AMAL. All garments satisfactorily met the static and dynamic test requirements of MIL-C-5085A (Aer). Preliminary tests indicated that the cotton-fortisan was considerably warmer than the HT-1 material.

1,042

Coburn, K.R., P.H. Craig & E.L. Beckman 1961 EFFECTS OF POSITIVE G ON CHIMPANZEES IMMERSED IN WATER. (Paper presented at 32nd annual meeting, Aerospace Medical Association, 24-27 April 1961, Chicago, Ill.)

ABSTRACT: This report deals with the physiological responses of fourteen experimental and three control chimpanzees exposed to increased G loading ranging from five to thirty-one positive G while immersed in water. Three general physical configurations of the G capsule were utilized in an attempt to determine the degree of protection offered. Arterial, venous, esophageal and endotracheal pressures were measured continuously, as were the internal capsule pressures. The physiological responses and the pathological changes observed are discussed in relation to the physical parameters used in this experiment. From the data it would appear that experimental procedure utilized produces overpressures in the pulmonary system of sufficient magnitude to cause loss of lung tissue integrity with the subsequent production of mediastinal emphysema and, further, that exposure to increased G under the experimental conditions utilized produces hydrostatic pressure gradients which favor the migration of air bubbles from the region of the mediastinum towards the head. (Aerospace Med. 32(3):226, March 1961)

1,043

Coburn, K.R., E.L. Beckman & T.D. Duane 1963 LIMITATION OF OCULAR MOTILITY UNDER ACCELERATION: AN OBJECTIVE ENDPOINT FOR USE WITH HUMAN CENTRIFUGE SUBJECTS. Aerospace Medicine 34(9):824-825

ABSTRACT: More than 50 subjects, male and female, ranging from 18 to 50 years of age, participated in more than 350 separate centrifuge runs in the 37 foot radius AMAL centrifuge. Since subjective endpoints of greyout and blackout have long been a problem, it was found that by using LOMA (limitation of ocular motility) these difficulties are eliminated and a much more accurate assessment of the human centrifuge subjects' true physiological state can be made. (CARI)

1,044

Cochran, L.B. 1953 STUDIES ON THE EASE WITH WHICH PILOTS CAN GRASP AND PULL THE EJECTION SEAT FACE CURTAIN HANDLES. J. Aviation Med. 24(1):23-28

SUMMARY AND CONCLUSIONS: 1. Thirty naval fighter pilots, of various anthropometrical measurements, from NAAS, Cabaniss Field, Texas, VR-31, and VF-71, Com Air-Lant, were tested on the Pensacola Human Centrifuge in their ability to actuate the Martin-Baker type ejection seat mechanism. For these tests the subjects, protected by anti-blackout suits, were subjected to levels of positive radial acceleration about 2.0 g above their relaxed blackout tolerance level.

2. The results suggest that, unless extremely fatigued, most suit-protected pilots should be able to perform the arm movements necessary to actuate the Martin-Baker type ejection seat at 2.0 g above their control blackout level IF THE G WERE A CONSTANT ONE. There were no means available by which their ability could be tested under conditions of fluctuating g-levels.

3. A marked degree of success would appear to depend on the pilot's pre-knowledge of the effects of such forces on him and his plane, and proper instructions as to precedure and techniques employed which facilitate his ability to actuate the ejection seat under high accelerative forces. This portion of success could be made available through lecture training and centrifuge indoctrination.

1,045

Cochran, L. B. 1954 A STUDY OF THE HALF-PRESSURE ANTI-BLACKOUT SUIT (Naval School of Aviation Medicine, Pensacola, Fla.) Research Rept. No. NM 001 059.15.03; ASTIA AD-44 403

ABSTRACT: A half-pressure antiblackout suit was designed to provide evenly distributed pressure over the total body area from the waist downward. Tests conducted on the human centrifuge indicated significantly greater protection of vision by the half-pressure antiblackout suit than is afforded by service antiblackout suits; the suit was also considered more comfortable than the service antiblackout suit in spite of frequent complaints by the subjects. The laboratory tests revealed certain unexplainable pulse rate response and irregularity of cardiac rhythm induced by pressurization which made it inadvisable to determine the absolute protection afforded by the suit. The suit gave promise of being easily incorporated into a combination exposure and anti-G suit.

1,046

Cochran, L.B., P.W. Gard, & M.E. Norsworthy 1954 VARIATIONS IN HUMAN G TOLERANCE TO POSITIVE ACCELERATION. (U.S. Naval School of Aviation Medicine, Pensacola, Fla.) Project No. NM 001 059.02.10, 31 Aug. 1954. ASTIA AD 50 297.

SUMMARY: It has been determined in the Naval Air Training Program that a relatively high percentage of instructors and students frequently experience episodes of blackout and unconsciousness. Due to these findings, the Acceleration Unit has been actively engaged in this study in an effort to determine human G tolerance and some of the variations. This study reports the findings obtained on 1000 individuals tested on the human centrifuge composed of the following groups: (1) master control, (2) naval Aviators, (3) referral groups, (4) naval aviation cadets, and (5) Miscellaneous.

The differences in mean G tolerance for all groups tested for loss of peripheral vision, blackout, and unconsciousness were not significant. Also, a great range in human G tolerances for these symptoms was determined, each having approximately the same variations.

It was found that neither the time required to attain "peak G" nor the G level had any significant effect on the time required to produce loss of peripheral vision, blackout, and unconsciousness in individuals experiencing these symptoms at various G stresses. A comparative study may be done to ascertain the effect of varying rates of onset and varying magnitudes of G stress loads on the time required to produce loss of vision and consciousness. (DACO)

1,047

Cochran, L.B., P.W. Gard, & M.E. Norsworthy 1955 G x TIME FLIGHT PATTERNS IN THE NAVAL AIR TRAINING COMMAND PHASES IV AND V: AEROBATIC AND GUNNERY MANEUVERS AS FLOWN IN ADVANCED TRAINING UNITS 300 AND 301. (U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.) Research Report No. NM 001 100 103.03. 21 Feb. 1955. ASTIA AD 66 701.

ABSTRACT: Flight students in the Naval Air Training Program have been exposed to sufficient positive radial accelerations during various flight maneuvers to frequently produce symptoms of greying, black-out, and unconsciousness. This study reports the findings of G x time flight patterns as flown by personnel in Advanced Training Units 300 and 301 in the AD-1 and F6F-5 aircraft. It was found that the magnitudes and durations of G stresses imposed were sufficient degree to frequently produce undesirable physiologic impairment. These findings confirm the importance of repeated indoctrination of all flight personnel on the protection provided by anti-blackout equipment in an endeavor to improve both efficiency of flying and flight safety.

1,048

Cochran, L. B., P. W. Gard, & M. E. Norsworthy 1956 Gx TIME FLIGHT PATTERNS IN THE NAVAL TRAINING COMMAND. VI: AEROBATIC AND GUNNERY MANEUVERS AS FLOWN IN ADVANCED TRAINING UNIT 201. (Naval School of Aviation Medicine, Pensacola Fla.) Research Proj. NM 001 100 103, Rept. No. 4; MR005.15-0100.1.4., 6/21/56; ASTIA AD-119 598

ABSTRACT: The magnitudes and particularly the durations of positive accelerative stresses to which personnel of advanced training unit 201 are frequently exposed are of sufficient degree to produce such undesirable effects as: excessive fatigue visual impairment, or loss of consciousness, particularly in the low g tolerant individual. In view of the durations of exposure, the proper use of anti-blackout equipment unquestionably has made a significant contribution to flight safety and efficiency in the Naval Air Training Command. Proper maintenance and use of anti-blackout equipment together with thorough indoctrination of all flight personnel on the protection provided are vitally important in the Naval Air Advanced Training Command. (AUTHOR'S SUMMARY)

1,049

Cochran, R., & L. E. Morehouse 1948 THE ABILITY OF MAN TO REACH UPWARD DURING POSITIVE G. (University of Southern Calif., Los Angeles, Calif.) Contract N6ori77, Task Order 1; ASTIA ATI-208 697

SUMMARY: 1) The hands can be raised above the head under conditions of 8 positive G and a simulated Martin-Baker ejection seat released with a resistance of 30 lbs. can be operated with ease. 2) A loss of visual fields in one subject was not accompanied by either losses in kinesthetic or touch sensations, or the ability to control learned movements with accuracy. 3) A reach above the head during positive G can be accomplished easier and more accurately if the elbows are first flexed and then the hands are drawn upward past the ears, than if the reach is performed with the arms raised upward in extension. (AUTHOR)

1,050

Cochran, R. and L. E. Morehouse 1948 THE ABILITY OF MAN TO REACH UPWARD DURING POSITIVE G.
(University of Southern Calif., School of Medicine, San Francisco, Calif.)
June 28, 1948 ASTIA TIP U5329

ABSTRACT: The Martin-Baker ejection seat requires the pilot to reach upward and behind his head in order to grasp the protective face curtain which, when pulled downward, triggers the release mechanism. In level flight the handle can be easily reached but in an emergency under high acceleration it is not known if the pilot would be able to free himself from the aircraft. A release bar simulating the ejection seat mechanism was constructed and 3 subjects tested it. The hands could be raised above the head under conditions of 8 positive g and a simulated Martin-Baker ejection seat release with a resistance of 30 lb. could be operated with ease. A loss of visual fields in 1 subject was not accompanied by losses in either kinesthetic or touch sensations or in the ability to control learned movements with accuracy.

A reach above the head during positive g can be accomplished more easily and more accurately if the elbows are first flexed and then the hands drawn upward past the ears, than if the reach is performed with the arms raised upward in extension. (ASTIA)

1,051

Code, C. F., E. H. Wood, & E. J. Baldes Aug. 1943 THE PROTECTION AGAINST THE EFFECTS OF ACCELERATION AFFORDED THE HUMAN BY IMMERSION IN WATER AND BY A WATER FILLED SUIT (THE F.F.S.). (Submitted to the Nat'l. Research Council and Aero Medical Lab., Wright Field.

1,052

Code, C.F., E.H. Wood, and E.J. Baldes 1945 HYDROSTATIC ANTI-BLACKOUT PROTECTION THE PROTECTION AFFORDED MAN AGAINST THE EFFECTS OF POSITIVE ACCELERATION BY IMMERSION IN WATER Federation Proceedings 4:15

1,053

Code, C. F., E. H. Wood, & E. H. Lambert 1945 THE LIMITING EFFECT OF CENTRIPETAL ACCELERATION ON MAN'S ABILITY TO MOVE. (Committee on Aviation Medicine, National Research Council) CAM Rept. No. 436, May 1945; ASTIA AD-132 084
See also J. Aero Science 14(2):117-123, Feb. 1947
NOTE: CARI P&S 2.1mp

ABSTRACT: A study designed to give an estimate of the restrictions placed on man locomotive ability by the application of radial g (centrifugal force) was made on the human centrifuge. Five subjects were studied. The results were as follows:
1. Movement in the same direction as the radial force. Movement in this direction was easy but hazardous. Falling one foot at 2 g was sufficient to knock the wind out of subjects. It was concluded that falls of greater distances at slightly higher accelerations would often cause injury.
2. Movement at right angles to the radial g. (a) On the average the time required to crawl across the end of the centrifuge, a distance of 7½ feet, was increased 2½ times by 1 radial g, 5 times by 2 radial g, and 10 times by 3 radial g. Three of five subjects tested could not accomplish this task at 4 g. (b) The time required to round a barrier which projected 22 inches from the back of the centrifuge was increased 2½ times by 1 radial g, 6 times by 2 radial g, and 18 times by 3 radial g. The subjects stated they could not accomplish the task at 4 g. The results indicate the tremendous increase in time required to perform simple movements of the body under radial g. At 4 g even these simple movements became impossible for most subjects.
3. Movement against the radial g. Against a force of 2 to 3 g it became impossible for the subjects to crawl, walk, climb a rope or a ladder or rise from a bomber seat. The results indicate that escape maneuvers of a flyer directed against the accelerative forces may often be ineffective if this force is in the neighborhood of 3 g.
4. Donning a parachute when exposed to radial g. The average time required for

three subjects to don a standard back parachute was 17 seconds at 1 g gravity. This was increased to 21 seconds at 1 g radial, 41 seconds at 2 g radial and 1 minute 15 seconds at 3 g radial. One of the three subjects was unable to complete the task at 3 g. It was uniformly agreed that at an acceleration slightly above 3 g the parachute could not have been donned by any of the subjects.
5. Concluding statement. Although the number of subjects studied in these tests is small, the results are sufficiently striking and definite to call attention to the serious limitations radial acceleration may place on a flyer's ability to escape from his aircraft. At accelerations above 2.5 or 3 g the flyer may need assistance or conveniences in the aircraft which at present are not provided. The study gives strong support to the contention that the following facilities demand further development: (a) Convenient escape exits at all pilot and battle stations; these placed as pairs on opposite sides of the plane. (b) Automatic mechanical or explosive mechanism to open all escape exits. Mechanism activated by a simple procedure such as pressure on a button. Button placed near exit and covered with luminous paint. Exit should preferably be forced outward--although sliding mechanism might be satisfactory if sufficient force were provided to overcome g and jamming. (c) Automatic ejection of man in seat at pilot or battle station from plane. Mechanical or explosive mechanism. Parachute could be part of light seat assembly and chute open with man sitting in seat. (AUTHOR)

1,054

Code, C. F., E. H. Wood, R. E. Sturm, E. H. Lambert, & E. J. Baldes 1945
SEQUENCE OF PHYSIOLOGICAL EVENTS IN MAN DURING EXPOSURES TO POSITIVE ACCELERATION. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 58-635; ASTIA AD-208 151
See also Abstract: Federation Proceedings 4(1):14, 1945

ABSTRACT: There is a definite sequence to the physiologic events that occur in the comfortably seated human being during exposure to positive acceleration. This sequence is divided into two distinct periods: the period of progressive failure and the period of compensation.
During the period of progressive failure, the pulse rate progressively increases, the amount of blood in the ear maybe gradually reduced or abruptly lost, the blood pressure at the level of the base of the brain declines and reductions of vision and consciousness, if they occur, become evident. As accelerations of greater intensity are experienced, the extent of these changes is increased.
The period of progressive failure is usually terminated by compensatory reactions, which become effective about six to eleven seconds after the onset of acceleration During the period of compensation, the blood pressure rises, the ear pulse may return or increase, the amount of blood in the ear pulse may return or increase, the pulse rate increase is checked and the pulse may slow and, if these compensatory changes are sufficiently effective recovery from symptoms (both loss of vision and consciousness) will occur.
This consistent pattern has been observed in a total of more than 250 subjects. Measurement of the magnitude of the changes has allowed the development of an accurate quantitative assay procedure for the determination of man's g tolerance and for the measurement of the efficiency of any device designed to prevent or offset these physiologic changes. (Federation Proceedings 4(1): 14, 1945)

1,055

Code, C.F., E.H. Wood, R.E. Sturm, E.H. Lambert & E.J. Baldes 1945 THE SEQUENCE OF PHYSIOLOGICAL EVENTS IN MAN DURING EXPOSURE TO POSITIVE ACCELERATION. Federation Proc., 4(1):14

ABSTRACT: There is a definite sequence to the physiologic events that occur in the comfortably seated human being during exposure to positive acceleration. This sequence is divided into two distinct periods: the period of progressive failure and the period of compensation.

During the period of progressive failure, the pulse rate progressively increases, the amount of blood in the ear maybe gradually reduced or abruptly lost, the blood pressure at the level of the base of the brain declines and reductions of vision and consciousness, if they occur, become evident. As accelerations of greater intensity are experienced, the extent of these changes is increased.

The period of progressive failure is usually terminated by compensatory reactions, which become effective about six to eleven seconds after the onset of acceleration. During the period of compensation, the blood pressure rises, the ear pulse may return or increase, the amount of blood in the ear pulse may return or increase, the pulse rate increase is checked and the pulse may slow and, if these compensatory changes are sufficiently effective recovery from symptoms (both loss of vision and consciousness) will occur.

This consistent pattern has been observed in a total of more than 250 subjects. Measurement of the magnitude of the changes has allowed the development of an accurate quantitative assay procedure for the determination of man's g tolerance and for the measurement of the efficiency of any device designed to prevent or offset these physiologic changes.

1,056

Code, C. F., E. J. Baldes, E. H. Wood, & E. H. Lambert 1946 THE EFFECT OF ENVIRONMENTAL TEMPERATURE UPON MAN'S G TOLERANCE (Acceleration Lab., Mayo Aero Medical Unit, Rochester, Minn.) See also Federation Proc. 5(1):18

ABSTRACT: The g tolerance (capacity to withstand increased positive accelerative forces) of fifteen normal men has been studied in a cool environment (average: 63 degrees F., 72 per cent relative humidity) and contrasted with that obtained in the same subjects in a warm humid environment (average: 89 degrees F., 77 per cent relative humidity).
The g tolerance was determined on the human centrifuge (accelerator) by means of an assay procedure based upon the recognition and recording of the subjective visual symptoms and the objective measurement of changes in ear opacity (blood content of ear), ear pulse and heart rate during exposures to acceleration (g). As determined by these criteria the g tolerance of the group was uniformly lower in the warm than in the cool environment. The visual symptoms, ear opacity, ear pulse and heart rate changes of the group showed average reductions in tolerance of 0.9, 0.7, 0.8, and 0.7 g. respectively, indicating that in the warmer environment the overall g tolerance of the subjects was lower on the average by 0.8 g.

1,057

MOTION PICTURE

Code, C. F., E. H. Wood, & E. J. Baldes 1946 HYDROSTATIC ANTI-BLACKOUT PROTECTION; THE PROTECTION AFFORDED MAN AGAINST THE EFFECTS OF POSITIVE ACCELERATION BY IMMERSION IN WATER. (Acceleration Lab., Mayo Aero Medical Unit, Rochester, Minn.)

ABSTRACT: The motion picture shows the methods used in this study and illustrates the average protections afforded man against the effects of positive acceleration by immersion in water.
The study was carried out on the human centrifuge. A specially constructed bath tub was placed in the gondola or cockpit of the centrifuge. The subjects sat in this tub in the same position as that assumed by a pilot in a fighter airplane. Each test included the determination of the subject's g tolerance while sitting in the tub---first, without water, then with water added to various body levels, and finally again without water as a re-check of the control determinations. On the average, immersion in water to the xyphoid gave 0.9 g protection and immersion in water to the level of the third rib gave 1.7 g protection. (Federal Proceedings 5(1):18, 1946)

1,058

Code, C. F., Williams, M. M. D., Baldes, E. J. & Ghormley, R. K. 1947 ARE THE INTERVERTEBRAL DISKS DISPLACED DURING POSITIVE ACCELERATION J. Aviat. Med. 18(3):231-236,296

SUMMARY: Anteroposterior and lateral roentgenograms were made of the lower part of the spinal columns of four subjects before and during positive accelerations of 2 to 6 G.

Measurements were made of the lumbar intervertebral spaces and of the length of the lumbar part of the spinal column. No significant changes in these measurements were observed during the accelerations tested. It is concluded that in these normal subjects there was no compression or displacement of the intervertebral disks.

1,059

Code, C. F., E. H. Wood, & E. H. Lambert 1947
THE LIMITING EFFECT OF CENTRIPETAL ACCELERATION ON MAN'S ABILITY TO MOVE. J. Aero Sci. 14(2):117-123 February
See also (Committee on Avia. Med.) CAM Rept. No. 436, May 1945
ASTIA-DSC AD-132 084

ABSTRACT: Instances have been recorded in which fliers were unable to bail out of spinning aircraft because of the centrifugal force generated by the spin. A study designed to give an estimate of the restrictions placed on man's locomotive ability by exposure to radial g was made on the human centrifuge. Five subjects were studied. The average time required to don a parachute was increased from 17 sec. at 1*g to 1 min. and 15 sec. at 3 g,

it being uniformly agreed by the subjects tested that they could not don the parachutes at accelerations slightly above 3 g. The ability of the subjects to move against the force or at right angles to the force was seriously restricted when the magnitude of the force was 2 to 3 g. Progress against the force became impossible at 3 g. Moving the body at right angles to the force became impossible in the neighborhood of 4 g. The study demonstrated that under conditions at which accelerations of 3 g or more develop, fliers will need help if they are to escape from their aircraft. Emphasis is therefore given to the need, recognized for some time by others, of further consideration and development of devices designed to assist the flier when escaping from his aircraft.

1,060

Coermann, R. 1938 UNTERSUCHUNGEN UBER DIE EINWIRKUNG VON SCHWINGUNGEN AUF DEN MENSCHLICHEN ORGANISMUS (Investigations Regarding the Effect of Vibrations on the Human Organism)
Jahrbuch der Deutschen Versuchsanstalt für Luftfahrt (Berlin) Pt. 3; 111-142.
See also: Air Corps, Trans. No. 349, 19 May 1941.

1,061

Coermann, R. 1939 DIE WIRKUNG VON ERSCHUTTERUNG UND LARM AUF DER MENSCHLICHE ORGANISMUS. (THE EFFECTS OF VIBRATION AND NOISE ON THE HUMAN ORGANISM.) R.A.E. Library Translation No. 121.
From Ringbuch der Luftfahrttechnik, Part VF1. GDC. 10/7686. 1946

1,062

Coermann, R. 1961 TO WHAT EXTENT CAN DUMMIES INSTEAD OF MEN BE USED IN IMPACT TESTING?
(Paper, Symposium On Impact Acceleration Stress, Brooks Air Force Base, San Antonio, Texas, November 27-29, 1961)

1,063

Cofer, F. S., H. M. Sweeney, & C. E. Frenier 1946 HISTORY OF DEVELOPMENT SINCE 1941: USAF EJECTION SEATS (Air Material Command, Wright Field, Dayton, Ohio) Rept No. TSEAC 11-45341-1-2, Aug. 1946

1,064

Cohen, S.I., A.J. Silverman, G. Zuidema & A. Caton 1957 NEUROHORMONAL ASPECTS OF G TOLERANCE.
(Paper, Meeting of Aero Medical Association, Denver, Colorado, May 6-8, 1957)

ABSTRACT: The threshold for blackout appears to be ultimately dependent on cardiovascular reflex activity. However, catechol amine production from the adrenal medulla and sympathetic neural endings seems to play an important role in determining the level of compensation possible. It was observed that under centrifugal stress a substantial production of noradrenaline occurred in subjects who withstood exposure to high G levels. Subjects blacking out at lower G levels secreted less noradrenaline and more adrenaline Hypertensive responses to a hypotensive drug were associated with high noradrenaline levels and hypotensive responses with lower noradrenaline and higher adrenaline levels. The interrelationship of emotional factors, catechol amine levels and G tolerance indicated that high levels of anxiety were associated with high levels of adrenaline and lower levels of noradrenaline and lowered G tolerance. Overt anger was associated with lower levels of adrenaline and high levels of noradrenaline and high G tolerance. (J. Aviation Med. 28(2):196, April, 1957)

1,065

Cohen, S.I., A.J. Silverman, G.D. Zuidema, & G.E. Johnson 1958 SKIN RESISTANCE CHANGES DURING ACCELERATION.
(Wright Air Development Center, Wright-Patterson AFB, Ohio)
WADC TN 56 397, ASTIA AD 97 275.

ABSTRACT: To investigate basal skin resistance changes (gradual drifts or changes) during acceleration stress, a series of experiments were performed on the human centrifuge. Basal resistance changes were measured 1) during acceleration with and without G-suit protection, 2) with rapid and gradual acceleration, and 3) with progressively increased rapid acceleration. The role of blood volume changes and compensatory sympathetic vasoconstrictive activity,the primary determinant of decreases in skin resistance during acceleration was investigated with hemisympathectomized dogs. The use of basal resistance changes as a rapid indicator of changes in the psychophysiological state during acceleration is discussed. Basal skin resistance level changes are felt to be due primarily to changes in over-central nervous system activity. Human subjects exposed to centrifugal forces demonstrated decreases in skin resistance. Rapid onset acceleration produces greater decreases in skin resistance than gradual onset acceleration or rapid onset acceleration demonstrated decreases in skin resistance. Rapid onset acceleration produces greater decreases in skin resistance than gradual onset acceleration or rapid onset acceleration of subjects protected by anti-G suits. The role of blood volume changes and compensatory sympathetic vasoconstrictive activity as the primary determinant of skin resistance decreases during acceleration was investigated in dogs which were hemisympathectomized and exposed to accelerative forces. The intact side showed a considerably greater decrease than the sympathectomized side. (Author)

1,066

Cohen, E., and G. B. Simon 1961
THE SIMULATION OF MOTION FOR TRAINING AND FOR RESEARCH
(Presented at Meeting of the Panel on Acceleration Stress of the Armed Forces-NRC Committee on Bioastronautics, National Aeronautics and Space Administration, Ames Research Center, Moffett Field, California, March, 1961.

1,067

Cohen, H.N. & L.D. Dubrow 1955 METHOD FOR CALCULATING MAXIMUM IMPACT LOAD IN DESIGNING A PARACHUTE SUSPENSION SYSTEM (Samuel Feltman Ammunition Labs., Picatinny Arsenal, Dover, N.J.) Proj. No. TA2-4004; Technical rept. no. 2158 April 1955; ASTIA AD-60 623

ABSTRACT: A method for calculating the maximum pull in the parachute lines, P Max, has been derived which takes into account the deceleration of the load and the drag effect on the parachute just before the lines tighten must be known.

In order to calculate the maximum impact load in the lines of a parachute, it is assumed that the pull in the lines is equal to a known spring constant multiplied by the elongation.

It is possible to substitute in the equation $F = \frac{mdV}{dt}$ and then to convert the time variable to a stretch variable. The equation is integrated and solved for P_{max}.

1,068

Colajanni, G. 1931 UN CASO DI EMORRAGIA RETINICA PER LANCIO NEL VUOTO CAN PARACADUTE. (A case of hemorrhage in the retina while dropping with a parachute) Ann. di ottal. e clin. ocul., 59:1017-1020

ABSTRACT: The author stated that he found only one similar case reported by the Italians. His case concerns a pilot, aged 32, who lost control of his plane in a cloudbank and had to jump. The jump was uneventful and he landed on his feet without mishap. However, a few hours later he noticed a dark spot in his right eye. Examination revealed nothing unusual in the right eye except a hemorrhagic spot with large axis horizontal, situated between the macula and papilla, and other small posts in the superotemporal region near the papilla. For possible causes, the author cited: sudden barometric changes, the impetuous action of the wind, the increase in the thoracic pressure due to sudden pull of parachute belt, and the emotive state. He states that since many jumps without such effects have been made from even higher altitudes, it is probably that this individual had a predisposition, due perhaps to a profound endocrine imbalance, that had not been revealed by the various tests required in the examinations of pilots.

1,069

Cole, D.M. & D.E. Muir 1958 AROUND THE MOON IN EIGHTY HOURS.
(The Martin Company, Denver, Colorado) M-M-P-58-42, Aug. 1958.

ABSTRACT: A conceptual design of a manned circumular vehicle for the early 1960's is presented, showing how early availability and low cost can be achieved by making maximum use of ICBM hardware and facilities. Results of orbit, space medicine, and re-entry studies critical to the circumular flight are included.

1,070

Cole, W. H., J. B. Allison, T. J. Murray, A. A. Boyden & J. H. Leathern 1944
COMPOSITON OF BLOOD OF RABBITS IN GRAVITY SHOCK.
Am. J. Physiol. 141(2):165-171, April 1944.

ABSTRACT: (1) Rabbits suspended head up, without anesthesia, became unconscious in from 20 to 120 minutes, even though breathing continued at a rate about one-half that of normal. Thirty per cent of the animals died within 24 hours although all external symptoms appeared normal.

(2) Other changes resulting from suspension were: a, marked reduction of blood pressure; b, suppression of urine flow; c, metabolic acidosis (pH = 7.0); d, decreased blood carbon dioxide and venous oxygen; e, increased plasma lactate, phosphate, pyruvate, potassium and non-protein nitrogen; f, increased or decreased plasma glucose; g, decreased plasma chloride in well-fed animals.

(3) There were no constant or significant changes in hematocrit, plasma specific gravity, protein, sodium or calcium or in the blood cell counts.

(4) Hemoconcentration did not occur.

(5) Suspension resulted in a peripheral circulatory deficiency leading to tissue hypoxia. Altered concentrations of certain blood metabolites occurred, which were useful in determining the severity of shock, and the course of recovery when the rabbits were returned to the horizontal position.

1,071

Coleal, Ernest 1960 TRACK FACILITIES GUIDEBOOK.
(Air Force Flight Test Center, Edwards Air Force Base, Calif.)
ASTIA AD-253 717

ABSTRACT: General and detailed information is presented concerning the Air Force Flight Test Center 20,000 Foot High Speed Track Facility at Edwards Air Force Base, California. The general capabilities of the 20,000 foot track range are discussed in terms of speed, acceleration, propulsion, recovery and testing techniques. Prominent features of the various facility components are discussed and described. These are categorically presented under topic headings of 20,000 foot track, instrumentation, photography, propulsion and simulated rainfall range. Test program types are reviewed including: (a) missile fuse and warhead systems tests, (b) rain erosion testing, (c) airscrew escape systems,

(d) parachute recovery systems, (e) airfoil and empennage flutter tests, and (f) structural and acceleration tests. Development areas discussed are: (a) waterbrake recovery systems, (b) track slippers and bearing design, (c) shock and vibration isolation systems, and (d) acoustical environment study and control. (Author)

1,072

Colehour, J. K., & A. Graybiel 1963 URINARY EXCRETION OF CORTICOSTEROIDS AND CATECHOL AMINES IN NORMAL PERSONS (NON-PILOTS) AND DEAF SUBJECTS WITH BILATERAL VESTIBULAR DEFECTS SUBJECTED TO ACROBATIC FLIGHT STRESS. (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 28 - May 2, 1963)

ABSTRACT: This report is one of a series dealing with comparative studies between normal subjects and deaf persons with bilateral labyrinthine defects (L-D subjects) exposed to identical or nearly identical force environments. In this instance all of the subjects were exposed to a standardized series of acrobatics in an AD-5 Skyraider. The total daytime and nighttime urinary excretions were collected the day prior to flight and on flight day. The activities of the subjects were standardized insofar as possible. Adrenalin and noradrenalin were measured according to the method of Crout, 17-hydroxcortiocosteroids according to the method of Kornel and uropepsin according to the method of Anson. On the day of the flight compared to the control day, the excretion of catechol amines and corticosteroids was significantly higher for the normal but not the L-D group. Other interesting intergroup differences were noted as well as individual variance. Some of the differences were clearly attributable to the vestibular organs but other differences were either related to basic personality trait or unexplained.

1,073

Coleman, T. L., et al. 1954 MANEUVER ACCELERATIONS EXPERIENCED BY FIVE TYPES OF COMMERCIAL TRANSPORT AIRPLANES DURING ROUTINE OPERATIONS. (National Advisory Committee for Aeronautics, Washington, D. C.) NACA TR 3086, April 1954

1,074

Coles, C.H. 1945 ABRUPT DECELERATION OF ANIMALS. (AAF Air Technical Service Command, Wright Field, Dayton, Ohio) Memorandum Report Serial No. TSEAL-6F-181, July 1945.

1,075

Collar, A.R. 1954 ON THE STABILITY OF ACCELERATED MOTION (Aeronautical Research Council (Gt. Brit.) ARC rept. no. 16831; May 1954; ASTIA AD-48 604

ABSTRACT: In a previous note, the author has discussed some of the difficulties of dealing with the stability of systems governed by linear differential equations with variable coefficients. In general, this problem is difficult even for a single second-order equation. The problem of dealing with a set of coupled equations is naturally very much more difficult. In the case of certain sets of equations such as arise in problems of aircraft stability, however, the coefficients vary with speed in related ways. It is shown in this report that in such systems a particular form of acceleration enables a general solution to be obtained; the result may be regarded as a generalization of the treatment of sets of equations with constant coefficients.

1,076

Collins, C.C., J.L. Brown & C.F. Fischer 1957 A FLIGHT SIMULATOR INCORPORATING ACCELERATION FORCES.
(Paper, Meeting of Aero Medical Association, Denver, Colorado, May 6-8, 1957)

ABSTRACT: It is proposed to use the Johnsville centrifuge to add the forces of acceleration to flight simulation. This realism can be made possible by allowing the pilot to control his own acceleration through an analogue computer simulating aerodynamic performance on the centrifuge. Transfer functions have been developed which will enable the transformation of control stick displacements into the appropriate centrifuge motions. The measured dynamic responses of the centrifuge will allow simulations of most high G aircraft maneuvers. This simulator will not only provide a facility for investigation which has heretofore been possible only in actual flight testing, but also will extend the measurements to the vital area not before realizable with safety, i.e., to the limits of both aircraft and human performance. (J. Aviation Med. 28(2):196, April 1957)

1,077

Collins, C.C. 1958 SOME ENGINEERING PROBLEMS IN SPACE MEDICINE (U.S. Naval Air Development Center, Johnsville, Pa. (Pennsylvania Triangle, published by the University of Pennsylvania) March, 1958.

ABSTRACT: This paper presents a discussion of some of the problems to be encountered in sending a man into space and maintaining him in that environment Some of the factors which must be considered in the design of a capsule environment for a space flight of considerable duration where space, weight, and power limitations are significant are presented. Oxygen supply in a closed system and methods and materials for absorbing carbon dioxide are discussed. Other areas considered include: simulation of cabin environments on earch, capabilities of pilots during reentry, and kinesthetic sensations of pilots under stress conditions.

1,078

Collins, C.C., R.J. Crosbie, & R.F. Gray 1958 PILOT PERFORMANCE AND TOLERANCE STUDIES OF ORBITAL REENTRY ACCELERATION. (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR 64, Serial 7856, 19 Sept. 1958.

ABSTRACT: This report concerns a preliminary study of human tolerance to the re-entry accelerations expected in zero life vehicles. The study was undertaken to ascertain whether a human subject would tolerate orbital reentry acceleration patterns associated with the National Advisory Committee for Aeronautics (NACA) manned space capsule. The first phase of this study involved the expected reentry G-time histories supplied by NACA. These were carried up to 12 G peak. The second phase of the study probed the area up to 20 G. Three subjects rode the AMAL centrifuge open loop in the semi-supine position in the NACA contour couch. Subjects wore Z-a anti-blackout suits and strained during runs. Two subjects rode to 12 G in Phase I and two rode to 20 G in Phase II. One subject rode at 17° supination but, at this level, the other subject blacked out. By adjusting the angle of supination to 10°, this second subject was able to continue to 20 G without blackout. Apparently supination to 80° afforded the most protection. The subjects were able to operate a right-hand control stick with no apparent impairment due to the high G forces. It is concluded that a human subject can tolerate the acceleration associated with specific reentry patterns into the atmosphere from orbit with no physiological damage.

1,079

Collins, C.C., R.M. Herrick, & R.W. Lawton 1958 STATUS REPORT ON ANIMAL SATELLITE (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR73, Dec. 15, 1958

ABSTRACT: This report details the present status of the subject project. The equipment has been designed for use with rats and with modification, can be used with other animals. The animal behavior laboratory has been instrumented and is presently in use training rats to perform specified tasks according to a fixed routine. Spin studies, behavioral studies and diet studies are currently underway. Engineering requirements for orbital animal experiments have been studied, calculations have been performed and the proposed environment is described

1,080

Collins, C.C. & R.F. Gray 1959 PILOT PERFORMANCE AND TOLERANCE STUDIES OF ORBITAL REENTRY ACCELERATION (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR90 Sept. 16, 1959

ABSTRACT: This study was undertaken to ascertain whether a human subject could tolerate orbital reentry acceleration patterns associated with emergency conditions in a manned space capsule. The study evaluated the second model of a space couch which was fabricated at the NASA Langley Research Center, with changes incorporated as suggested by the staff of AMAL. The object of this study was to determine the maximum acceleration which could be tolerated by a human subject protected by the NASA human support system and to explore the limiting factors

of non-liquid G protective systems. The support system was molded directly to the body of the test subject in the semi-supine position. The subject wore a standard Navy Z-2 G-suit and strained during the runs. At a back angle of 17^{o}, the subject rode the centrifuge up to 20 G where balckout occurred. At a back angle of 14^{o}, the limit was established by blackout at 23 G. No pain was experienced in any of these runs. At a back angle of 8^{o}, the subject was able to withstand a peak acceleration of 25 G, the highest yet tried with solid support. Blackout did not occur during this run but the subject was not able to continue holding his breath. No pain was experienced.

1,081

Collins, W. E., G. H. Crampton, & J. B. Posner 1960 THE EFFECT OF MENTAL SET UPON VESTIBULAR NYSTAGMUS AND THE ELECTROENCEPHALOGRAM. (Army Medical Research Lab., Ft. Knox, Ky.) Rept. No. 439

ABSTRACT: Simultaneous recordings of horizontal nystagmus and EEG were obtained during vestibular stimulation. Six subjects were given tasks involving attention to the stimulus, mental arithmetic, and reverie. Attending to the stimulus was not necessary to maintain nystagmic output, although reverie states considerable reduced it. The degree of general "alertness" seemed to be the important factor. The vestibular stimulation did not block the alpha rhythm and more alpha was produced during states involving mental arithmetic.

1,082

Collins, W.E. 1960 FURTHER STUDIES OF THE EFFECTS OF MENTAL SET UPON VESTIBULAR NYSTAGMUS. (U.S. Army Medical Research Lab., Ft. Knox, Ky.) Rept. No. 443, December 1960. ASTIA AD 249 113L.

ABSTRACT: During rotational stimulation subjects were instructed in different test sessions, to: (1) do mental arithmetic, (2) make estimates of subjective velocity, (3) reproduce durations of sound stimuli, and (4) assume a state of reverie. The reverie state resulted in significantly less recorded nystagmus than the other tasks while mental arithmetic was the most efficacious means of obtaining a response. A factor of alertness seems to be an important condition for the maintenance of nystagmus. Simultaneous recordings of EEG were analyzed for amount of alpha production. No differences were evident among the conditions. The vestibular stimulation, however, did not block ongoing alpha activity.

1,083

Collins, W.E., F.E. Guedry, Jr. & J.B. Posner 1961 CONTROL OF CALORIC NYSTAGMUS BY MANIPULATING AROUSAL AND VISUAL FIXATION DISTANCE. (U.S. Army Medical Research Laboratory, Ft. Knox, Ky.) Rept. No. 485. ASTIA AD 263 256.

ABSTRACT: Groups of "naive" and "experienced" subjects were given a series of aural irrigations under various conditions. Variables manipulated inaural irrigations under various conditions. Variables manipulated included instructions designed to alert or relax the subjects, fixation distance, and illumination vs. total darkness. The alert condition produced nystagmus of greater amplitude and longer duration and yielded a smoother graphed function than the reverie condition. Near fixation (30.5cm.) yielded greater response than ceiling fixation, and two subjects showed no observable reaction to the latter condition. These findings are of importance in clinical situations and in theoretical formulations of vestibular functioning. Instructions which influence arousal and visual fixation distance should not be matters of inadvertent variation in clinical examination procedures.

1,084

Collins, W.E., G.H. Crampton, & J.B. Posner 1961 EFFECTS OF MENTAL ACTIVITY ON VESTIBULAR NYSTAGMUS AND THE ELECTROENCEPHALOGRAM. Nature (London) 190(4771):194-195

ABSTRACT: The present work was undertaken to ascertain how nystagmus, produced by a standard vestibular stimulus, is modified by different sets of instructions and, further, to determine the effects of these conditions on the electroencephalogram.

1,085

Collins, W. E. and F. E. Guedry, Jr. 1961 AROUSAL EFFECTS AND NYSTAGMUS DURING PROLONGED CONSTANT ANGULAR ACCELERATION. Report on Psychophysiological Studies.
(Army Medical Research Lab., Fort Knox, Ky.)
Report No. 500 29 August 1961 ASTIA AD 264 979
Also see Acta Otolaryng (Stockholm) 54:349-362, March-April 1962.

ABSTRACT: When tasks were assigned to insure heightened mental activity, vestibular nystagmus did not decline during constant angular acceleration. With the same vestibular stimulus but with a task not conducive to heightened mental activity, nystagmus declined (or was of very low magnitude) during the stimulus. It is suggested that previously reported losses of subjective velocity during constant angular acceleration, may be an indicator of reduced corticofugal feedback to the reticular system and hence, as subjective velocity declines in this situation, nystagmus also declines except for extraneous sources of arousal. (Author)

1,086

Collins, W. E. & F. E. Guedry, Jr. 1961 AROUSAL EFFECTS AND NYSTAGMUS DURING PROLONGED CONSTANT ANGULAR ACCELERATION
Acta Oto-laryngol. 54(3):349-362.

ABSTRACT: Six subjects were given a series of 10 rotary trials in which accelerations of $1.0^{\circ}/sec^2$ and $1.8^{\circ}/sec^2$ were employed for durations of 84 and 50 seconds respectively. Subjective states of arousal were manipulated by instructions. Duration and slow-phase velocity of nystagmus were measured. Qualitative as well as quantitative differences were observed as a function of arousal level.

Results indicated: (1) during mentally active states, no decline of nystagmus was evident during stimulation nor was there an abrupt cessation of nystagmus accompanying stimulus termination; (2) during states of mental relaxation, the nystagmic response was reduced, declines during stimulation appeared, and the response occasionally ended prior to, or at the moment of, stimulus termination.

Theoretical implications of the findings are discussed.

1,087

Collins, W. E., F. E. Guedry, Jr. and J. B. Posner 1961 CONTROL OF CALORIC NYSTAGMUS BY MANIPULATING AROUSAL AND VISUAL FIXATION DISTANCE. (U.S. Army Medical Research Lab., Fort Knox, Ky.) Proj. 6X95 25 001, Task. 04, Rept. 485. August 1961.

ABSTRACT: The effects of arousal state and visual fixation distance on calorically induced vestibular nystagmus were studied. Horizontal eye movements of naive and experienced Ss were recorded during aural irrigation (30 degrees C for 40 sec.) under different conditions: arousal (alerting or relaxing instructions), fixation distance (30.5cm, 1.63m), and illumination (total darkness or room illumination). Duration of nystagmus and quality rating of nystagmus based on amplitude, frequency, and regularity were treated by analysis of variance technique. Also, the effect of the two arousal states were compared by t-test for the various conditions. The implications for the clinical situation were discussed. (Tufts)

1,088

Collins, W. E. & R. H. Poe 1961 AMPHETAMINE, AROUSAL, AND HUMAN VESTIBULAR NYSTAGMUS. Report on Vestibular Function and Acceleration in Relation to Performance. (Army Medical Research Lab., Fort Knox, Kentucky) Proj. 6x95-25-001, Rept. No. 526, 22 December 1961. ASTIA Doc. No. AD-271 070.

ABSTRACT: A normal clinical dosage of amphetamine and a placebo were administered to groups of rotation-naive and rotation-experienced subjects by the double-blind method. The drug produced significant effects on pulse rate and systolic blood pressure. However, it did not significantly affect the slow-phase velocity of vestibular nystagmus during the first 30 seconds of response to a rotatory stimulus 4.15 degrees/ sq sec applied for 13 seconds under conditions of mental activity and mental relaxation. In agreement with other

1,089

Collins, W.E. and R.H. Poe 1962 AMPHETAMINE, AROUSAL, AND HUMAN VESTIBULAR NYSTAGMUS. J. Pharmacol Exp Ther. 138(1):120-125, Oct. 1961.

ABSTRACT: A normal clinical dosage of amphetamine and a placebo were administered to groups of rotation-naive and rotation-experienced subjects by the "double-blind" technique. The drug produced significant increases in cardiovascular activity. However, it did not affect significantly the total amount of slow-phase nystagmus induced by rotation when instructions influencing mental activity were employed. In agreement with other studies, the mentally active state resulted in greater output and longer durations of nystagmus than did the relaxed state.

1,090

Collins, W.E. 1962 EFFECTS OF MENTAL SET UPON VESTIBULAR NYSTAGMUS. J. Exper. Psychol. 63(2):191-197

ABSTRACT: During rotational stimulation subjects were instructed, in different test sessions, to: (a) do mental arithmetic, (b) make estimates of subjective velocity, (c) reproduce durations of sound stimuli, and (d) assume a state of reverie. The reverie state resulted in significantly less recorded nystagmus than the other three tasks, while mental arithmetic was the most efficacious means of obtaining a vigorous response. A factor of sustained alertness seems to be an important condition for the maintenance of nystagmus. (Author)

1,091

Collins, W. E., & F. E. Guedry, Jr. 1962 AROUSAL EFFECTS AND NYSTAGMUS DURING PROLONGED CONSTANT ANGULAR ACCELERATION. Acta Oto-Laryngologica (Stockholm) 54:349-362

ABSTRACT: Six subjects were given a series of 10 rotary trials in which accelerations of 1.0 degrees/sec^2 and 1.8 degrees/sec^2 were employed for durations of 84 and 50 seconds respectively. Subjective states of arousal were manipulated by instructions. Duration and slow-phase velocity of nystagmus were measured. Qualitative as well as quantitative differences were observed as a function of arousal level.
Results indicated: (1) during mentally active states, no decline of nystagmus was evident during stimulation nor was there an abrupt cessation of nystagmus accompanying stimulus termination; (2) during states of mental relaxation, the nystagmic response was reduced, declines during stimulation appeared, and the response occasionally ended prior to, or at the moment of, stimulus termination.
Theoretical implications of the findings are discussed. (AUTHOR)

studies, the mentally active state resulted in greater output and longer durations of nystagmus than did the relaxed state. Amphetamine produced significantly longer reactions than the placebo, tending to affect nystagmus more when subjects were relaxed. There were indications that the drug and mental activity may facilitate secondary nystagmus, especially with naive subjects. (Author)

1,092

Collins, W. E. 1962 MANIPULATION OF AROUSAL AND ITS EFFECT ON HUMAN VESTIBULAR NYSTAGMUS INDUCED BY CALORIC IRRIGATION AND ANGULAR ACCELERATIONS. (Paper, 33rd Annual Meeting, Aerospace Medical Association, 9-12 April 1962, Atlantic City, N. J.) (Federal Aviation Agency, Aviation Medical Services, Civil Aeromedical Research Institute, Oklahoma City, Oklahoma) Rept. No. 62-17; Oct. 1962; Aerospace Med. 32(2):124-129. February.

ABSTRACT: Investigations concerned with the effects of subjective states on vestibular nystagmus were reviewed. Methods of controlling such states were discussed. Data indicate that the significant factor in subject-orientation is a state of arousal, defined in terms of mental activity. Continuous, concerted attending to a task yields a brisk, long-duration nystagmus. If responses to a task require less attention with repetition, or if subjects are not kept alert, a significant reduction in nystagmus output may occur. A sudden alerting stimulus may then occasion a burst of nystagmic activity in an apparently "adapted" individual. Knowledge of subjectives states is a pre-requisite for proper evaluation of vestibular responses in theoretical formulations, in many clinical stiuations, and in ascertaining vestibular components associated with air- or space vehicle maneuvers. (AUTHOR)

1,093

Collins, W.E. 1963 OBSERVATIONS ON THE ELICITATION OF SECONDARY AND INVERTED PRIMARY NYSTAGMUS FROM THE CAT BY UNILATERAL CALORIC IRRIGATION. (Federal Aviation Agency, Civil Aeromedical Research Institute, Oklahoma City, Oklahoma) CARI Report 63-3, February 1963

ABSTRACT: Vestibular stimulation by repeated unilateral caloric irrigation of cats occasioned the appearance of secondary, tertiary, and inverted primary nystagmus in some animals. These inverse responses were recorded with stimulus temperatures of 5,23.5, and 53.5 C, applied for durations ranging from 15-35 seconds. The inverse reaction most frequently obtained was the secondary nystagmus. Several possible explanations for the occurrence of the phenomena were examined. The findings appear related to "habituation" of the vestibular system, and thus have implications for vestibular adaptation in clinical situations and during air-vehicle maneuvers.

1,094

Collins, W. E., F. E. Guedry, & J. B. Posner 1962 CONTROL OF CALORIC NYSTAGMUS BY MANIPULATING AROUSAL AND VISUAL FIXATION DISTANCE. Ann. Oto-Rhino-Laryngologica 71:187-202

ABSTRACT: 1) Groups of "naive" and "experienced" subjects were given a series of aural irrigations.under various conditions. Variables manipulated included instructions designed to alert or relax the subjects, fixation distance, and illumination vs. total darkness. 2) The alert condition produced nystagmus of greater amplitude and longer duration and yielded a smoother graphed function than the reveries condition. Near fixation (30.5 cm) yielded greater response than ceiling fixation, and two subjects showed no observable reaction to the latter condition. These findings are of importance in clinical situations and in theoret ical formulations of vestibular functioning. 3) Instructions which influence arousal and visual fixation distance should not be matters of inadvertent variation in clinical examination procedures. (AUTHOR)

1,095

Comenzo, R. J. 1960
DESIGN FOR MANNED RE-ENTRY GLIDE
(1960 Proceedings of the Institute of Environmental Sciences. Paper not available at time of publication)

1,096

Comrey, A.L, A.A. Canfield, R.C. Wilson and W.S. Zimmerman 1951 THE EFFECT OF INCREASED POSITIVE RADIAL ACCELERATION UPON PERCEPTUAL SPEED ABILITY. J. Aviation Med., 22(1):60-64, Feb 1951

ABSTRACT: Limited exposure to the effects of increased positive radial acceleration, up to the level of 4 g, may distract subjects in the performance of perceptual-speed tasks, but adaptation to such distractions readily takes place. This is based on the assumption that the subjects vision is not limited due to greyout or blackout. The increased acceleration force apparently has little effect on ability to note minor differences in visual detail.

1,097

Conley, M. 1950 THE MEN WHO CAN MAKE SPACE FLIGHT POSSIBLE TODAY. J. Space Flight, 2:1-3

ABSTRACT: Suggests a crew of six and the things each will need to know.

1,098

Conley, M. 1952 A METHOD OF SUPPORTING THE HUMAN BODY STRUCTURE DURING SPACE FLIGHT. J. Space Flight 4(9):3-4, Nov. 1952.

ABSTRACT: Lightweight zippered supporters, made of webbed cotton fabric, are recommended for use in space ships to protect various parts of the body from effects of acceleration, deceleration, and zero-g conditions. They would be worn underneath the underclothing as a "second skin", to hold the body's shape and prevent rupturing of organs.

1,099

Conley, M. 1952 A METHOD OF SUPPORTING THE HUMAN BODY STRUCTURE DURING SPACE FLIGHT
J. Space Flight 4(9): 3-4, Nov. 1952

ABSTRACT: Lightweight zippered supporters, made of webbed cotton fabric, are recommended for use in space ships to protect various parts of the body from effects of acceleration, deceleration, and zero-g conditions. They would be worn underneath the underclothing as a "second skin", to hold the body's shape and prevent rupturing of organs.

1,100

Connors, J.F. & J.C. Lovell 1960 SOME OBSERVATIONS ON SUPERSONIC STABILIZATION AND DECELERATION DEVICES.
(Institute of the Aeronautical Sciences) Paper No. 60-19, Jan. 1960.

1,101

Connors, R.J. & L.D. Sachs 1957 EVALUATION OF THE ESCAPE SYSTEMS FOR THE B-52 AND RB-52 AIRPLANES (American Machine and Foundry Co., Chicago, Ill.) Rept. No. R-1363, Contact Da 11-022-ORD-1604, Jan 1957, ASTIA AD-124 308

ABSTRACT: The escape systems for the B-52 and RB-52 airplanes comprise various subsystems providing for emergency escape of several crewmen. Numerous "get ready' operations, such as seat positioning, equipment stowage, hatch jettison, etc., are performed in each subsystem prior to ejection of the crewman. Each subsystem consists of several cartridge actuated devices, such as initiators, thrusters, and catapults. The devices are connected with lengths of hose or tube or by mechanical linkage to an aircraft component set in motion. The details of each subsystem and the estimated or measured pressure at the inlet of each c artridge actuated device are presented.

1,102

Consumer Reports 1960 AUTO SEAT BELTS
(Consumer Reports, February, 1960, pp. 82-87)

ABSTRACT: Tests have proved that seat belts can substantially reduce the annual toll of people killed and injured in auto accidents. However, most people do not have seat belts because they are either indifferent to them through lack of any information or because seat belts are too expensive.

Details are given of the standards that the Federal Government specified for seat belts.

Recommendations are given for buying seat belts and what to specify when having them installed. A list of acceptable and unacceptable brands of seat belts is also included.

1,103

Convair DEVELOPMENT TEST OF PILOT EMERGENCY ESCAPE, UPPER TORSO HARNESS. (Convair, San Diego) Test Report 9999.

1,104

Convair 1956 F-102A PILOT'S EMERGENCY ESCAPE SYSTEM SLED TEST. (Convair, San Diego) Report No. 9163, September 1955-January 1956.

1,105

Convair 1956 REPORT OF DEVELOPMENT ENGINEERING INSPECTION. F-102B SUPERSONIC SEAT. (Convair, General Dynamics Corp.) 15 May 1956.

1,106

Convair Division of General Dynamics Corporation 1958 INDUSTRY (ICESC) SUPERSONIC UPWARD EJECTION PILOT'S ESCAPE SYSTEM. Part I. Development Phase Sled Tests. Rept. 57-100F-1, San Diego

1,107

Convair 1960 F-106 PILOT'S ADVANCED ESCAPE SYSTEM. HUMAN POSITIONING TESTS. (Convair, San Diego, Calif.) Rept. no. DL 60-132, October 1960 AD 258 887

ABSTRACT: Research was undertaken to provide the test subjects with experience in the rapid positioning prelaunch sequence of the B-seat. A reserve chest-type parachute was incorporated in these positioning tests to determine its placement for compatibility with the pre-launch positioning of the seat. A

total of nine runs were conducted using a 95- percentile anthropomorphic dummy, A 50- percentile human, and a 65-percentile human, as test subjects. The dummy was tested in a MK IV full-pressure suit only, while the humans were tested in CSU-4/P full-bladder pressure suits, MK IV full-pressure suits, K-2B summer flying suits, and CWU-1/P winter flying suits. The present MK IV full-pressure suit was not compatible with the pre-launch positioning of the seat, even when unpressurized. These tests also indicated that a pressurized CSU-4/P of the foot pan motor unit, causing the motor to stall, and preventing complete seat positioning. (Author)

1,108

Conway, S. M. P., & B. J. Cremin 1956 SOME MEDICAL PROBLEMS OF PARACHUTING IN MALAYA. J. Royal Army Med. Corps (London) 102(1):70-72, Jan. 1956

ABSTRACT: A 4.6% casualty rate was found in 995 operational or training parachute jumps of troops and medical personnel over the Malayan jungles. The hazards of jumping in the jungle include parachute hook-up and catching in branches and trees, or giving-way of the parachute after initial hook-up. The most common injuries occurred in the back, usually crush fractures of the lumbar and thoracic vertebrae. Other injuries occurred in the ankle, ribs, pelvis, clavicles, or any other bones which come in contact with direct violence by branches or the ground. Lacerations and bruises were usually treated on the spot, but more serious injuries were evacuated by helicopter. Casualties were reduced by air reconnaissance of the terrain prior to jumps.

1,109

Conybeare, J.J. 1942 SOME PROBLEMS OF AVIATION MEDICINE.
Guy's Hosp. Gaz. 56:2-6

1,110

Cook Electric Company 1954 PROGRAM FOR STUDY OF THE PHYSIOLOGICAL EFFECT OF EMERGENCY ESCAPES AT TRANSONIC SPEEDS.
(Cook Research Laboratories, Cook Electric Company, Chicago, Ill.)

1,111

Cook Electric Company 1962 FEASIBILITY STUDY OF HYPERSONIC PARACHUTE FREE FLIGHT TEST CAPABILITY, PHASE I
(Aeronautical Systems Division, Wright-Patterson Air Force Base, Ohio) Project No. 6065, Task No. 606506, ASD-TR-61-600, March 1962, Contract No. AF 33(616)-8469, ASTIA AD 275 578

ABSTRACT: A study has been conducted to determine the feasibility of establishing a free-flight test capability for aerodynamic decelerators at supersonic and hypersonic velocities. Methods for boosting test vehicle weights of

250, 500, 800, and 2000 pounds to various altitudes and Mach numbers utilizing presently available rocket motors and range facilities are evaluated. Test altitudes vary from 2000 to 250,000 feet for a Mach number range of 1.0 to 10. Instrumentation requirements for measuring decelerator performance characteristics and vehicle flight parameters are investigated. Methods for water and land recovery of the payload section of the vehicles are presented. The results of the study indicate that presently available vehicle design and instrumentation techniques, as well as existing range facilities, may be employed

1,112

Cook, J.C. 1960 THE GRAVITATION PHENOMENON AND ITS ENERGY IMPLICATIONS. (Symposium on Medical and Biological Aspects of the Energies of Space, at The School of Aviation Medicine (USAF), Brooks AFB, Texas)

1,113

Cook, J.E., J.P. Stapp, F.M. Townsend & V.A. Stemtridge 1958 THE PATHOLOGIC FINDINGS IN EXPERIMENTAL ANIMALS SUBJECTED TO RAPID ACCELERATION AND ABRUPT DECELERATION.
(Paper, 1958 Meeting of Aero Medical Association, Statler Hotel, Washington, March 24-26, 1958)

ABSTRACT: Animals are frequently utilized in experiments designed to gain data concerning individual tolerances and safety margins. While those animal tests are not intended to replace actual human participation in evaluating man's ability to withstand physical stress, the properly selected and utilized animals allows for both the examination of living tissues and varied environments without the initial use of human volunteers. This paper presents the pathologic lesions observed in experimental animals subjected to rapid acceleration, abrupt deceleration, supersonic thrust wind blast and prolonged high transverse G. The advantages and disadvantages of the various experimental animals (primates, bears, swine) is given together with pertinent anatomical comparison of the different species. (J. Aviation Med. 29(3):234)

1,114

Cook, J.E., J.D. Mosely & H.J. von Beckh 1959 PATHOLOGY OF VISCERAL DISPLACEMENT IN ANIMAL SUBJECTS EXPOSED TO ABRUPT DECELERATION
(Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: Eight Canadian black bears, approximately two years of age and averaging 160 pounds, were subjected to abrupt deceleration. The subjects were autopsied and analyses were made of the pathologic findings in relation to the G loads sustained. These findings were correlated with positioning and the restraint system used. Studies made on human volunteer subjects exposed to similar forces will be discussed. A description of a self-positioning rat G couch will be shown. The performance of this automatic

G-orienting device, during the bear sled-runs, will be discussed. (J. Aviation Med. 30(3):180, March 1959)

1,115

Cook, J. E., & J. D. Mosely 1960 VISCERAL DISPLACEMENT IN BLACK BEARS SUBJECTED TO ABRUPT DECELERATION. Aerospace Medicine 31(1):1-8, Jan. 1960 See also (Air Force Missile Development Ctr., Holloman AFB, N. Mex.) AFMDC TN 60-6, March 1960

ABSTRACT: Eight American black bears, utilized in abrupt deceleration studies, showed considerable promise as comparative abrupt deceleration subjects. They approximate man's confirmation and weight and stand alone easily on the rear limbs with the head at a normal inclination. Their tolerance to plateau, onset and duration g depends entirely upon positioning and restraint as does man. In the rearward facing position based upon necropsy findings and statements from human volunteer subjects, it appears that the bears' tolerance to abrupt deceleration of less than 0.2 seconds durations is close to that of man. In the forward facing position with a full harness they have sustained g levels with reversible lesions which would be unusually painful and not recommended for human volunteers.

1,116

Cook, James E., John P. Stapp;F. M. Townsend; and V. A. Stembridge 1962 PATHOLOGIC FINDINGS OF EXPERIMENTAL ANIMALS SUBJECTED TO RAPID ACCELERATION AND ABRUPT DECELERATION. (Armed Forces Inst. of Pathology, Washington, DC, and Aero Medical Field Lab.,Air Force Missile Development Center, Holloman AFB, New Mexico) January 1962

1,117

Cooper, K.H. & F.M.G. Holstrom 1961 INJURIES DURING EJECTION SEAT TRAINING. (Paper presented at 32nd annual meeting, Aerospace Medical Association, Chicago, Ill.)

ABSTRACT: The USAF ejection seat trainer used for emergency escape familiarization is an occasional cause of injury to trainees. Injuries that occur are usually minor and related to high headward acceleration of very short duration. Three new cases of coccygeal injury resulting from ejection seat training are reported. The character and magnitude of the accelerative forces, the role of body position, and the protective value of high energy absorbent seat cushions are discussed. Recommendations to minimize the recurrence of such injuries are included. (Aerospace Med., 32(3):227, March 1961)

1,118

Cooper, K.H. 1963 INJURIES DURING EJECTION SEAT TRAINING. Aerospace Medicine 32(2):139-141, Feb. 1963.

ABSTRACT: Ejection seat indoctrination is a valuable training exercise. It occasionally exacts a penalty, usually in the nature of a mild to severe coccygeal injury. These injuries are generally related to unfavorable elastic characteristics of the seat cushions, to improper body position of the trainees and perhaps most important, to unusual accelerative characteristics of certain firings. Use of a firm, energy-absorbing seat cushion, careful attention to body position and use of the blowout patch and modified cartridge should serve to make ejection seat training a safe procedure.

1,119

Cooper, W.N. and M.A. Beaupre 1961 INTERNALIZED ANIMAL TELEMETRY SYSTEM - ENGINEERING CONSIDERATIONS.
(Paper, 1961 Meeting of Aerospace Medical Association, Chicago, April 24-27)

ABSTRACT: This paper describes the engineering development of an improved method of gathering biomedical data. A biological telemetry system was implanted within an animal and subsequently tested under simulated missile conditions. The biological and physical environments are discussed. Engineering aspects of the surgery performed to implant a transmitter and sensing electrodes into two simians is presented. A description is given of an animal support system which includes methods of restraint, couch configuration, protective qualities, and hardward integral with the couch. Formulation of test specifications, amount and type of test performed, and the equipment used, are discussed. Data recorded and the comparative results of these data are described.
(Aerospace Medicine 32(3):227, March 1961)

1,120

Cope, F.W. & B.D. Polis 1957 CHANGE IN PLASMA TRANSAMINASE ACTIVITY OF RHESUS MONKEYS AFTER EXPOSURE TO VIBRATION, ACCELERATION, HEAT, OR HYPOXIA.
(U.S. Naval Air Development Center, Johnsville, Pa.)
NADC-MA-5718. ASTIA AD 209 173.

ABSTRACT: Significant increases in plasma glutamic-oxalacetic transaminase levels were observed in monkeys exposed to vibration, acceleration, heat, hypoxia, or noise and confinement stress. In all but 1 of 17 animals, no specific tissue damage was evident. The increase in plasma transaminase is interpreted as a non-specific stress effect. The data suggest that caution should be exercised in basing clinical judgments on serum transaminase levels. (Author)

1,121

Cope, F.W. 1958 ELASTIC CHARACTERISTICS OF ISOLATED SEGMENTS OF HUMAN AORTAS UNDER DYNAMIC CONDITIONS. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA 5809, 13 Aug. 1958. ASTIA AD 209 084.

See also J. Applied Physiol. 14(1):55-59, Jan. 1959.

ABSTRACT: When isolated segments of human descending thoracic aorta were caused to change their volume rapidly and continuously in sinusoidal fashion with pulse pressures and pulse rates maintained in the physiological range, the resulting pressure-volume curves showed slight but consistent increases in stiffness, compared to pressure-volume curves obtained on the same specimens when inflated stepwise. There was introduced into the pressure measuring system a time lag of sufficient magnitude to eliminate the hysteresis loop. The extent of hysteresis in the aorta was not determined because time lags in the aorta could not be distinguished from time lags in the measuring equipment. (Author).

1,122

Cope, F.W. 1958 EFFECTS OF AGEING, DRUGS, EXERCISE AND OTHER STRESSES ON THE ELASTIC CHARACTERISTICS OF THE INTACT LIVING HUMAN AORTA. (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-5815, 19 Nov. 1958.

ABSTRACT: A method was developed by which aortic distensibility characteristics can be computed in the intact living human, if systolic and diastolic arterial pressures, heart rate and cardiac output are known. In this way the aortic characteristics of a large series of normal men of different ages were computed. Comparing these results with measurements on excised aortas, a more pronounced trend toward increasing aortic stiffness with increasing age is evident in living than in dead aortas. Norepinepherine and exercise apparently cause the living aortas to constrict but to become more distensible. The same change occurs after 30 min. of high spinal anesthesia. The ganglionic blocking agents hemamethonium pentamethonium, and tetraethylammonium usually cause the living aorta to become stiffer, presumably due to dilation. The aortas of patients with pulmonary disease usually react in different fashion to exercise or tetraethylamnonium. The increased aortic distensibility that occurs with the hypertension induced by norepinepherine or exercise acts as a compensatory mechanism by decreasing systolic pressure. (Author)

1,123

Cope, F.W. 1958 EFFECTS OF AGEING, DRUGS, EXERCISE AND OTHER STRESSES ON THE ELASTIC CHARACTERISTICS OF THE INTACT LIVING HUMAN AORTA. (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-5815, 19 Nov. 1958.

ABSTRACT: A method was developed by which aortic distensibility caracteristics can be computed in the intact living human, if systolic and distolic arterial

1,124

Cope, F.W. 1959 PROBLEMS IN HUMAN VIBRATION ENGINEERING. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA 5902, 6 March 1959. ASTIA AD 216 507.

See also Ergonomics 3(1):35, Jan. 1960.

ABSTRACT: Vibration is considered to include the oscillatory motion of traveling vehicles. The predominent linear sinusoidal component of this motion is usually in the vertical direction and of 0-50 cps in frequency. A human or animal, subjected to vibration, may exhibit a variety of symptoms and anatomical damage. These effects may be diminished by shielding the operator from the vibration of the vehicle by means of an elastic device. A variety of suitable devices are available. However, excessive shielding is undesirable in that it will increase the relative motion of the operator with respect to the vehicle which may be expected to cause performance decrements. (Author)

1,125

Cope, F.W., and D. Polis. 1959 INCREASED PLASMA GLUTAMIC-OXALACETIC TRANSAMINASE ACTIVITY IN MONKEYS DUE TO NONSPECIFIC STRESS EFFECT. J. Aviation Med. 30(2):90-96.

ABSTRACT: Significant increases in plasma glutamic-oxalacitic transaminase levels in monkeys have been found after exposure to vibration, acceleration, heat, and noise and confinement stress. In all but one of fourteen animals, no specific tissue damage was evident. Repeated exposure of the same monkey to the same intensity of vibration stress produced progressively smaller mean increases in the plasma transaminase levels. The data suggest that an increas in plasma transaminase activity can occur as a nonspecific stress effect. It follows that caution should be exercised in basing clinical judgements on serum transaminase levels.

1,126

Cope, F.W. & B.D. Polis 1959 SOME EFFECTS OF PROLONGED LOW FREQUENCY VIBRATION ON THE MOLECULAR AND CELLULAR COMPOSITION OF BLOOD
Journal of Aviation Medicine 30: 90-96, 1959
See also: U.S. Naval Air Development Center Rep't. No. NADC-MA-5715, Nov. 6, 1957

ABSTRACT: Thesus monkeys were exposed to vertical sinusoidal vibration of amplitude 0.1 inch and frequency 20 cps for 3 hours a day for 8-12 successive days. The monkeys were strapped in a sitting position on a vertically vibrating table top. Control monkeys were placed nearby. The vibrated monkeys showed no grossly visible abnormalities. On the first day of vibration, the neutrophile counts and plasma transaminase levels rose abruptly, and then gradually decreased as

the vibration was repeated on successive days. These changes were interpreted as nonspecific changes such as may be characteristic of the General-Adaptation-Syndrome and do not necessarily indicate any specific tissue damage such as myocardial infarction of the monkey. Similar changes of lesser magnitude were produced by merely handling the monkeys. Plasma glucose and ascorbic acid levels and eosinophile counts, which are known to change with stress, were maximally depressed by the mild stress of handling the animals. No additional effect on these determinations could be ascribed to vibration. The data obtained with monkeys suggest that a rise in transaminase activity merely reflects a general response to a stressful state.

1,127

Cope, F.W. 1960 PROBLEMS IN HUMAN VIBRATION ENGINEERING.
Ergonomics 3(1):35. Jan. 1960.
See also (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5902, 6 March 1959. ASTIA AD-216 507.

ABSTRACT: Vibration is considered to include the oscillatory motion of traveling vehicles. The predominent linear sinusoidal component of this motion is usually in the vertical direction and of 0-50 cps in frequency. A human or animal, subjected to vibration, may exhibit a variety of symptoms and anatomical damage. These effects may be diminished by shielding the operator from the vibration of the vehicle by means of an elastic device. A variety of suitable devices are available. However, excessive shielding is undesirable in that it will increase the relative motion of the operator with respect to the vehicle which may be expected to cause performance decrements. (Author)

1,128

Cope, F. W. 1961 AN AUTOMATED SYSTEM FOR THE STUDY OF MENTAL FUNCTION IN THE HUMAN SUBJECTED TO ACCELERATION STRESS.
(Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.)
Rept. no. NADC-MA-6113 Sept. 8, 1961. ASTIA AD 263 609

ABSTRACT: A design is given for a system that provides a continuous, easily analyzable record of a subject's mental functioning as measured by response time during a period of acceleration or other stress. The subject is given the task of adding 2 random numbers which are given to him via his earphones every 3 seconds. The subject is told to press a right or left hand switch according to whether the answer is even or odd. A continuous readout is presented by small combination analog-digital computer system. The steepness of the slope of the output record indicates the speed and/or accuracy of the subject's mental functioning. Preliminary studies using the above method showed that mental functioning seems to be slowed during acceleration stress. For acceleration studies, the method has the advantage of giving an indication of mental function independent of changes in vision occurring during greyout. (Author)

1,129

Cope, F. W. 1961 A METHOD FOR THE COMPUTATION OF AORTIC DISTENSIBILITY IN THE LIVING HUMAN PATIENT.
(US Naval Air Development Center, Johnsville, Pa.)
April 3, 1961 NADC-MA-6109: 1-6

1,130

Cope, F.W. and R.E. Jensen 1961 PRELIMINARY REPORT ON AN AUTOMATED SYSTEM FOR THE STUDY OF MENTAL FUNCTION IN THE HUMAN SUBJECTED TO ACCELERATION STRESS. (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-6113, 8 Sept. 1961. ASTIA AD 263 609.

ABSTRACT: A design is given for a system that provides a continuous, easily analyzable record of a subject's mental functioning as measured by response time during a period of acceleration or other stress. The subject is given the task of adding 2 random numbers which are given to him via his earphones every 3 seconds. The subject is told to press a right or left hand switch according to whether the answer is even or odd. A continuous readout is presented by a small combination analog-digital computer system. The steepness of the slope of the output record indicates the speed and/or accuracy of the subject's mental functioning. Preliminary studies using the above method showed that mental functioning seems to be slowed during acceleration stress. For acceleration studies, the method has the advantage of giving an indication of mental function independent of changes in vision occurring during greyout.

1,131

Coplan, M. J. 1960 RE-ENTRY DRAG DEVICES STUDIED.
Missiles and Rockets 7(22):48, 63, Nov. 28, 1960

ABSTRACT: Research is being conducted on the development of ideal materials for expandable drag devices.

1,132

Coppa, A.P. 1958 STRUCTUAL CONSIDERATION OF MANNED SPACE VEHICLES.
(Paper presented at ARS 13th annual meeting, 17-21 Nov 1958, New York)
ARS paper no. 732-58

ABSTRACT: This paper considers the structural requirements for a manned space vehicle. It gives approaches leading to an optimum vehicle, considering the requirements of thermodynamics and human factors, in addition to structure. Several space vehicle configurations are presented including a ballistic and a glide type in order to exemplify some of the structural problems encountered in each type during the phases of space flight, entry into an atmosphere, and landing. These include aerodynamic heating and loading, meteoroid impact, and other problems. Materials and constructions are discussed sufficiently to demonstrate available choices and indicate areas of required development.

1,133

Corazzi, U. 1961 POSSIAMO VIVERE NELLO SPACIO? (COULD WE LIVE IN SPACE?) Oltre il cielo (Rome), 5(90):271-274, Oct. 1961. (In Italian)

ABSTRACT: This is a review of the studies done by Colonel Professor Rodolfo Margaria, director of the Institute of Physiology of the University of Milano. The review includes his studies on high altitude physiology, aviation medicine, protection from accelerative forces, respiration and position sense, space flight physiology, mammalian resistance to acceleration, effects of zero gravity on the otolithic apparatus, and the effects of interplanetary voyages on the central nervous system and mental conditions. There is also a biographical sketch of the author included.

1,134

Corbin, K. B. & H. L. Williams 1960 DIZZINESS The Medical Clinics of North America 44(4):941-951.

ABSTRACT: Dizziness and vertigo may be defined as unreal sensations of movement. Dizziness is caused by a variety of conditions, and patients use the term to describe various sensations. True rotary vertigo usually indicates a disturbance in the vestibular mechanism, anywhere from the end-organ to the cerebral cortex; on the other hand, faintness or lightheadedness usually indicates a cerebral vascular disturbance due to a variety of causes. This paper is concerned with the differential diagnosis of diseases in which a principal complaint is dizziness or vertigo and in which the sensation of unreal movement is due to a dysfunction of some part of the vestibular system, anywhere from labyrinthine end-organ to cerebral cortex.

1,135

Cordy, R.N. 1961 SPRING MASS DAMPED SYSTEM EXPONENTIAL RESPONSE. (Atomics International, North American Aviation) NAA-SR-Memo-6171 27 June 1961.

ABSTRACT: The second order equation describing spring-mass-damped systems is solved for exponential forcing functions. The results, presented as amplitude and time delay errors, are plotted for large ranges of natural frequency, damping and exponential period.

1,136

Corey, E.L. 1946 MEDICAL ASPECTS OF BLAST U.S. Nav. Med. Bull. 46:623-652

1,137

Corkindale, K.G. 1961 PSYCHOLOGICAL PROBLEMS OF SPACE FLIGHT. New Scientist (London), 10(236):457-459. May 23, 1961.

ABSTRACT: The effects of the following psychological stresses on performance and behavior of the astronaut are summarized: high g forces, weightlessness, isolation, restraint, and sensory deprivation.

1,138

Cörmann, R. 1940 UNTERSUCHUNGEN ÜBER DIE EINWIRKUNG VON SCHWINGUNGEN AUF DEN MENSCHLICHEN ORGANISMUS (Investigation of the Effects of Vibration Upon the Human Organism)
Luftfahrtmedizin 4: 73-117.

1,139

Cornell University 1948 NEED OF MULTI-G ACCELERATION-DECELERATION RESEARCH (Cornell University Medical College, Cornell Committee for Air Safety Research October 22, 1948

ABSTRACT: During the past five years the Crash Injury Research project has studied the causes of serious and fatal injuries in more than 600 survivable aircraft accidents. Data for the study have come principally from accidents in small planes. Lack of multi-g research facilities for studying the mechanics of structures and the mechanics of the human body under heavy dynamic loads has left an important part of aviation's safety problem completely unexplored. The universal lack of knowledge of the forces present in crashes makes interpretation of accident-injury details difficult. The Crash Injury Research project and all groups concerned with the future safety of flying have a deep interest in multi-g acceleration-deceleration facilities, for such facilities will permit research on the basic factors governing chances of safety in severe crack-ups: (1) energy absorption by structure, (2) optimum relationships between the human body and surrounding aircraft structure under conditions of crash force.

1,140

Cornell University Medical College 1950 HUMAN TOLERANCE OF CRASH DECELERATION (Cornell Committee for Air Safety Research, Cornell University Medical College, New York) 31 Jan. 1950. ASTIA AD 208 667.

ABSTRACT: Human volunteers have been subjected to decelerations of 35 g without injury. Jolt loads of 57g have been recorded on safety belts and shoulder harness during 35g decelerations. Results of this research indicate

that the strength of aircraft structures and installations, rather than the strength of the human body, is the limiting factor in pilot protection. Experiments with the rocket sled developed by Northrop Aircraft concerning body positioning and shoulder harness during deceleration is making military flying much safer.

1,141

Cornell University Medical College 1951 INFORMATIVE ACCIDENT RELEASE NO. 12. DETAILS OF HASTINGS CRASH NEAR BENINA, LYBIA; AND DETAILS OF VALETTA CRASH NEAR STOCKHOLM, SWEDEN. (Crash Injury Research, Cornell University Medical College, New York) 22 May 1951.

1,142

Cornell University Medical College 1952 CRASH INJURY STUDY OF THE NORTHEAST AIRLINES - CONVAIR 240 ACCIDENT AT LAGUARDIA AIRPORT ON JAN. 14, 1952. (Crash Injury Research, Cornell University, New York) August 1952. ASTIA TIP U-13763.

ABSTRACT: This report describes the basic accident-injury findings of the Convair Accident. Relationships between crash force, seats, safety belts, structures and injuries are discussed ans summarized in order to record useful information for future considerations of crashworthy design.

1,143

Cornell University Medical College 1952 SHOULDER HARNESS: ITS USE AND EFFECTIVENESS. (Crash Injury Research, Cornell University, New York) Nov. 1952.

1,144

Cornell University 1956 GENERAL DESIGN REQUIREMENTS FOR CRASH WORTHINESS AND DE-LETHALIZATION OF PASSENGER TRANSPORT AIRCRAFT (Aviation Crash Injury Research of Cornell University) Naval Research Contract NONR 401/21, AV-CIR-0-45/67 August 1956

1,145

Cornell University Medical College 1956 AN EVALUATION OF SAFETY BELT EFFECTIVENESS IN AUTOMOBILE ACCIDENTS. (AS DEMONSTRATED BY A CLINICAL STUDY OF 236 OCCUPANTS OF 162 CARS IN RURAL ACCIDENTS) (Automotive Crash Injury Research, Cornell University Medical College, New York, New York)

1,146

Cornell Aeronautical Laboratory, Inc. 1958 CORNELL PROBES WEIGHTLESSNESS. Aviation Week 68(2):26-28. 13 Jan. 1958.

ABSTRACT: A review of work being done at Cornell Aeronautical Laboratory, Inc. for Air Research and Development Command. The work reviewed concerns investigation of the efficiency of man's intellectual functions as opposed to physiological reactions, during weightless space travel in rockets, satellites or other space vehicles.

1,147

Cornell Aeronautical Laboratory 1958 CORNELL INVESTIGATES WEIGHTLESSNESS. Missiles and Rockets, 3(2):138 Feb. 1958

ABSTRACT: Cornell Aeronautical Laboratory has recommended to the USAF experiments in which both a monkey and a rat would be sent aloft in a capsule enclosed within the nose of a rocket to study animal behavior under conditions of weightlessness. Some data on the studies made by CAL which resulted in the recommendation for experiments.

1,148

Cornell University 1958 ANNUAL REPORT AVIATION CRASH INJURY RESEARCH OF CORNELL UNIVERSITY, AUGUST 15, 1957 THROUGH NOVEMBER 15, 1958 (Aviation Crash Injury Research, Cornell University, Naval Research Contract No. Nonr-4-1(21) Feb. 16, 1959. ASTIA AD 210 703

ABSTRACT: A report on the objectives and tasks, general program, publications, and investigations of Av-CIR.

1,149

Cornell-Guggenheim Aviation Safety Center 1961 RELATIONSHIP BETWEEN IMPACT VARIABLES AND INJURIES SUSTAINED IN LIGHTPLANE ACCIDENTS. (Cornell-Guggenheim Aviation Safety Center, New York) Contract DA 44-177-tc-707; TREC TR 61-95; AvCIR 61-5; ASTIA AD-263 676L

ABSTRACT: Impact conditions are related to injuries sustained by 248 occupants involved in lightplane crashes. Seat tie-down and belt restraint were considered effective and structural collapse was generally not extensive, yet one of every four occupants was killed. Injury severity, fatality rate, and incidence of injury to all areas of the body - except the lower torso and thoracic-lumbar spine - were directly related to impact velocity and to angle of impact but inversely related to stopping distance. Lumbar and thoracic spine injuries occurred more frequently in low-angle, long deceleration crashes. It was concluded that crucial injuries largely stem from flailing of the body against injury-producing structures within the occupant's environment. Belt restraint is thus seen to play only a moderate role in reducing injury severity. The need for additional safety measures is emphasized. (AUTHOR)

1,150

Cortesi, Arnaldo 1959 LOSS OF FOUR RUSSIANS IN SPACE REPORTED... ITALIAN NEWS AGENCY SAYS DEAD IN TESTS SINCE '57 INCLUDED A WOMAN. The New York Times, 14 December, p. 9.

ABSTRACT: A report received from the Italian News Agency Continentale notes unsuccessful Russian attempts to put humans into space on four occasions. Source is attributed to "most reliable sources in Prague". All four attempts were made from the missile base of Kapustin Yar near Aralsk on Lake Aral. Alexei Ledowsky, the first to lose his life in 1957, was followed by instruments to less than 200 miles. His rocket transmissions were "abruptly terminated" and nothing further was heard of him. A second astronaut, Serenty Schiborin, was fired in a rocket in 1957 and lost in space. The two fatal launchings, according to Continentale, caused the Russians to pause for over a year before the next attempts, However Andreii Mitkov was killed in January, 1959, after the successful launching of the first Soviet moon rocket. His rocket exploded 20 minutes after launch. Continentale reported that the woman, Mirija Grozov, lost her life in a "space vehicle" rather than a rocket, similar to the U.S. X-15, but did not report under what conditions she was killed.

1,151

Cotner, J. S. 1962 ANALYSIS OF AIR RESISTANCE EFFECTS ON THE VELOCITY OF FALLING HUMAN BEINGS.
(Civil Aeromedical Research Institute, Oklahoma City) Unpublished Paper.

ABSTRACT: Data is provided on the effect of air resistance on the velocity of falling bodies. A simple method employing a closed-form solution for velocity at impact was devised for fall cases where body position and clothing condition were observed to be constant. Tables and curves providing direct graphical solution were included. (CARI)

1,152

Cotner, J.R. and J. Weertman 1961 BIBLIOGRAPHY ON HIGH SPEED DEFORMATION OF MATERIALS 1950 - 1961. (Northwestern Technological Inst., Evanston, Ill.) ASTIA AD-261 376

ABSTRACT: Abstracts of the literature, from 1950 to 1961, dealing with high speed deformation of materials are given in this bibliography. References concerning stress wave propagation are included to aid in the understanding of the deformation. The arrangement of the abstracts is chronological with an alphabetic sequence within each year. An author index is included. The principal reference works used are : American Society of Metals Review of Metal Literature Applied Mechanics Reviews: Physics Reviews; Journal of Applied Physics; Journal of Applied Mechanics; American Society for Testing Materials, Proceedings: Proceedings of the Society for Experimental Stress Analysis; Transactions of the American Institute of Mining and Metallurgical Engineers, the Metallurgical Society; Proceedings of the Conference on the Properties of Materials of High Rates of Strain: Proceedings of Third Symposium on Hypervelocity Impact; Plasticity, Structural Mechanics; and Repsonse of Metals to High Velocity Deformation. (Author)

1,153

Cotten, F.S. 1945 AN AERODYNAMIC SUIT FOR THE PROTECTION OF PILOTS AGAINST BLACKOUT. Australian J. So. 7:161-166

1,154

Cotten, F.S. & J.H. Tyrer EXPERIMENTAL RESULTS ON THE AMOUNT OF PROTECTION AGAINST G AFFORDED BY RESTRICTING CAAC SUIT TO "LEGS" PLUS A BELT. (Flying Personnel Research Committee, Royal Austrailian Air Force) RAAF-FR 83(a)

ABSTRACT: With the convention that the unprotected blackout threshold equals 100, results obtained from grayout data on the centrifuge so far are as follows:

(a) The average error of a single test of a series carried out during one centrifuge run is less than 3%.

(b) The average error of the mean value of individual tests in one centrifuge run is less than 2%.

(c) The capacity of any subject to withstand "g" often shows a progressive change during a series of tests, and if this is not taken into account, serious errors may be introduced.

(d) The average "g" threshold using "legs" of suit alone is 121.

(e) Average threshold using "legs" plus air belt is 128.

(f) Average threshold using whole suit is 134.

(g) Values (d) and (f) are probably reliable; value (e) is probably too low.

(h) More protection is given by the suit to those with low initial "g"-thresholds than to those with high thresholds.

1,155

Cotzin, M., C. J. Hill, & G. R. Wendt 1955 STUDIES OF MOTION SICKNESS. XIV. Subjective reports of the apparent path of motion on a vertical Accelerator. J. Psychol. 39:417-421

1,156

Coughlin, W. J. 1955 FORCE OF 10 HURRICANES BUFFET EJECTED PILOT (GEORGE F. SMITH). Aviation Week, 14 November 1955 63(20):14-17

See Also: Anon. 1955 George Smith's Phenomenal Escape.

ABSTRACT: In this report, many of the technical and medical problems about supersonic ejected pilots are told for the first time by a survivor, test-pilot G.F. Smith, who makes a low-altitude supersonic bailout and survives.

1,157

Courtney, M.D. 1951 RECENT NAVY AERO-MEDICAL EQUIPMENT DEVELOPMENTS. Journal of Aviation Medicine, 22(6):540-543 Dec. 1951

ABSTRACT: New developments in protective equipment for pilots of high performance aircraft which include helmets and flying suits, improved bail-out devices and techniques and oxygen equipment.

1,158

Courtney, M. D., & J. L. Brown 1955 HUMAN LIMITATIONS IN AIRCRAFT CATAPULT AND ARRESTING. PHASE II. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 318; TED ADC AE 1407; 31 Dec. 1955

ABSTRACT: An investigation has been made of the nature of acceleration patterns obtained with existing catapults, including the XC-7 steam catapult. The nature of control which must be exercised on aircraft immediately after launching has been obtained from the Aeronautical Instruments Laboratory. This information was compared with information obtained by interviewing a number of pilots as to the nature of the control which they must perform during carrier take-off and arrested landing. With this background information, a simulated control task was devised which would provide a basis for measuring performance decrement as a function of acceleration. Instrumentation for this control task has been assembled by the Aeronautical Instruments Laboratory.

1,159

Courville, C.B. 1942 STRUCTURAL CHANGES IN THE BRAIN CONSEQUENT TO TRAUMATIC DISTURBANCES OF INTRACRANIAL FLUID BALANCE Bulletin of the Los Angeles Neurological Society 7:55-76

1,160

Courville, C.B. 1945 COUP-CONTRECOUP MECHANISM OF CRANIOCEREBRAL INJURIES Archives of Surgery 45:19-43, June 1945

1,161

Covey, R.E. 1962 XII. AERODYNAMIC FACILITIES A. 21-INCH HYPERSONIC WIND TUNNEL
In: Jet Propulsion Laboratory Research Summary No. 36-13 ASTIA AD 274 011

ABSTRACT: A preliminary investigation Test WT 21-C4C, was conducted to determine the minimum starting and running compression ratios for Mach Number 9.3 in the hypersonic wind tunnel. The purpose of this test was to establish the existing diffuser efficiency for the tunnel. In future tests, the minimum starcin g and

running compression ratios for Mach Numbers 6.0 and 8.0 will be obtained. Transient and steady-state heat transfer were studied in Test WT 21-C10E by JPL, using a 3-in. diameter hemisphere-cylinder model in the 21-in. hypersonic wind tunnel. Test WT 21-C22B was conducted by JPL as part of a program to develop a small stagnation temperature probe useful in the hypersonic region. Test WT 21-C22C was conducted by JPL as part of a program to develop a hypersonic stagnation temperature probe capable of measuring the stagnation temperature, without instrument error, over a large range of Mach Number, Reynolds Number, and temperature.

1,162

Covey, R.E. 1962 XII. AERODYNAMIC FACILITIES B. 20-INCH SUPERSONIC WIND TUNNEL
In: Jet Propulsion Laboratory Research Summary No. 36-13 ASTIA AD 274 011

ABSTRACT: Test WT 20-484 was conducted by JPL to investigate the feasibility of obtaining dynamic stability coefficients in a wind tunnel. Test results are currently being analyzed. Future effort will concentrate on this and the improvement of hartware and data acquisition and reduction methods. Test 20-C43A was conducted to determine the usefulness of a heated stagnation temperature probe in surveying the tunnel thermal boundary layer and the wake behind a cylinder in supersonic flow. The cylinders used were 0.5, 1.5, and 2.0 in. in diameter. Data were obtained at Mach Number 3.74. The results of the test are now being analyzed. Test WT 20-482 was a test of North American Aviation Company (Downey) 42-in. long, 10-deg included angle cone model. The purpose of the test was to investigate the effect of two-dimensional disturbance elements on boundary layer transition with zero heat transfer.

1,163

Coy, R. G. 1956 INVESTIGATION OF THE RELATIVE EFFICIENCY OF PILOT PARACHUTES. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 56-147; ASTIA AD-89 095; March 1956

ABSTRACT: The relative efficiency of pilot parachutes MA1, MA1A, MA1B, and MA1C was evaluated by measuring and determining the forces, impulses, and time to deployment when deploying a portion of the main canopy from a dummy mounted in a vertical wind tunnel. Pressure distribution tests were completed by measuring the total pressures during simulated free fall in a vertical wind tunnel. The results indicated that Pilot Chute Type MA1A deploys in a shorter time than the other three types tested for a dummy angle of zero degrees. Types MA1 and MA1B transmit less energy to the test rig and have smaller average and peak force values than Types MA1A and MA1C at dummy angles of 0, 45, and 90 degrees. (AUTHOR)

1,164

Craddick, R. A. 1963 PSYCHOLOGICAL CORRELATES OF BIODYNAMIC STRESS. (New Mexico State University, Las Cruces, New Mexico)

ABSTRACT: Current research studying psychological correlates of biodynamic stress at Holloman AFB suggests several methodological problems. An outline of the methodological approach being used and concurrent problems will be discussed. Comparisons of performance on various psychological tests prior to and immediately after experiencing different "S" stress on sled-run impact are being studied. Over-all performance changes following six months of biodynamic stress will be measured. Discussion of five subjects exposed to over 500 cumulative "G" stress will be discussed in terms of their test performances. (Aerospace Medicine 34(3): 251, March 1963)

1,165

Cragun, M.K., ed. 1962 THE FIFTH STAPP AUTOMOTIVE CRASH AND FIELD DEMONSTRATION CONFERENCE. SEPT. 14-16, 1961. (Minneapolis: University of Minnesota, 1962)

1,166

Craig, P. H., K. R. Coburn, R. F. Gray, & E. L. Beckman 1960 THE PATHOLOGICAL CHANGES PRODUCED IN LARGE PRIMATES EXPOSED TO HIGH POSITIVE G WHILE IMMERSED IN A WATER CAPSULE. (Paper, 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960)

ABSTRACT: The biological changes which resulted when large primates were exposed to high positive G while immersed in a sealed, water-capsule have been evaluated by standard clinical methods and by the use of gross and microscopic pathology techniques. The findings from these studies will be presented.

1,167

Craig, R. B. & J. E. Colleary 1961 EVALUATION OF THE TE-15 and TM-19 RUNWAY ARRESTING GEARS WITH CARRIER-BASED AIRPLANES. (Naval Air Test Center, Patuxent River, Md.) Proj. TED No. PTR RSSH-31001, Serial No. FT2221-263, August 1961. ASTIA Doc. No. AD-264 588.

ABSTRACT: Seventy-four arrestments were performed into the TE-15, dual engine, rotary brake, nylon tape arresting gear located at Edwards AFB, California. Model A4D, F8U, and F3H airplanes are compatible for power-on landings at engaging speeds up to 170 kt. The model A3D airplane at

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48,000 lb. [illegible] for power-on landings at engaging speeds up to 160 kt. The model A3D airplane at 67,000 lb. is limited to an engaging speed of 140 kt. with power off. All aircraft can be arrested up to 50 ft. off-center with the exception of the model A4D. This airplane should be limited to 25 ft. off-center whenever possible. Two-blocking of the arresting gear can occur under certain conditions. The pendant supports tested were not of optimum design for an emergency gear. It is recommended that airplane compatibility tests be conducted to determine an optimum pendant support and that certain discrepancies in the arresting gear configuration be investigated which prevented testing of the arresting gear to maximum capacity (Author)

1,168

Cramer, R.L. 1961 SOME NEW NEUROPHYSIOLOGIC STUDIES ON MOTION SICKNESS AND ITS THERAPY. (Paper, 1961 Meeting of Aerospace Medical Association, Chicago, April 24-27)

ABSTRACT: This study is concerned with determining the locus of effect of various anti-motion sickness drugs. Although a number of currently available preparations have demonstrable prophylactive effects against motion sickness, little is known of the locus of their effect in the systems mediating autonomic responses to vestibular stimulation. If the vestibular nerve and nuclei are affected, then intravenous administration of these drugs should modify the responses of single cells in the vestibular nuclei to standard electrical stimulation of the Eight Nerve in decerebrate and decerebellate cat. Positive results will indicate that administration of these drugs to flying personnel must be considered carefully from the point of view of effects on other vestibular responses, including spatial disorientation. (Aerospace Medicine 32(3):277, March 1961)

1,169

Crampton, G.H. 1958 VESTIBULAR PHYSIOLOGY AND RELATED PARAMETERS IN ORBITAL FLIGHT. (Paper read at Symposium on "Possible Uses of Earth Satellites for Life Science Experiments", Washington, D.C., 14-17 May 1958)

1,170

Crampton, G.H. 1960 EFFECTS OF THE AROUSAL REACTION ON NYSTAGMUS HABITUATION IN CATS. (U.S. Army Medical Research Laboratory, Fort Knox, Ky.) AMRL Report No. 434, 24 Aug. 1960. ASTIA AD 242 786.

ABSTRACT: The purpose of this experiment is to examine the habituation or decrement of ocular nystagmus found with repeated angular acceleration of an animal in total darkness and to relate this decrement to the animal's state of alertness or arousal. It was found that habituation of nystagmus can be

attenuated by alerting the animal with sounds. However, neither occasional alerting by auditory stimuli nor a continuous alerting stimulus sustained by cutaneous electric shock prevent habituation from occurring. Furthermore, drowsiness of of an animal, as indicated by electroencephalographic analysis, is not the only variable responsible for a decrement of nystagmus. Other factors, not yet identified, must be of importance.

1,171

Crampton, G.H. 1961 HABITUATION OF VESTIBULAR NYSTAGMUS IN THE CAT DURING SUSTAINED AROUSAL PRODUCED BY D-AMPHETAMINE. (U.S. Army Medical Research Lab., Ft. Knox, Ky.) Report No. 488. ASTIA AD 263 258.

ABSTRACT: These observations were designed to determine if habituation of ocular nystagmus in total darkness would occur when cats were maintained in a continuous state of arousal with d-amphetamine sulfate.

Amphetamine served to increase nystagmic output of the drug group by nearly 60 per cent over that of the control group, but the drug group showed a habituation that was equal in magnitude to that of the control group.

A loss of nystagmic output does occur in cats that cannot be attributed simply to a loss of generalized arousal. Other factors must be of importance to the habituation process. Two factors that have been proposed, (a) learning, and (b) fatigue of sensory and neural structures, are discussed.

1,172

Crampton, G. H., & W. J. Schwam 1961 TURTLE VESTIBULAR RESPONSES TO ANGULAR ACCELERATION WITH COMPARATIVE DATA FROM CAT AND MAN. (Army Medical Research Lab., Fort [illegible], Ky.) [illegible] No. [illegible], Project No. 6795-25-001, ASTIA AD-255 879L

ABSTRACT: Under conditions in which visual cues were virtually eliminated, the box turtle (Terrapene c. carolina) responded to angular acceleration with a deviation of the head graded according to the intensity and duration of the stimulus. The head-turning continued throughout an acceleration and a subsequent deceleration served to return the head toward its normal central position. Habituation did not occur, nor could a vestibular ocular nystagmus be recorded. A similarity was found between the turtle head turning response and the slow phase of ocular nystagmus of cat and of man. (AUTHOR)

1,173

Crampton, G. H. & W. J. Schwam 19[illegible] TURTLE VESTIBULAR RESPONSES TO ANGULAR ACCELERATION WITH COMPARATIVE DATA FROM CAT AND MAN (USA Medical Research Lab., Fort Knox, Ky.) USAMRL Proj. 6X95 25 001, Task 06, Rep. 471, April 1961.

ABSTRACT: To examine responses of the turtle (Terrapene c. carolina) to angular acceleration, four turtles were subjected to a series of calibrated angular accelerations in the horizontal plane designed to survey the relevant features of the head movement response to vestibular stimulation. In addition, an examination was made for ocular vestibular nystagmus. Finally, the head response was compared with representative records of ocular nystagmus from a cat and a man. Recommendations were made concerning the usefulness of the turtle for studying vestibular effects of accelerations existing during orbital space flight. (Tufts)

1,174

Crampton, G. H., & W. J. Schwam 1961 EFFECTS OF AROUSAL REACTION ON NYSTAGMUS HABITUATION IN THE CAT. American J. Physiology 200(1):29-33
NOTE: Reel 7, Flash 7, Item 10

ABSTRACT: The effects of the arousal reaction on the reduction or habituation of nystagmus in unanesthetized cat repeatedly rotated in darkness were determined. A reduction in nystagmus was correlated with drowiness as indicated by the electro encephalogram, but alerting an animal by sounds occasioned only a temporary and partial recovery of nystagmus. Further, a continuous arousal sustained by cutaneous electric shock stimuli did not prevent habituation. It is concluded that drowsiness or reduction of alertness is not wholly responsible for the nystagmic reduction and that other factors, not yet identified, play a powerful role. (AUTHOR)

1,175

Crampton, G. H. 1962 EFFECTS OF VISUAL EXPERIENCE ON VESTIBULAR NYSTAGMUS HABITUATION IN THE CAT. (US Army Medical Research Lab., Fort Knox, Ky.) Rept. No. 547, 13 Aug. 1962

ABSTRACT: Separate groups of ten cats each were exposed to three specific varieties of visual experience during a series of angular accelerations, and then compared on a test trial in darkness to three control groups of ten cats each that had received the same acceleration experience but without concomitant visual stimulation. Animals were maintained in a high state of arousal with d-amphetamine. Electro-oculographic recordings showed that the nystagmic response decrement was prominent for all six groups and that the visual experience neither hastened nor slowed the habituation process. (AUTHOR)

1,176

Crampton, G. H. 1962 EFFECTS OF VISUAL EXPERIENCE ON VESTIBULAR NYSTAGMUS HABITUATION IN THE CAT.
Acta Otolaryng (Stockholm) 55:516-526, Nov.-Dec. 1962.

1,177

Crampton, G.H. and W.J. Schwam 1962 TURTLE VESTIBULAR RESPONSES TO ANGULAR ACCELERATION WITH COMPARATIVE DATA FROM CAT AND MAN
Journal of Comparative & Physiological Psychology, 55:315-321

ABSTRACT: Under conditions in which visual cues were virtually eliminated, the box turtle (Terrapene c. carolina) responded to angular acceleration with a deviation of the head graded according to the intensity and duration of the stimulus. The head-turning continued throughout an acceleration and a subsequent deceleration served to return the head toward its normal central position. Habituation did not occur, nor could avestibular ocular nystagmus be recorded. A similarity was found between the turtle head-turning response and the slow phase of ocular nystagmus of cat and of man.

1,178

Crampton, G. H. 1962 DIRECTIONAL IMBALANCE OR VESTIBULAR NYSTAGMUS IN CAT FOLLOWING REPEATED UNIDIRECTIONAL ANGULAR ACCELERATION.
(U. S. Army Medical Research Lab., Fort Knox, Ky.)
Project No. 6X99-28-001, Report No. 529, Jan. 22, 1962. ASTIA AD 272 380
Also see Acta. Otolaryng. (Stockholm) 55:41-48, July-August 1962.

ABSTRACT: Cats were subjected to schedules of angular accelerations to determine if a marked nystagmic habituation to accelerations of one direction would "transfer" and thus cause a reduced nystagmus to accelerations of the opposite direction. All testing was in total darkness and animals were maintained in a state of continuous arousal with d-amphetamine. It was found that habituation does not transfer, that nystagmus in the untested direction remains undiminished, and that a directional imbalance is the result.

1,179

Crampton, G.H. 1962 DIRECTIONAL IMBALANCE OF VESTIBULAR NYSTAGMUS IN CAT FOLLOWING REPEATED UNIDIRECTIONAL ANGULAR ACCELERATION
Acta Otolaryngologica, 55:41-48 July Aug.,1962

ABSTRACT: Cats were subjected to schedules of angular accelerations to determine if a marked nystagmic habituation to accelerations of one direction would "transfer" and thus cause a reduced nystagmus to accelerations of the opposite direction. All testing was in total darkness and animals were maintained in a state of continuous arousal with damphetamine. It was found that habituation does not transfer, that nystagmus in the untested direction remains undiminished, and that a directional imbalance is the result.

Cranmore, D. 1954 LETHAL LEVELS AND GROSS PATHOLOGY OF RATS EXPOSED TO POSITIVE AND NEGATIVE FORCES OF ACCELERATION. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5410; ASTIA AD-39 424

ABSTRACT: In a study of the lethal levels of stress acceleration, 269 male albino rats were subjected to various combinations of magnitude and duration of positive or negative G stress. The weights of the rats ranged from 169 to 336 g. Centrifuges with arms 3 and 8 ft. in radius were used. Data on the mortality and gross pathology of the animals are presented. Strength-duration curves and mathematical formulae are included. The minimum survival time (100% survival) was attained at 35 positive G, and the infinite survival (the force at which the time factor ceases to be significant in the response) was at 12 positive G. The spread of these values was sharply decreased for negative G: the minimum survival time was reached at about 15 negative G while the stress tolerated for an infinite was about 3 negative G. Anoxic anoxia was postulated as the immediate cause of death due to acceleration stress. (ASTIA)

1,181

Cranmore, D. 1954 LETHAL LEVELS AND GROSS PATHOLOGY OF RATS EXPOSED TO POSITIVE AND NEGATIVE FORCES OF ACCELERATION. (U.S. Naval Air Development Center, Aviation Medical Acceleration Lab., Johnsville, Pa.) Report No. NADC-MA-5410, 30 July 1954. ASTIA AD 39424

ABSTRACT: Two hundred and sixty-nine male albino rats were subjected to various combinations of magnitude and duration of positive or negative G stress. Data on the mortality and gross pathology of the animals are presented.

Strength-duration curves and mathematical formulae are presented to express the probability of survival for male albino rats in terms of duration of exposure and magnitude of acceleration.

Significant values of G stress are defined on a basis of a constant "minimum survival time," and on a basis of "infinite survival," where time ceases to be a significant factor in mortality from G stress.

Anoxic anoxia is postulated as the immediate cause of death due to acceleration stress. This hypothesis is examined in relation to gross pathological findings and to time factors.

1,182

Cranmore, D. 1955 A POST-MORTEM STUDY OF RHESUS MONKEYS (MACACA MULATTA) AT INTERVALS AFTER SINGLE OR REPEATED EXPOSURE TO NEGATIVE ACCELERATION. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5504, 26 May 1955

1,183

Cram[illegible], D. 1955 PATHOLOGICAL CHANGES PRODUCED BY STRESS OF ACCELERATION. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 306; 31 December 1955; PHASE I

ABSTRACT: Twenty-two rhesus monkeys, with appropriate controls, were subjected to negative acceleration for one or more exposures at levels of 12, 32, or 40 G and killed 15 minutes to 90 days later. Lesions of the brain that might be attributed to acceleration were limited to occasional microscopic hemorrhages, moderate edema and scattered foci of cell loss. These were found in less than half of the animals and occasionally in controls also. Thus the changes in function of the central nervous system that follow exposure to negative G cannot be attributed to vascular accidents. Neither do current histological techniques reveal change in morphology that can be related to changes in function.

Animals subjected repeatedly to negative acceleration developed increased tolerance as indicated by lessening of peripheral hemorrhage and edema, and of the shock-like state induced by acceleration. These changes were accompanied by enlargement of the adrenal cortex and suggest that tolerance to acceleration may be increased by appropriate schedules of conditioning.

1,184

Cram[illegible], D., & H. L. Ratcliffe 1956 A STUDY OF ADAPTATION TO ACCELERATION WITH RATS AND GUINEA PIGS AS TEST ANIMALS. (Naval Air Development Ctr., Johnsville Pa.) NADC-NA-5602; ASTIA AD-90 233

ABSTRACT: Experiments were conducted to explore the possibility of increasing tolerance to acceleration stress by developing appropriate schedules of conditioning. Guinea pigs and rats were subjected repeatedly to negative acceleration at levels that produced temporary loss of balance and respiratory difficulty, facial edema and hemorrhages from the nose, eyes, and ears. These signs decreased in magnitude, and, in some instances, disappeared completely as the schedule continued Other signs of increased tolerance, and evidence of slight to moderate adrenal cortical hypertrophy, led to the conclusion that the animals were undergoing adaptation to acceleration stress, and that increased activity of the adrenal cortex is a factor in this process. (AUTHOR)

1,185

Cram[illegible], D '1956 BEHAVIOR, MORTALITY, AND GROSS PATHOLOGY OF RATS UNDER ACCELERATIVE STRESS. J. Aviation Med. 27(2):131-140, April 1956

ABSTRACT: Two hundred and sixty-nine male albino rats were subjected to various combinations of magnitude and duration of positive or negative g stress. Data on the mortality and gross pathological findings of the animals are presented. Strength-duration curves and mathematical formulae are presented to express the probability of survival of male albino rats in terms of duration of exposure and magnitude of acceleration stress. Significant values of g stress are defined on a basis of a constant minimum survival time, and on a basis of "infinite" survival, where time ceases to be a significant factor in mortality from g stress. This hypothesis is examined in relation to the gross pathological findings and to time factors.

1,186

Crash Injury Research 1950 HUMAN TOLERANCE OF CRASH DECELERATION
31 Jan. 1950 (Crash Injury Research, Cornell University Medical College)

ABSTRACT: The acceleration-deceleration research at Edwards AFB, in which volunteers withstood decelerations of 35 g without injury, is discussed with reference to cabin structure and body supports. A review of the campaign for the shoulder harness is included.

1,187

Craven, C. W. & E. L. Cole 1960 MANNED SPACE OPERATIONS
In Vistas in Astronautics--1960, Volume III. Proceedings of Third AFOSR Astronautics Symposium, Los Angeles, Calif., October 12-14, 1960. (Society of Automotive Engineers, Inc., New York, N. Y.) Pp. 83-84. October 1960.

ABSTRACT: A brief review is given of some of the activities and problems of manned space operations. Acceleration, weightlessness, isolation, work cycles, radiation, restraint and support, and ecological systems are pointed out as areas in which intensified research is needed. (Tufts)

1,188

Creer, Brent Y., Harald A. Smedal & Rodney C. Wingrove 1960
CENTRIFUGE STUDY OF PILOT TOLERANCE TO ACCELERATION AND THE EFFECTS OF ACCELERATION ON PILOT PERFORMANCE
(National Aeronautics and Space Administration, Wash., D. C.)
NASA TN D-337 November
ASTIA AD: 245 411; NASA N62-70911

ABSTRACT: The centrifuge studies showed there could be marked decreases in pilot tracking performance with increases in the magnitude of the impressed accelerations. Pilot comments indicated that in order to have the same level of control over the vehicle, andincrease in the vehicle dynamic stability is required with increases in the magnitude of the acceleration impressed on the pilot. It appears that a great deal of additional research work is warranted in investigating the effects of sustained accelerations on the pilot performance.

The study indicated quite clearly the improvement in tolerance to acceleration times which can be realized through relatively minor improvements in the pilot's restraint system. It would appear that with a suitable restraint, the pilot's tolerance to eyeballs-out accelerations can be made equal to his tolerance to eye-balls-in accelerations. It is suggested in

this study that more meaningful tolerance to acceleration times may be obtained by using highly trained and highly motivated test subjects, as exemplified by the test pilot.

Finally, pilot comments indicated a unanimous preference for the two-axis class of side controller over the three-axis class. The pedal controls used in this study resulted in effective yaw control for most acceleration fields of this investigation.

The experimental setup consisted of a flight simulator with a centrifuge in the control loop. The pilot performed his control tasks while being subjected to acceleration fields such as might be encountered by a forward-facing pilot flying an atmosphere entry vehicle. Information was obtained on the combined effects of complexity of control task and magnitude and direction of acceleration forces on pilot performance. Boundaries of human tolerance to acceleration were established. A comparative evaluation was made of the three-axis type of side-arm controller and the two-axis type in combination with toe pedals for yaw control.

1,189

Creer, B.Y. 1962 INFLUENCE OF SUSTAINED ACCELERATION ON CERTAIN PILOT-PERFORMANCE CAPABILITIES. (Paper presented at 33rd annual meeting of the Aerospace Medical Association, 9-12 April 1962, Atlantic City)

ABSTRACT: The NASA has a continuing study of the effects of large acceleration forces on the pilot of a manned orbital or space vehicle. The objectives of these studies have been to investigate the effects of acceleration on the pilot's ability to perform the required tasks and on the effects of acceleration on the physiological processes of the pilot. These projects have been carried out using the Aviation Medical Acceleration Laboratory Centrifuge, U.S. Naval Air Development Center, Johnsville, Pa. The experimental setup consisted of a flight simulator with the centrifuge in the control loop. In previous Ames Research Center experiments, the influence of acceleration force fields up to 7 g on the pilot's ability to perform were investigated. In experiments which have recently been completed, the subject pilots have performed control tasks while being subjected to acceleration forces up to 14 g for the "eyeballs out" directions, and 9 g for the "eyeballs down" g field direction. The following specific results obtained to date from these research investigations will be presented and discussed: 1. Time tolerance to acceleration boundaries which are believed to apply to the test pilot population will be presented. These boundaries were derived by measuring the longest periods of time a test pilot can manually control a given simulated vehicle, with no marked deterioration in his performance while immersed in a specified, nearly constant elevated g field. (2) In these centrifuge investigations, an index of pilot performance was obtained by having the pilot track a randomly driven target while flying the simulated vehicle. The effect of acceleration on the pilot's ability to track the target, as a function of the length of time, the magnitude and the direction of the applied g field will be presented. Information will also be given on the maximum g beyond which the pilot could not be expected to manually control the simulated space vehicle. (3) Data have been obtained on the influence of rate-of-onset-acceleration on pilot performance, and on the pilot's time-tolerance-to-acceleration. These data will be presented and discussed in terms of the maximum rate-of-onset-of-acceleration which will be encountered by a vehicle entering the earth's atmosphere at parabolic velocities.

1,190

Creswell, A.W., J. Ernsting et al. 1959 DURATION OF PROTECTION AFFORDED BY THE PRESSURE BREATHING MASK, PRESSURE JERKIN AND ANTI-G SUIT COMBINATION. (RAF Institute of Aviation Medicine, Farnborough) FPRC Memo. 117

ABSTRACT: The protection against anoxia at 56,000 feet afforded by pressure breathing at 60 mm Hg with the pressure mask, jerkin, and anti-g suit system was investigated using the Mk 21 demand oxygen regulator. Experiments demonstrated that two additional stresses are applied to the subject during pressure breathing with this system. One is associated with the discomfort and stimulation of the carotid artery baroreceptors due to the use of an oronasal mask to deliver the pressure to the respiratory tract. The other stress is that of anoxia due to the use of an intrapulmonary pressure of 126 mm Hg absolute (alveolar oxygen tension of approximately 50 mm Hg). This pressure breathing system cannot be relied upon to provide adequate protection against anoxia if the period of exposure exceeds 30 seconds at 56,000 feet followed by a descent to 40,000 feet at 10,000 feet per minute. It is recommended that the pressure breathing mask, pressure jerkin, anti-g suit and the Mk 21 oxygen regulator combination should only be used in aircraft which exceed an altitude of 50,000 feet by a small margin only and which can descend from maximum altitude to below 40,000 feet rapidly. (Author)

1,191

Crisman, R. B., & C. L. Forrest 1957 HUMAN FACTORS IN THE DESIGN OF HIGH PERFORMANCE AIRCRAFT. (Paper, SAE National Aeronautical Meeting, April 1957)

1,192

Critz, G. T., F. M. Highly, Jr., & E. Hendler 1963 DETERMINATION OF HUMAN TOLERANCE TO NEGATIVE IMPACT ACCELERATION. PHASE II. (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 29-May 2, 1963)

SUMMARY AND CONCLUSIONS: Under the design conditions of this study; i.e., closed seat angle, rate of acceleration prolonged by inhibiting devices, a helmet with restraining devices, and a restraint system as modified for this project, healthy adult subjects could tolerate without injury 14.5 plateau, 18.5 peak impact tailward G with duration of 60 milliseconds. Rate of onset of subject G of 1540 maximal and peak subject G of 31.8 were tolerable.
Symptoms, chiefly of the central nervous system, were virtually abolished. Other symptoms and signs were fewer and less dramatic. No cardiac arrhythmias were noted, and the ride was "smoother".
Evidence is offered that neck stretching, either by over movement of the head or under movement of the shoulders, may have produced symptoms.
The mechanism for the production of rebound positive G was undetermined from the present study. (AUTHOR)

1,193

Crocco, G. A. 1951 LA SOPPORTAZIONE FISIOLOGICA NEI MISSILI A REAZIONE (Physiological Endurance and Rocket Flight) L'Aerotecnica (Rome) 55-59, 15 Feb. 1951

1,194

Crook, J.M. 1963 RESEARCH LEADING TO THE ESTABLISHMENT OF PARAMETERS FOR OMNI-DIRECTIONAL RESTRAINT AND/OR CONTAINMENT FOR PILOTS IN AIRCRAFT. (National Textile Research, Inc., Raleigh, N.C.) ASTIA AD-400 920

ABSTRACT: Investigations were directed toward the establishment of methods, utilizing broad woven fabrics, to accept, dissipate, and distribute impact shock forces such as would be developed during sudden and abrupt changes in acceleration caused by crash, high-speed maneuvers, and operational malfunction of various types of airframes. These investigations included the following: (1) to determine the feasibility of employing broad woven fabrics to effectively restrain, contain, and omni-position the body during abrupt changes in acceleration; (2) to determine the design parameters necessary to provide lineal and/or area load acceptance of restraint garments; (3) to determine the fabrics and weave constructions best suited to this application; (4) to determine the fundamental requirements of body restraint with omni-directional capabilities; and (5) to study the force distributions of the fabric as it relates to imparting loads to the body. (Author)

1,195

Crosbie, R., & C. Clark 1955 CAM DESIGNING FOR THE HUMAN CENTRIFUGE. (Naval Air Development Center, Johnsville, Pa.) NADC-MA-5512 18 Nov. 1955. ASTIA AD 86293.

ABSTRACT: A mathematical analysis is presented for designing cams which control the motion of the inner and outer gimbals in coordination with the speed of the human centrifuge so that the subject can be aligned with the resultant acceleration vector. The gimbal system consists of an outer gimbal which rotates about a horizontal axis perpendicular to the centrifuge arm and of an inner gimbal and perpendicular to the axis of the outer gimbal. The analysis consists of the formulation of curves which represent cam contours for desired resultant acceleration programs. Various G programs are listed with their respective formulas. A method is described for accurately reproducing the calculated results as cam contours. An illuminated cam layout box is described for accurately plotting the cam contours.

1,196

Crosbie, R., C. Clark, R. W. Lawton, J. W. Taylor, & M. Chianta 1955 ELASTIC PROPERTIES OF MAMMALIAN TISSUE. PHASE V. X-RAY CINEFLUOROGRAPHY (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 315; 31 Dec. 1955

ABSTRACT: Densitometric calibration procedures are in progress to allow the interpretation of density changes in terms of organ thickness as well as organ position. Inoperative Westinghouse Fluorex Image Amplifier and Philips X-Ray Image Intensifier tubes have been tested for electrode displacement and glass failure under acceleration, the former to 12.4 G transverse with but slight reversible electrode displacement and the latter to 9.6 G transverse with no detectible electrode displacement. Neither tube broke. Operative tubes are not yet available here, but are of interest in order to reduce the x-ray dose to human subjects by a factor of ten to forty. Measurement correlation has been achieved between the x-ray film frames and the simultaneously recorded physiological data. Work is in progress to extend such measurements, particularly to relate the x-ray visualizations to other measurements of respiration and circulation. Preliminary measurements and computations have been made of the elasticity of the heart supports of a chimpanzee under acceleration.

1,197

Crosbie, R., & C. Clark 1955 DEVELOPMENT OF BIOLOGICAL AND RESEARCH APPARATUS FOR USE IN ACCELERATION AND DECELERATION STUDIES. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 303; 31 Dec. 1955; PHASE II

ABSTRACT: The mathematics involved in the calculation of cam contours for acceleration program control of the human centrifuge were completed at a much earlier date (1951). However, due to repeated overhauls on the outer gimbal and the main centrifuge control units, the completion of the report has been delayed. The report is now completed and, if one neglects distortion effects on the response curves (these are negligible for low performance runs), methods are now available which enable one to calculate and accurately lay out cams which control the motion of the inner and outer gimbal in coordination with the speed of the human centrifuge at AMAL in order to control the resultant acceleration vector with respect to the subject.

1,198

Crosbie, R.J. 1956 DIRECTIONAL CONTROL OF ACCELERATIVE FORCES IN CENTRIFUGE BY SYSTEM OF GIMBALS.
(Naval Air Development Center, Johnsville, Pa.) NADC-MA-5608.
See also J. Aviation Med. 27(6):505-511, Dec. 1956.

ABSTRACT: A two gimbal system of the human centrifuge is described and illustrated. In human centrifuge studies, by suspending the subject in a controllable double gimbal system, as compared to placing him on a freely swinging platform, the following beneficial results are derived: (1) It is possible to vector out the tangential acceleration due to the angular acceleration of the

centrifuge arm by proper movement of the inner gimbal, so that it is not felt as a transverse G component of the resultant G. The oculogyral illusions of the gondola tumbling are less unpleasant and less disorienting than the oculogyravic illusions caused by the rotating resultant G vector on a nongimbaled centrifuged ride. (2) The overshooting and oscillating of the freely swinging platform are practically eliminated by the sight control placed on the outer gimbal during its movement. (3) The ability of the gimbals to operate singly or in combination allows for a great variety of jostling G patterns, typical of uncontrolled aircraft. These may be duplicated as often as necessary to gain a statistical evaluation of the tolerance of the average pilot under such conditions. (4) Catapult G patterns may be partially reproduced by proper positioning of the gimbals. Valuable information for a preliminary study on the catapult can therefore be obtained prior to actual catapulting, under more precise control conditions and at a much reduced cost per run. (5) The gimbal system may offer the means whereby a pilot, with the aid of suitable instrumentation, may actually control his own ride under various conditions. (SAM, Brooks AFB, Texas)

1,199

Crosbie, R.J. 1956 UTILIZATION OF A SYSTEM OF GIMBALS ON THE HUMAN CENTRIFUGE FOR THE CONTROL OF DIRECTION OF ACCELERATION WITH RESPECT TO THE SUBJECT. J. Aviation Med. 27:505-511. See also (NADC, AMAL, Johnsville, Pa.) Rept. No. MA-5608, Aug. 1956. ASTIA AD 107 772.

ABSTRACT: Advantages of a centrifuge which utilizes a system of controllable gimbals over a freely swinging platform type of centrifuge are discussed. Particular emphasis is placed upon the ability of such a system to eliminate transverse and lateral components of the resultant acceleration on a subject during an entire G run. Although this elimination could be realized at the center of the gimbal system, the secondary accelerations produced by the gimbal motion itself, which exist at all parts of the subject's body remote from the center of rotation, could not be ignored. However, it was found that the oculogyral illusions which resulted from these accelerations were less disturbing to the subject than the oculogravic illusions which occurred on the freely swinging platform. Other advantages of this device which are discussed include the elimination of the characteristic oscillations of the freely swinging platform and the addition of a greater variety of G programs to centrifuges in general.

1,200

Crosbie, R. J. 1956 FORCES DEVELOPED ON A CAR TRAVELING RADIALLY ALONG A MOVING CENTRIFUGE ARM. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5610; ASTIA AD-108 391

ABSTRACT: Equations are derived which enable one to determine the forces acting on a car traveling radially along a moving centrifuge arm. These forces are of interest in determining the feasibility of attaching a track to a centrifuge arm which will provide a device for producing either a step or an impulse forcing func-

tion. The author concludes that the Coriolis force developed on a radially moving car is of such magnitude as to make this method of producing a step forcing function extremely difficult, if not actually unfeasible. Under certain limiting conditions, the Coriolis force developed on this radially moving car may be canceled by proper control of the angular deceleration of the centrifuge. This deceleration must generally be of such magnitude that the centrifuge is slowed considerably, and hence the production of a step forcing function without the disadvantages of the Coriolis force is practically impossible. However, a definite impulse forcing function may be produced if the car is brought to rest at the end of the track on the centrifuge arm by compressing a spring of known force constant. This impulse is much less, however, than that obtainable by a typical linear accelerator or ejection seat device. (AUTHOR)

1,201

Crosbie, R.J. and F. Gollub 1959 A STRESS ANALYSIS ON THE INNER GIMBAL DRIVE SHAFT OF THE HUMAN CENTRIFUGE FOR VARIOUS GONDOLA LOADING CONDITIONS. (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-5901; ASTIA AD 217 637.

ABSTRACT: Equations are derived which enable one to predict the effect of load distribution in the gondola of the human centrifuge on the torsion stress of the inner gimbal drive shaft under various dynamic conditions. Experimental verification of these equations are obtained over a frequency range of the inner gimbal from 0 to 1.1 cps at $\pm 20^{o}$. Simultaneously the centrifuge acceleration was increased to a 12 G level. Analysis of these results indicate that additional loads in the gondola should be distributed to minimize unbalanced moments about the center. The extent of permissible moment unbalance may be obtained from the equations derived herein. In some cases this requirement may necessitate adding extra weights to counter-balance pay loads. (Author)

1,202

Crosbie, R.J. 1959 THE REQUIREMENTS FOR MODIFICATION OF THE HUMAN CENTRIFUGE FOR HIGH PERFORMANCE AIRCRAFT AND SPACE VEHICLE SIMULATION RESEARCH. (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-5907. ASTIA AD 225 000.

ABSTRACT: A proposed modification program for the human centrifuge at the Aviation Medical Acceleration Laboratory is outlined. Specifications are given concerning centrifuge improvements as a dynamic simulator for space vehicle studies such as the X-15 and Mercury Project and for g-tolerance and performance investigations. A proposed 100 g capability for the centrifuge is discussed and an interchangeable capsule concept is explained. Also presented are the detailed requirements for the complete program along with criteria for a feasibility study of the proposed modifications. (Author)

1,203

Crosbie, R.J. 1960 EXPLICIT EXPRESSIONS FOR THE ANGULAR ACCELERATIONS AND LINEAR ACCELERATIONS DEVELOPED AT A POINT OFF CENTER IN A GONDOLA MOUNTED WITHIN A THREE GIMBAL SYSTEM ON THE END OF A MOVING CENTRIFUGE ARM. (U.S. Naval Air Development Center, Johnsville, Penn.) NADC-MA-6034, ASTIA AD-248 216

ABSTRACT: That a gondola mounted within a controllable three gimbal system on the end of a moving centrifuge arm has the capability of providing a more realistic flight simulation than is possible with a two gimbal system has generally been conceded. The Human Centrifuge at the Aviation Medical Acceleration Laboratory is being modified to provide a third gimbal (yaw) to its present roll and pitch gimbal system also envisions a gondola mounted within a three gimbal system.

This paper, although it does not offer any direct solution to the control problem, does provide equations which will enable one to calculate both the angular accelerations and linear accelerations developed at a point off center of the gondola as a consequence of various combinations of gimbal motions superimposed upon the centrifuge motion. Grosswald (2) has developed the equations for a two gimbal system and much of his notation is used in this paper.

1,204

Crosbie, R.J. 1961 MODIFICATION OF THE HUMAN CENTRIFUGE AT THE AVIATION MEDICAL ACCELERATION LABORATORY: PROGRESS REPORT CONCERNING. (Naval Air Development Center, Johnsville, Pa.) NADC-MA-L6101; ASTIA AD 251 947.

ABSTRACT: This report includes:
McKiernan-Terry Corp., Dover, N.J., "Johnsville Naval Air Development Center Human Centrifuge Modification Program, (Job No. 19042)." Technical Progress Reports No. 1-6, Contract N62269-825, 31 Aug. 1960 - 21 Feb. 1961.

A proposed modification program for the human centrifuge at the Aviation Medical Acceleration Laboratory is outlined. Specifications are given concerning centrifuge improvements as a dynamic simulator for space vehicle studies such as the X-15 and Mercury Project and for G-tolerance and performance investigations. A proposed 100 G capability for the centrifuge is discussed and an interchangeable capsule concept is explained. Also presented are the detailed requirements. (Author)

1,205

Cross, A.G. & J. Ball 1943 SUBCONJUNCTIVAL HAEMORRHAGE CAUSED BY ACROBATIC FLYING
Lancet, 2:766

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Cross, C. A. 1959 A SPACE FLIGHT SIMULATOR.
Aeronautics 28-30, Feb. 1959

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Crossfield, A.S. 1957 A TEST PILOT'S VIEWPOINT.
In Campbell, P.A., et al. SPACE TRAVEL: A SYMPOSIUM.
J. Aviation Med. 28:492-495

1,208

Crossfield, S. 1961 FUTURE MANNED AIRCRAFT Lectures in Aerospace Medicine, 16-20 January 1961.
(School of Aviation Medicine, Brooks AFB, Texas)

1,209

Crout, P.D. 1960 A METHOD FOR DETERMINING VELOCITY BY COMBINING POSITION AND ACCELERATION DATA TAKEN ON THE SNORT TRACK (Naval Ordnance Test Station, China Lake, Calif.) 28 Mar 1960; NOTS TP 2474, NAVWEPS rept. no. 7069; ASTIA AD-239 676

ABSTRACT: A method of combining accelerometer and track-coil data to obtain velocity data using Lagrange polynomials is described. An error analysis shows that under most conditions an RMS of less than 0.1 fps over a velocity range of 200 to 2,000 fps is possible. (Author)

1,210

Cruchet, R. & R. Moulinier 1911 LE MAL DES AVIATEURS. (Aviator's Sickness)
C.R. Acad. Sci.(Paris), 152:1114-1115
See also C.R. Soc. Biol. 82:677-679

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Cruchet, R. 1911 LE VOL EN HAUTEUR ET LE MAL DES AVIATEURS (High-Altitude Flight and Aviator's Sickness)
Revue scientifique (Paris) 49(2): 740-744

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Cruchet R. and R. Mouliner 1919 LE MAL DES AVIATEURS. (Aviator's sickness) Compt. rend. Soc. de biol., (Paris) 82:677-679

ABSTRACT: Aviator's sickness includes the following phenomena: more marked vasomotor reactions, congestion of the face, humming in the ears, auricular pain, headache, tachycardia, sleepiness, and occasional syncope. Aviators participating in high altitude flying must have good sight and perfect hearing.

1,213

Cruchet R. 1959 THE ROLE OF SPEED IN AIRCRAFT. Rev Prat (Par) 9:2709-13, 1 October 1959

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Cumberland, C. H. & G. S. Bowey 1948 PASSENGER SEATS IN CIVIL AIRCRAFT: DESIGN CONSIDERATIONS. (Ministry of Supply, London) Air Transport Technical Memorandum No. 11, April 1948.

1,215

Cushman, R. Nov. 1956 ROCKET-TUBE EJECTOR ADDS TO ESCAPE MARGIN FOR JET PILOTS. Aviation Week 65(20):71-77

ABSTRACT: Rocket-tube pilot emergency escape catapult is being readied for the Convair F.106 by the Talco Engineering Corp., Hamden, Conn. The new ejector uses a canted rocket inside a tube to give added ejection height at low altitudes and to counteract the air-blast deceleration at high speed.

ACCELERATION

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Daguet, J. 1946 PHYSIOPATHOLOGIC EFFECTS OF ACCELERATION ON THE AVIATOR. Biol. Med. 35(11):197-219.

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Dahms, J. G. and S. T. Ferguson 1958 FORCES IMPOSED ON PILOTS DURING IN-FLIGHT EMERGENCIES. (USN, Air Dev. Ctr, Johnsville, Pa.) Rept. No. NADC-ED-5813, 2 July 1958.

1,218

Daigle, D.L. and J.C. Lonborg 1961 EVALUATION OF CERTAIN CRUSHABLE MATERIALS. (Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena) Technical report no. 32-120, ASTIA AD-266 550

ABSTRACT: A series of static and dynamic tests of crushable materials, using drop towers and other devices, is described. A crushable material may be used to protect a relatively delicate object at impact by limiting the acceleration applied to the object while absorbing the impact kinetic energy. Materials tested included balsa wood, aluminum honeycomb, and various foam plastics. The tests were not, except in the case of the balsa, extensive, nor was any specific engineering problem under study. The materials were not rated. The intent was rather to develop a guide for the selection of materials for various applications and a method of testing the materials. (Author)

1,219

Daily, Madison M. Aug. 1960 A STUDY OF THE MOTION OF A MANNED-SATELLITE RE-ENTERING THE EARTH'S ATMOSPHERE (Air Force Inst. of Tech., Wright-Patterson AFB, Ohio) Rept. No. GAO-58-2. ASTIA AD 201 592

ABSTRACT: A study is presented of the motion of a manned satellite re-entering the earth's atmosphere at a desired maximum deceleration of 10 g. The motion of 3 non-lifting configurations were investigated from an initial altitude of 400,000 ft to the surface of the earth. The configurations consisted of a sphere alone, a sphere and one parachute, and a sphere with 4 parachutes that

were detached in a prescribed manner during re-entry. Results obtained indicated that for a sphere alone or a sphere with one parachute, the maximum angle of re-entry was 2° in order to keep the deceleration under 10g. For the configuration consisting of 4 parachutes and a sphere, the maximum angle of re-entry was 6°. This latter configuration appeared to be a feasible means of re-entering the earth's atmosphere. A reference bibliography covering all of the problems of manned space flight is included.

1,220

Danaher, James W. and Anthony Sylvestro 1961
AVIATOR ESCAPE SYSTEM TRAINING
(Courtney and Co., Philadelphia, Penn.)
March ASTIA AD 256 342

ABSTRACT: The purposes of this study were to investigate Naval escape system training needs and to provide information upon which recommendations could be made to improve training procedures and devices. These data were gathered by means of a literature study; a Pilot Questionnaire; interviews with equipment manufacturers and training specialists; review and analysis of ejection accident data; and a training film survey. Recommendations were made regarding: the standardization of equipment and procedures involved in ejection, parachuting ditching and survival; dissemination of accident information to all pilots; added realism in training devices; and a more holistic approach to escape training. (AUTHOR)

1,221

Daniel, G. A., & C. F. Kasparek 1961 COMPREHENSIVE BIBLIOGRAPHY OF RESEARCH REPORTS ISSUED OVER A NINETEEN-YEAR PERIOD BY THE U.S. NAVAL SCHOOL OF AVIATION MEDICINE. (Naval School of Aviation Medicine, Pensacola, Fla.) Bureau of Medicine & Surgery Proj. MR005.13-3001; Subtask 5; Rept. No. 3; ASTIA AD 258 940.

ABSTRACT:

The Problem: Inasmuch as a complete listing under one cover of all research reports issued by the U. S. Naval School of Aviation Medicine had not been published since 1 May 1953, it seemed advisable that such a task be undertaken.

Findings: The 772 reports listed cover many aspects and phases of aviation and space medicine and show the trend which research has taken since formal entrance of the School into the field of research in 1942.

1,222

Daniels, G. S. 1952 HUMAN FACTORS OF EXTENDED RANGE FLIGHT. (Wright Air Development Center, Wright-Patterson AFB, Ohio) WCRD TN 52-57, Sept. 1952.

1,223

Danileyko, V. I. 1962 PHYSIOLOGICAL REACTION OF THE ORGANISM OF SMALL ANIMALS TO (PROLONGED TRANSVERSE ACCELERATION) Fiziologichniy Zhurnal (Journal of Physiology -- of the O. O. Bogomolets Physiology Institute of the Ukrainian SSR Academy of Sciences) 8(2):220-230, Mar.-April 1962

ABSTRACT: This article was submitted for publication on 8/20/60, but the work was done in 1957 and 1958. The test animals were 259 albino rats, 49 albino mice, 20 siberian marmots, 12 pigeons, 10 sparrows, and one swamp turtle. Groups of these animals were variously subjected to transverse and longitudinal accelerations of 18.1, 20.1, 21.7, and 23.5 G,s for periods ranging from 15 seconds to 90 minutes in a special centrifuge with a radius of 0.65 meters. In some cases, ECG,s were recorded and hystological investigations of heart and lung preparations performed. The results are given in detail. White rats easily withstand 20.1 G,s chest-to-back for 10 minutes. White mice took 23.5 g,s for 50 minutes, side-to-side without ill effect. Most animals died after 35 seconds of 18.1 G,s head-to-tail. Forces of 20.1 G,s chest-to-back for longer than 5 minutes killed the pigeons but the sparrows supported this for 30 minutes. The turtle managed to survive 20.1 G,s chest-to-back for 60 minutes without harm. Barbamil narcosis and hypothermia --rectal temperature 24.0 to 26.0 c -- in white rats and hybernation in the marmots increased the endurance to acceleration but dibazol tried on the mice had no effect.

1,224

Danilin, B.S. 1958 VTORZHENIE V KOSMOS (INVASION OF THE COSMOS) Nauka i zhizn' 1957, No. 12, p. 4-8.
English Translation: Soviet Bloc International Geophysical Year Information, (13):2-10, 4 March 1958.

1,225

Danilin, B. 1959 LIFE IN THE COSMOS
Nauka i Zhizn' (Moscow) (7):34-36, July 1959.

ABSTRACT: In this article the author discusses the possibility of man flying in space. He states that experiments have shown that the forces of acceleration can be best withstood in a back-to-chest direction. The ability to withstand acceleration increases sharply if a man is immersed in water. The difficulty of controlling the space ship is increased by the state of complete weight

lessness which immediately replaces the high G-stresses. The best method to counter the effects of weightlessness is to fasten oneself in the seat at the beginning of the flight. For ensuring the required physical load, rubber tractions in the region of the joints, and special G-suits can be used. Also studied is the possibility of creating artificial gravitation by rotation of the cabin. (CARI)

1,226

Danilin, B. 1959 LIFE IN COSMOS (Zhizn' v Kosmose)
Trans. of Tekhnika Molodenzhi (USSR) 27(7):34-36.
(Office of Technical Services, Washington, D. C.)
Oct. 20, 1959. PB No. 59-22211

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Danson, J.G. 1934 THE SYMPTOMS OF VERTIGO.
J.R. Army M. Corps., 63:167-68. Also; J.R. Nav. M. Serv., 20:205-16

1,228

Darby, T. D., L. I. Goldberg, P. C. Gazes, & S. R. Arbeit 1954 METHOD OF OBTAINING DIRECT-BODY DISPLACEMENT-VELOCITY-ACCELERATION BALLISTOCARDIOGRAMS OF THE DOG, Proc. Society Experimental Biology & Medicine 86:673-676
NOTE: Reel 7, Flash 7, Item 35

SUMMARY: A method of obtaining direct-body displacement, velocity and acceleration ballistocardiograms of the dog has been described. Ballistocardiograms obtained by this method are similar to those of the human. (AUTHOR)

1,229

Davey, C. T. and R. C. Good 1959 RESEARCH AND DEVELOPMENT ON A HIGH-G STRAIN GAUGE ACCELEROMETER.
(Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.) Rept. No. 4, 10 Jan - 9 Feb 59. AD 212 737.

Abstract: Studies relating to the experimental determination of strain distribution were continued. Scale model No. 1 was instrumented and a number of static tests were made on it. Static measurements on scale Model No. 2 were repeated with a swivel head fixture in the test machine to obtain better alignment of load. Both models were loaded under conditions of distributed and concentrated loading. The scale factors of models 1 and 2 were checked and found to be in agreement in two positions for distributed loading and in five positions for concentrated loading. All of the positions where

agreement occured were on the center line of the side struts. The regions of the cyclinder and hole surfaces around an angle of 30 degrees to a horizontal plane through the hole axis were investigated with six addi - tional strain gauges on Model No. 1. A tensional strain was found at this location on the hole surface. The central axes of the struts appear to be the best location for strain gauges in that they appear to be less sensi- tive to asymmetrical loading and would therefore be more applicable to the accelerometer. (Author)

1,230

David, H. 1960 X-15 MOVES NEARER SPACE FLIGHT
Missiles and Rockets 7(22):18-19, Nov. 28, 1960

ABSTRACT: This article discusses the biomedical instrumentation package which telemeters and records data on the pilot's physical condition and his reactio- to space-equivalent conditions.

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David, H. M. 1961 HOW TO MAKE MAN EFFICIENT IN SPACE?
Missiles and Rockets 8(1):19, Jan. 2, 1961

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Davidson, S. 1944 EVALUATION OF METHODS OF RESISTANCE TO THE EFFECTS OF G. (RAF, Institute of Aviation Medicine, Farnborough)
FPRC 599, Oct. 1944.

1,233

Davidson, S., & W. K. Stewart 1944 NOTE ON SOME PHYSIOLOGIC EFFECTS OF LOW VALUES OF CENTRIFUGAL FORCES ENCOUNTERED IN FLIGHT. (RAF, Institute of Aviation Medicine, Farnborough) FPRC No. 573, 29 Feb. 1944

ABSTRACT: Used 6 experimental subjects.
(a) Operational tests show that values of 2-½ to 3 "g", if frequently repeated, cause fatigue, GI disturbances.
(b) Immediate fatigue is increased by factors such as unsuitable aerodynamic properties and structural design of aircraft.
(c) Reduction in frequency of exposure and alleviation of monotony of flight patterns help symptoms somewhat.
(d) Protection afforded by anti-"g" suits (FFS) is extremely important.
(e) In the design of anti-"g" devices it is important to have full protection against the lower values of centrifugal acceleration as well as to prevent black- ing out at higher values.

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Davis, P. K. 1959 A STUDY OF THE CRITERIA FOR DAMAGE DUE TO CONTROLLED IMPACT ON A SINGLE-DEGREE-OF-FREEDOM SYSTEM. (Master's Thesis, The University of Texas)

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Davis, W. O. 1956 FUNDAMENTAL BASIS OF SPACE FLIGHT
Jour. Astronautics 3(1):9-10, 25. Spring 1956.

ABSTRACT: In addition to the engineering aspects of space flight, the psychological and physiological problems related to survival of the crew under the conditions of space (weightlessness, ultraviolet light, vacuum-type environment) are briefly considered. Mention is made of the problems of nutrition, sewage disposal and conversion, air conditioning and powering of auxiliary equipment related to the thermodynamic cycle.

1,236

Davydov, V. D., & N. Gurovskiy 1962 SCIENCE AND LIFE (SELECTED ARTICLES)
Nauka i Zhizn' 1961(9):34-36, 78-79
(Translation Services Branch, Foreign Technology Div., Wright-Patterson AFB, Ohio) FTD-TT-62-185/1+4, 19 June 1962

CONTENTS:
Davydov, V. D., From the Window of an Interplanetary Station,
Gurovskiy, N., Hypoxia,

1,237

Day, R. E. 1961 X-15 SIMULATION AND THE X-15 FLIGHT PROGRAM.
(Paper, Panel on Acceleration Stress of the Armed Forces-NRC Committee on Bio-Astronautics, 6-11 March 1961, NASA Ames Research Ctr., Moffett Field, Calif.)

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Dearborn, C. H. and H. W. Kirschbaum 1931 MANEUVERABILITY INVESTIGATION OF AN F6C-4 FIGHTING AIRPLANE. NACA TR-386, App. 497, in Seventeenth Annual Reports, NACA, 1931. (Wash., D. C.: U. S. Govt. Printing Off., 1931).

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Dearnaley, E. J., J. T. Reason, & J. D. Davies 1962 THE NATURE AND DURATION OF AFTER-SENSATIONS FOLLOWING THE CESSATION OF TURNING IN A CHIPMUNK AIRCRAFT. Aerospace Medicine 33(10):1224-1229, Oct. 1962

SUMMARY AND CONCLUSIONS: (1) Ten students and four instructors observed the nature and duration of their after-sensations following the cessation of a 45 degree banked turn at 90 knots in a Chipmunk Aircraft. (2) Observations were made under three conditions: (a) eyes closed, (b) eyes open under an instrument hood, and (c) eyes open with attention directed towards the horizon. (3) The after-sensations always included a component described as rotation in the opposite direction to the stimulus turn. (4) Some observers reported a component of descent and described their after-sensations as a slipping turn or spiral dive. (5) The after-sensations gradually decreased in intensity and the end points were difficult to detect. (6) The durations of the after-sensations experienced with closed eyes were in general accord with the published psycho-physical data. (7) The durations of the after-sensations diminished as the amount of visual information about the true state increased. (8) The more experienced pilots reported after-sensations of shorter duration. (9) It was suggested: (a) that the experience of a slipping turn or spiral dive was the result of interpreting the decrease in the resultant acceleration as descent and compounding this with the after-sensation of rotation, and (b) that learning to fly involves the gradual establishment of veridical perception by reducing vestibular sensations learnt to be misleading and that failure of this system may account for some cases of disorientation reported by experienced pilots. (AUTHOR)

1,240

DeBra, D. B., & E. V. Stearns 1958 PROBLEMS OF ATTITUDE CONTROL OF SATELLITES AND INTERPLANETARY VEHICLES. (Tech. paper No. 58-961, read at AIEE Space Flight Symposium, Buffalo, 24 June 1958)

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De Cilla, F., & P. Italiano 1957 ALCUNE CONSIDERAZIONI SULLE LESIONI TRAUMATICHE VERTEBRALI DA INCIDENTE DI VOLO (CONSIDERATIONS OF TRAUMATIC VERTEBRAL LESIONS CAUSED BY AIRPLANE ACCIDENTS) Revista di Medicina Aeronautica (Roma) 20(2):262-268, April/June 1957

1,242

Dee, P. 1962 A 900,000 G-POUND COMBINED ENVIRONMENTAL CENTRIFUGE. (Institute of Environmental Sciences, Mt. Prospect, Ill.) Reprint 62-161

ABSTRACT: The need for thorough and accurate testing of missile propulsion components under simulated operational conditions prior to their actual integration into the missile system is imperative in order to gain a reliable and effective weapon or space vehicle.

During 1957, the U. S. Air Force Air Research & Development Command (now Air Force Systems Command) initiated a component improvement program which called for an accelerated effort to design, develop and test new and advanced components for ballistic missile systems as well as an extensive test program to determine the maximum performance range for existing missile components.

One phase of this program involved developing test facilities at the Edwards AFB Rocket Site, located in the northwest corner of the Mojave Desert.

One of the major facilities to be developed was a Combined Environmental Centrifuge. The purpose of this paper is to describe the design considerations, construction details, instrumentation and operating techniques for this facility, which to the best of my knowledge is the largest in the United States.

1,243

de Gaulejac, M. R. 1939 [PERILS OF THE PARACHUTE]
Presse Med. 47:1035.

ABSTRACT: Apart from really bad accidents the parachutist may suffer injury to the abdomen and thorax through the shock of arrest when the parachute opens. The force felt by the airman may be anything from 300 to 1,000 kg.; in the French Air Force it must not exceed 900 kg. Research is being undertaken to lessen the shock, and the suggested means include a special arrangement of the silk panels, and elastic valve at the top of the parachute, and check-straps to make the opening gradual. The arrangement of the harness is very important. If it confines only the upper part of the body the man is in considerable danger, but if it holds the lower limbs as well and forms a seat he can withstand a much more abrupt opening without damage.

1,244

De Haven, F. 1941 MEASURES FOR INCREASING SAFETY OF FLYING PERSONNEL IN CRASHES.
(National Research Council, Committee on Aviation Medicine, Washington, D. C.)
CAM Report no. 34, 14 November 1941.

1,245

DeHaven, H. 1941 MIRACULOUS SAFETY
Air Facts 4(3):21-26.

ABSTRACT: Many valuable facts have remained unknown which can be studied by relating injury results to forces expressed under circumstances to which the

body is accidentally exposed. The study of lack of injury and of relating injuries to established forces offers a unique field for investigation, one involving a number of sciences, but specific to none. However, it becomes more nearly being the science of safety. Deceleration experiments have proved that proper positional distribution of pressure can reduce injury during an impact. Several cases are cited on the velocity-to-pressure conversion with its resultant lack of injury effect on the body.

Safety in light planes is a tremendous MUST for the entire aircraft industry if it is to meet the years just ahead. This fact will unquestionably burt the whole aircraft industry in the very near future, for Young America wants to fly and will. But pilots in the future will be mostly civilian "week-end pilots." "Week-end pilots" will, of course, make plenty of mistakes, and these mistakes in quantity are going to set up a propaganda result which will cost the aircraft industry millions in planes, motors, tires, and instruments not sold - and Airline passengers not carried. Happily there is evidence on every hand that the

velocity involving most of the light plane crashes is not too great to be handled through safety engineering.

1,246

De Haven, H. 1942 MECHANICAL ANALYSIS OF SURVIVAL IN FALLS FROM HEIGHTS OF FIFTY TO ONE HUNDRED AND FIFTY FEET.
War Med. (Chicago) 2(4): 586-596.

ABSTRACT: Seven cases of free fall in which height of fall was exactly known and speed conservatively estimated are analyzed. It is concluded that the human body can tolerate and expend forces up to 200 times gravity for brief intervals during which the force acts in transverse relation to the long axis of the body.

1,247

DeHaven, H. 1943 INJURIES IN 30 LIGHT-AIRCRAFT ACCIDENTS. Medical Data and Crash Details from Field Investigations of the Civil Aeronautics Board. (National Research Council, Div. of Med. Sciences acting for the Committee on Medical Research of the Office of Scientific Res. and Dev. Committee on Avn. Med.) Report No. 230, 17 November 1943.

1,248

DeHaven, H. 1944 CAUSES OF INJURY IN LIGHTPLANE ACCIDENTS.
Aero Dig., 44(5):51-55,206.

ABSTRACT: The ability of the human body to survive crash forces which exceed the strength of aircraft structures seems remarkable, yet in one series of

accidents studied, 77% of the planes were washouts, with another 17% requiring complete overhauling, while only 47% of them resulted in fatalities. The main factors in the construction of safe planes are the use of rugged resilient structure which will not shatter completely and the locating of controls, braces tube clusters and panels where the head and body will not strike them in time of crashes. It has been suggested that the occupants be seated a foot or so further back in the fuselage, and it must be remembered that in crashes of two-seater tandem type planes injuries to the front occupant are 1-1/2 as common as injury to the rear occupant. Some head injuries to the passenger occur because his head strikes the front seat. Greater space should be allowed here. Also to be considered in view of the increasing popularity of the pusher-type plane is the fact that this type has three times as many fatal accidents as the tractor type, and at least twice as many serious accidents.

1,249

DeHaven, H. 1944 MECHANICS OF INJURY UNDER FORCE CONDITIONS. Mech. Engng., 66:264-268

ABSTRACT: Studies have indicated that a human being can withstand more than 100 g, and be stopped from a velocity of 50 miles an hour within a distance of six inches without injury if the force of contact is sufficiently spread out. On the other hand a speed of 15-miles per hour can cause death if the momentum of the head is not checked during rapid deceleration of surrounding structures. If a ten-pound object (the approximate weight of a human head) falls one foot, and strikes an area about one inch square, it undergoes a force of 480 quarter-inch pounds spread out over this area. Deformation of the skull would be very slight. If, however, the head under the same conditions strikes an object one centimeter square, the force would be 2800 lbs./cm.^{2} This would cause a puncture fracture.

In addition to skull fractures, injuries to the spine are almost unavoidable if the momentum of the head is not checked in crashes. Shoulder-harnesses, bulky as they are, protect the operator by stopping this forward momentum.

1,250

DeHaven, H. 1945 THE RELATIONSHIP OF INJURIES TO STRUCTURE IN SURVIVABLE AIRCRAFT ACCIDENTS. (National Research Council, Committee on Aviation Medicine) Report No. 440, 9 July 1945.

ABSTRACT: This report is supplement to CMR-CAM Report 230 issued Novemeber 17, 1943 in which relative injuries in the forward and rearward seats of 30 light-aircraft accidents were analyzed.

These 30 accidents are now included in a larger body of material. Trends indicated by the limited data of the first report are studied in relation to 110 accidents in fore and aft seating and 75 accidents in the side-by-side seating arrangement.

The conclusions reached are that:

(a) In accidents where cabin structure is distorted but remains substantially intact the majority of serious and fatal injuries are caused by dangerous cabin installations.

(b) Crash force-sufficient to cause partial collapse of present cabin structure--often is survived without serious injury.

(c) The head is the first and often the only vital part of the body exposed to injury.

(d) Fundamental causes of head injury are set up by heavy instruments, "solid" instrument panels, seat backs, and unsafe design and arrangement of control wheels.

(e) The probability of severe injuries of the head, extremities, and the chest is increased by failure of safety belt assemblies or anchorages. In one type of aircraft studied, safety belt failure occurred among 70% of the survivors.

(f) Failure of the 1000 pound safety belt occurred in 94 cases among 260 survivors. Only survivors showed evidence of injury of abdominal viscera; 2 of the injuries were classed as serious.

1,251

DeHaven, Hugh 1945-49 MONTHLY REPORTS AND PERIODIC BULLETINS FROM CRASH INJURY RESEARCH PROJECT. (School of Medicine, Cornell University, New York, N. Y., 1945-49)

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DeHaven, H. et al. 1946 CRASH INJURY PROJECT. (National Research Council, Committee on Aviation Medicine) Special CAM Report OEMcmr-121. 31 January 1946.

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De Haven, H. 1946 CRASH RESEARCH FROM THE POINT OF VIEW OF CABIN DESIGN. In Aero. Eng. Rev. 5(6):11-17, June 1946.

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DeHaven, H. 1947 CRASH INJURY RESEARCH REPORT, JULY 1, 1946 - JUNE 30, 1947 (National Research Council, Cornell University Medical College)

1,255

DeHaven, H. 1947 INFORMATIVE ACCIDENT -- 1 JANUARY 1947. (Crash Injury Research, National Research Council, Washington, D.C.)

1,256

DeHaven, H. 1947 INFORMATIVE ACCIDENT -- 12 FEBRUARY 1947. (Crash Injury Research, National Research Council, Washington, D.C.)

1,257

DeHaven, H. 1947 INFORMATIVE ACCIDENT, NO. 3 -- 5 MARCH 1947. (Crash Injury Research, National Research Council, Washington, D.C.)

1,258

DeHaven, H. 1948 FINAL REPORT, NATIONAL RESEARCH COUNCIL CRASH INJURY RESEARCH. (Cornell University Medical College) 30 June 1948

1,259

De Haven, H. and R. M. Petry 1948 INFORMATIVE ACCIDENT NO. 7, CRASH INJURY RESEARCH
(Cornell University Medical College, New York, N. Y.)
May 7, 1948

1,260

DeHaven, H. 1950 CRASH INJURY RESEARCH. SUMMARY REPORT FOR THE FISCAL YEAR 1 JULY 1949 TO 30 JUNE 1950. (Air Materiel Command, Wright-Patterson AFB, Ohio) AF TR 6007, Sept. 1950; ATI No. 94 824

ABSTRACT: At present, investigation of aircraft (and automobile) accidents is

aimed chiefly at determination of causes of accidents rather than causes of injuries. In spite of measures to prevent accidents the number of people injured and killed annually continues to mount.
The Crash Injury Research project has developed an accident reporting system to obtain accident data and related injury details. The data are recorded and analyzed to determine repeated causes of serious and fatal injuries in survivable accidents. Findings are made available to manufacturers, designers, and aircraft engineers. Manufacturers are increasingly interested in "crashworthiness" as a design feature in aircraft, and three new civilian planes are now being built which incorporate most of the safety features recommended by CIR.
CIR urges that crash tests be undertaken to determine the energy-absorbing capacities of various types of lightplane structure under crash conditions.
Twenty-six recommendations are made for increasing crash protection in personal aircraft. (AUTHOR)

1,261

DeHaven, H. 1950 CRASH DECELERATION, CRASH ENERGY, AND THEIR RELATIONSHIP TO CRASH INJURY. (Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio)
AF TR 6242, Dec. 1950; ATI-104 127
NOTE: CARI P&S 1.8aa

ABSTRACT: Crash energy, energy absorption by structure, and crash forces are discussed; the relationship of these factors in providing protectior from serious or fatal injury in survivable aircraft accidents is illustrated by theoretical cases which are compared with actual crash results.
Although considerable data now is available on causes of injury among survivors of aircraft accidents, the magnitude and duration of forces occurring in crashes remain unknown. It is proposed that crash tests be undertaken to study factors now contributing to safety or injury in accidents and to provide engineering data whereby safety in survivable accidents can be increased by structural design. (AUTHOR)

1,262

De Haven, H. 1951 CRASH INJURY RESEARCH. SUMMARY REPORT FOR FISCAL YEAR 1 JULY 1950 - 30 JUNE 1951.
(USAF, AMC, Wright-Patterson AFB, Ohio)
AF TR no. 6523.

1,263

De Haven, H. 1951 HANDBOOK FOR AIRCRAFT ACCIDENT INVESTIGATORS COOPERATING IN CRASH INJURY RESEARCH.
(Crash Injury Research, Cornell University Medical College, New York, N.Y.)
CIR H-2

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DeHaven, H. 1951 INFORMATIVE ACCIDENT RELEASE NO. 13, 30 AUGUST 1951. (Crash Injury Research, Cornell University Medical College, New York, New York) 30 August 1951.

1,265

DeHaven, H. 1951 A STUDY SPONSORED BY THE DEPARTMENT OF THE NAVY AND AIR FORCE: SEMI-ANNUAL PROGRESS REPORT. (Crash Injury Research, Cornell-University Medical College) January 1951.

1,266

De Haven, H. 1952 PACKAGING THE PASSENGER
SAE Journal 60(6):55-56, June 1952

ABSTRACT: During the last ten years, there has been a slow but steady increase in the deliberate use of aircraft configuration to protect pilots and passengers in accidents. Many of the developments should be useful in cutting the crash-injury rate in passenger cars.

The most frequent injuries in survivable aircraft and automobile accidents are fractures of the skull, lesions of the brain, smashing of facial bones, and other dangerous head injuries. Studies in 1942 on impact velocities and data from plane accidents led to studies of the injury potential of objects commonly struck by the head. Shoulder harness does an amazing job of protecting the head, but is not even on the horizon for autos. The safety belt does not effectively check the velocity of the head but modifies the injury-potential area.

Crash-engineering has been built into the instrument panels, windshields, flooring, rudder pedals, controls, et cetera, of aircraft. In six new planes crash-engineering has been extended to the cabin and its adjacent structures. The use of structures to protect the body in accidents is a vey young engineering art. Without specific crash-injury data, engineers cannot understand the factors responsible for dangers and cannot judge the need for safer design. The only way to find out is to extend the scope of present accident investigations and, in addition to getting reports on typical causes of accidents, get reports on typical and repeated causes of injury. (Journal of Aviation Medicine 23(5):533-534, October 1952)

1,267

DeHaven, H. 1952 ACCIDENT SURVIVAL--AIRPLANE AND PASSENGER CAR (Society of Automotive Engineers) Preprint No. 716, 1952.

1,268

De Haven, H. 1952 ACCIDENT SURVIVAL— AIRPLANE AND PASSENGER AUTOMOBILE. (Paper Annual Meeting, Society of Automotive Engineers, Jan. 1952. Part of a symposium of "Packaging the Passenger")

ABSTRACT: Efforts to increase "crashworthiness" and provide greater "crash safety" by the improvement of details in aircraft and automobiles are not new. Because the principles used to provide greater safety in aircraft are closely related to principles used by packaging engineers for increasing the protection and safety of valuable goods in transit, the author discusses the concepts of crash safety in relation to basic concepts used by packaging engineers.

1,269

DeHaven, H. 1952 THE SITE, FREQUENCY AND DANGEROUSNESS OF INJURY SUSTAINED BY 800 SURVIVORS OF LIGHTPLANE ACCIDENTS. (Dept. of Public Health & Preventive Medicine, Cornell University Medical College, New York, N.Y.) July 1952. ATI-172 675

ABSTRACT: Absence of injury in the Hi-G deceleration tests at Muroc, and limited body damage in many severe airplane crashes suggest that injuries are not a direct function of crash force. Herein analyzed are injuries sustained by 800 survivors of lightplane crashes; each of the survivors used only a safety belt as a restraining and protective means in crashes.

Five analytical procedures are followed to provide basic material from which to draw conclusions: (1) a segment of current data is compared with data from an early CIR report to determine whether early trends now are statistically confirmable; (2) the site and frequency of injuries are examined in order to determine the relative constancy and variability of the injury pattern produced by survivable aircraft accidents; (3) the frequency characteristics of the injury pattern are investigated and interpreted; (4) dangerous-to-life injuries are examined and discussed; (5) the degree of correlation between injury seriousness and accident severity is established.

Statistical analyses show that (1) the trends demonstrated in early CIR data are confirmed; a low incidence of strains of the neck and damage of cervical vertebrae, and a high frequency of damage to the head and extremities is established; (2) there is a distinct and constant pattern of injury among survivors of lightplane crashes who wear only safety belts; (3) a positive relationship exists between the frequency of injuries and the distance of damaged body areas from the safety belt; bruises of the hips and evidence of intra-abdominal injury are surprisingly rare, despite violent snubbing action by standard two-inch safety belts with holding capacities of 1000 to 2000 pounds; injury to one body area usually is not dependent on the occurrence of injury in another body area; (4) dangerous head injuries are sustained by nearly 18% of survivors; spinal injuries are likely to endanger life far more frequently than lower torso injuries; (5) of all the variance in seriousness of injury, only 22% of this variance is dependent upon variation in accident severity.

The statistical evidence provided in this report shows that injuries are not a direct function of crash force; the data indicate that injuries in survivable accidents are largely subject to control by engineering and design. (AUTHOR)

1,270

De Haven, Hugh, Boris Tourin, & Salvatore Macri 1953
AIRCRAFT SAFETY BELTS: THEIR INJURY EFFECT ON THE HUMAN BODY
(Crash Injury Research, Cornell U. Medical Coll., New York)
July ASTIA AD-14 643

ABSTRACT: An examination was made of the injuries sustained by 1039 survivers of 670 lightplane crashes. Chi-square methods were employed in statistical analyses to relate the use of the belt and body injuries of survivors. Safety belts were shown to be an infrequent cause of injury and to serve as effective protection. Severe snubbing action of safety belts as seen in 80 cases showed no significant correlation with the occurrence of intra-abdominal and lumbar spine injuries. Critical intra-abdominal and lumbar spine injuries appeared related to each other and to vertically acting forces. Bruises and minor contusions were attributable to safety belts. Injuries which occurred without any signs of snubbing were jolt loads transmitted by supporting structures and seats. Injuries of the upper and lower torso were associated with and increased by failure of safety belt installations. The percentage of all trunk injuries sustained by users and nonusers of safety belts were similar. No increased frequency was observed in injuries to the torso, neck, and spine by the use of the belt. Survivors not using safety belts suffered more serious injury than those that used them. Upper and lower torso injuries were also related to failure of belt installations. Dangerous-to-life injuries of head and body were associated and increased with vertical crash forces. (ASTIA)

1,271

DeJudicibus, C. and L. Carbonara 1961 CHARACTERISTICS OF THE NYSTAGMIC RESPONSE TO ACCELERATIVE STIMULI OF DIFFERENT PHYSICAL VALUE.
In Boll. Mal. Orecch. 79:635-640, Nov.-Dec. 1961 (Italy).

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Delaphchier 1917 BILATERAL FRACTURE OF ASTRAGALUS AFTER A PARACHUTE JUMP.
La Presse medicale, Paris, June 4, 1917.

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Denisov, V. and M. Klevtsov 1961 BIOTELEMETRY
Trans. of Radio, Moscow (USSR) (10):16-17, 1961.
(Joint Publications Research Services, New York, N. Y.) JPRS 12074, Jan. 26, 1962.

1,274

Dempsey, C.A. 1961 HUMAN PROTECTION IN ABRUPT ACCELERATION ENVIRONMENTS
In: 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D.C. (Mt. Prospect, Ill.: Institute of Environmental Sciences, P.O. Box 191) Pp. 365-370

ABSTRACT: The accelerations encountered in space flight are divided into three distinct segments: vibration, abrupt acceleration and long term acceleration. When these forces are acting as an integrated function they produce a singular subjective experience to the individual. The various maneuvers of manned space flight which produce abrupt accelerations are soft surface landings, emergency escape, air deceleration and hard surface landings. In addition, the potential hazard of explosion is significantly increased in space vehicles and forms another major source of high transient accelerations.

The human body can be categorized as a complex combination of systems which respond to the abrupt acceleration forces in accordance with the laws of a viscous/elastic system under the action of a constant unbalanced force or harmonic motion. While the body might at first appear to act as an integrated whole; it in reality, is segmented into four different parts which respond individually to the force and then in turn transmit their response to the other segments. These individual segments are: dorsal cavity, thoracic cavity, pelvic cavity, and body extremities. Vital body organs can sustain high transient accelerations when the force vector is oriented in the proper direction and the body is completely supported throughout the load period. Present research efforts are dedicated to the premise of completely understanding the protective requirements which are necessary to sustain the astronauts during abrupt acceleration conditions in all areas of aerospace operations.

1,275

Denisov, N. and S. Borzenko 1961 GAGARIN'S FLIGHT.
Trans. of mono. Polet Gagarina; Materialy, Opulikovannyee v Pravde, Moscow, 1961.
Sept. 17, 1962 ASTIA AD 287 715

CONTENTS:
The first flight of man into outer space
Communist Yurii Gagarin: the first Cosmonaut

1,276

Denisov, N. & S. Borzenko 1962 POLET GAGARINA (MATERIALY, OPUBLIKOVANNYYE v "PRAVDE") GAGARIN'S FLIGHT.
(Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio) FTD-TT-62-844 from Izdatel'stov "PRAVDA", Sept. 1962.
ASTIA AD 287 715

ABSTRACT: It was on 12 April 1961 that the Soviet Union carried out the first

manned flight into outer space. The spaceship "Vostok," with the USSR pilot cosmonaut Yu. A. Gagarin on board, was placed into orbit as a satellite of the earth. The satellite vehicle without the last stage of the rocket-carrier, weighed 4,725 kilograms. On the basis of refined data obtained through the evaluation of all measurements, the perigee was at 181 kilometers, and the apogee was at 327 kilometers; the inclination of the orbit was 64° and 57 minutes. Having completed the orbital flight, the satellite vehicle returned to earth successfully, landing in a designated area of our country. This publication contains a detailed account of the flight and relates the great significance of the journey to the entire world.

1,277

Denny-Brown, D. 1943 THE PRINCIPLES OF TREATMENT OF CLOSED HEAD INJURY
Bulletin from New York Academy of Medicine 19: 3.

1,278

Denova, A. A., A. M. Zakharov and V. E. Kolla 1960 THE EFFECT OF CARLINA BIEBERSTEINII ON THE TOLERANCE OF WHITE MICE TO RADIAL ACCELERATION, (Vliianie Koliuchnika Bibershteina Na Vynoslivost Belykh Myshei Po Otnosheniiu K Radial Nym Uskoreniiam).
Farmakol. i Toksikol. (Moscow) 23(2):177, March-April 1960.

ABSTRACT: A series of experiments were conducted on raising resistance to radial acceleration in white mice by aqueous infusions of seeds of the carline thistle (Carlina Biebersteinii Bernh). In the first series each subject received a 1% infusion before being subjected, together with a control, to radial acceleration in a centrifuge at a speed of 1000 r.p.m. for 5 seconds. The average time required by the controls to resume normal posture was 34 sec., to start running in a straight line, 90.4 sec.; for the experimental animals the values were 23.5 sec. and 64 sec., respectively. In the second series the experimental animals received a 10% infusion prior to acceleration under the same conditions. Normal posture was resumed by the controls in 26 sec., running in 52 sec.; and by the experimental animals in 14 sec. and 19 sec., respectively. In a third series, in which rotation was carried out for 10 sec., the experimental animals again recovered faster than the controls.

1,279

Denny-Brown, D. & W. R. Russell 1940 EXPERIMENTAL CEREBRAL CONCUSSION.
J. Physiol. 99:153, 20 December, 1940.
See also Brain 64:93-164, Sept. 1941.

ABSTRACT: Experimental concussion is a condition well known from early investigation to be associated with a cessation of respiration and rise of blood pressure, of duration corresponding to the intensity of the blow.

Re-investigation of the phenomenon in cats under nembutal anaesthesia confirms its appearance in severe degree, and ability to result in death, without macroscopic lesions of the brain stem. It is further established that the phenomenon can be elicited in the decrebrate animals, and corresponds with a passing depression of all bulbar reflexes.

The respiratory centre is the most sensitive to percussion. Acceleration in movement resulting from the blow is the essential factor in the stimulus, for if the head is prevented from moving when struck the phenomenon fails to occur. Momentary deformity of the skull, and stimulation of superficial structures, therefore appear to play no part.

Labyrinthine stimulation likewise appears to have slight if any part in the phenomenon, for it is obtained after section of both eight nerves. Rise of intracranial pressure does not accompany the phenomenon, though it is possible under certain circumstances to reproduce a similar effect by a shock-like rise of intracranial pressure alone.

The nervous effect of a blow is thus considered to be due to the physical acceleration directly transmitted to each and every centre.

1,280

Denny-Brown, D. & W. R. Russell 1941 EXPERIMENTAL CEREBRAL CONCUSSION. Brain 64:93-164, Sept. 1941.
See also J. Physiol. 99:153, 20 Dec. 1940.

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Denny-Brown, D. 1943 THE EFFECT OF HIGH EXPLOSIVES ON THE POST TRAUMATIC SYNDROME Trans. Amer. neurol. Assn. 69:98-102

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Denny-Brown, D. 1945 CEREBRAL CONCUSSION. Physiol. Rev. 25:296-325.

1,283

Denzin, E. C. 1946 INVESTIGATION OF BRAKE SHOES FOR CREW DECELERATION CARRIAGE, PROJECT NO. 27. A Resume Report of Tests Conducted at the American Brake Shoe Company. (Sargent Research Lab., Mahwah, N.J.) 12-20 September 1946.

1,284

Denzin, E. C. 1950 A DECELERATOR FOR HUMAN EXPERIMENTATION. (U.S.A.F. AMC, Wright-Patterson AFB, Ohio). USAF TR No. 5973 Note: CARI P&S 2.12

ABSTRACT: A device has been designed, built, and tested for producing and studying the effects of controlled decelerations up to 50 g for a duration of 0.1 second. A 1500-lb. carriage is mounted on slippers on a 2000-ft. standard gauge rail track. The human subject or test object is mounted on the carriage in the desired orientation. The carriage is accelerated to a predicted velocity by one to four 100-lb. thrust, 5-second solid fuel rockets. The carriage can be decelerated by brakes fixed between the track for a distance of forty-five feet. Forty-five sets of brake shoes clamp two metal keels 5 inches wide and 11 feet long, mounted under the carriage. Each set of brakes is preset to the desired pressure and is tripped by a trigger on the carriage. A system of AM-FM telemetering has been built for transmitting data from the carriage and subject to the recorder.

1,285

Dermksian, G. 1959 THE PROBLEM OF LOSS OF CONSCIOUSNESS IN FLYING PERSONNEL. In: L. E. Lamb, Ed., The First International Symposium of Cardiology in Aviation, 12-13 November, 1959, pp. 83-92. (School of Aviation Medicine, Brooks AFB, Texas) ASTIA AD 244 389

ABSTRACT: A healthy young adult male population was surveyed in an attempt to determine the incidence of clinical syncope. The factors associated with 130 episodes of clinical syncope were reviewed in an attempt to determine their frequency. One hundred and five individuals (70 with and 35 without clinical syncope) were studied with special procedures designed to stress the cardiovascular mechanisms resulting in experimental syncope. In addition, it was hoped that such procedures might distinguish those cases with clinical syncope and thus have predictive value.

Thirty percent of the aviation cadets were found to have had previous syncopal episodes. The special cardiovascular stresses revealed a surprisingly high incidence of cardiac arrhythmias in normal healthy adult males. Of the 38 cases of experimental syncope some 68 per cent were associated with an arrhythmia. It was though that the arrhythmias were secondary to cardio-inhibitory responses mediated through the vagus nerve. They could be abolished or prevented with intravenous atropine. The special procedures failed to distinguish between individuals with previous syncope and those without and thus had no predicitive value.

1,286

Derry, John D. 1951 HIGH-SPEED FLYING. Journal of the Royal Aeronautical Society, 55:626-639, October 1951.

ABSTRACT: This paper is mainly concerned in conveying the pilot's own view of

the problems of high-speed flying. The paper is divided under the following main headings:

1. The obstacles to negotiate at high and low altitude.
2. The approach to high-speed investigation and means of obtaining test results.
3. Present and future requirements of research aircraft.
4. Pilot safety measures.
5. Some requirements of a pilot engaged in high speed research and development flying.

For the most part it is intended only to cover research and development flying.

1,287

Desaga, H. n.d. EXPERIMENTELLE UNTERSUCHUNGEN DER LUFTSTOSSWIRKUNG. (EXPERIMENTAL STUDY OF AIR BLAST EFFECTS.) Mitteilungen aus dem Bebiet der Luftfahrtmedizin, (Herausgegeben vom Inspekteur des Sanitatswesens der Luftwaffe.) Forschungsbericht 15/43.

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Desaga, H. 1950 BLAST INJURIES.
In German Aviation Medicine, World War II. Vol. II, pp. 1274-1293. (Washington, D. C.: U. S. Govt. Print. Off., 1950)

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Devaux, P. 1940 LA RESISTANCE PHYSIOLOGIQUE AU CATAPULTAGE ET AUX ACROBATIES AERIENNES (THE PSYCHOLOGICAL RESISTANCE TO CATAPULTING AND TO AIRCRAFT ACROBATICS)
Nature (Paris) 67: 299-302

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DeVost, V. F. 1960 ACCELERATION, VELOCITY, DISTANCE, TIME.
Machine Design, Aug. 4, 1960.

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DeVost, V.F. 1960 NOL COPPER-BALL ACCELEROMETERS
(U.S. Naval Ordnance Laboratory, White Oak, Maryland) NAVORD Report 6925, July 27, 1960, ASTIA AD 248 282

ABSTRACT: This report describes conventional and discriminating copper-ball accelerometers currently in use at the Naval Ordnance Laboratory. Their operation as peak reading accelerometers and velocity meters is discussed. Theoretical dynamic response curves are presented to assist in analysis and interpretation.

1,292

DeVost, V.F. 1962 TEST SET, DROP SHOCK, WOX-126A.
(Naval Ordnance Lab., White Oak, Md.) Rept. No. NOLTR 61-106, ASTIA AD-297 401, 20 November 1962

ABSTRACT: The report describes a portable 70-inch, free-fall drop tester, presents operating instructions, and contains calibration curves. The tester is an adaptation of the Mk 209 Mod 0 Test Set, which it replaces. A wide range of shocks is produced with felt, rubber, and plastic shock pads. At maximum drop height and for payloads of 1 lb., shocks range in amplitude from 170 g for the softest pad to 3200 g for the hardest pad. The durations of these shocks are 12 ms and 0.6 ms respectively. The maximum allowable load for the test set is 4 lb. For a 4-lb. pay-load the maximum impact velocity change experienced by the carriage is 35 fps. The report includes complete drawings on the WOX-126A Test Set and calibration information on the Mk 209 Mod 0. (Author)

1,293

deVries, H.I. 1949 STRUCTURE AND POSITION OF THE TECTORIAL MEMBRANE IN THE COCHLEA
Acta Oto-Laryngologica (Stockholm) 37: 334-338

1,294

DeWeese, D. D. 1954 DIZZINESS—AN EVALUATION AND CLASSIFICATION.
(Springfield: C. C. Thomas, Publisher, 1954)

BOOK REVIEW SUMMARY: This publication is of special significance to flight surgeons. Vertigo, spatial disorientation and the motion sickness syndrome of dizziness are peculiarly related to the profession of flying and, therefore, are everyday problems of aviation medicine. They must be separated from the systemic disturbances resulting in dizziness; and these in turn must be subdivided into those conditions amenable to current therapy and those which are not. Particular

care is essential in this separation, for the flight surgeon's decision directly affects the career of both pilots and crew members. In this small monograph, the physician may find concisely reviewed the anatomy and physiology, classification and differential diagnosis of dizziness. The care reports in chapter nine add little to the value of the presentation.

1,295

de Wit, G. 1953 SEASICKNESS; (MOTION SICKNESS) A LABYRINTHOLOGICAL STUDY. Acta oto-laryng. (supp. 108) pp. 1-56

ABSTRACT: Cupulometric examination and examination with the parallel swing demonstrate an abnormality in the labyrinthine functions in every sufferer from sea-sickness. Only the small group in which the affection is completely psychic in nature forms an exception to this rule. However, these patients do not suffer from genuine seasickness, but they are neurotics. The seasick can be divided into:

a. The specific seasick (80% of the total). This group is characterized by a steep cupulogram, and by a rise of the pressure in the central retinal artery after stimulation of the otolith system. They lack the normal tendency to inhibition of strong labyrinthine stimuli.

b. The unspecific seasick (20% of the total). This group can be subdivided into one with mild labyrinthine abnormalities, in the sense of a slight difference in excitability between the right and left labyrinths, and the group of the deficiencies. Persons belonging to the latter group show an irregular cupulogram. Suprimal (benadryl-chlortheophyllinate) decreases the central excitability of the labyrinth. Atropine does the same, and moreover abolishes the endocranial vasolability.

c. The methods described in this monograph enable recognition of persons liable to seasickness at the beginning of their career at sea.

1,296

Diamond, H., J. R. Mott, & H. J. Smith 1962 DEVELOPMENT AND MANUFACTURE OF THE THREE-AXIS INTEGRATING ACCELEROMETER. (Sperry Gyroscope Co., Great Neck, N. Y.) Rept. No. CA-4230-0102-6; Contract DA 30-069-ORD-3420; Proj. TN2-8106; ASTIA AD-281 838

ABSTRACT: A three-axis integrating accelerometer is described which utilizes a single test mass to sense acceleration components in any direction. Principles of operation, error compensations, and constructional features of the accelerometer are described. A detailed analysis and parameter study of the pump-restoration servo is included. Detailed test results are tabulated. (AUTHOR)

1,297

Diamond Ordnance Fuze Labs. 1960 MEASUREMENT OF DISPLACEMENT, VELOCITY AND ACCELERATION: BIBLIOGRAPHY WITH ABSTRACTS AND INDEX (Diamond Ordnance Fuze Labs., Washington, D. C.) Aug. 22, 1960

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Dias Campos, F. 1945 INFLUENCIA DAS ACELERACOES SOBRE O ORGANISMO, EN AVIACAO (Acceleration; Influence on Organism) Rev. med. RioGrande do Sul. (Brazil) 1: 278-287, May-June 1945

1,299

Dickerson, K. H. and G. H. Kydd 1961 EFFECTS OF HIGH ACCELERATION ON RATS. (Paper presented at 32nd annual meeting, Aerospace Medical Assoc., 24-27 April 1961, Chicago, Ill.)

ABSTRACT: Interest in recovery of biological payloads from ballistic probes and orbital satellites has created a need for information on the effects of re-entry accelerations on animals. Some of the forces involved lie in the range between 50 and 100 G and are of short duration. Studies have been conducted in which rats were subjected to a selected range of high accelerations for short time intervals. The results indicate that where the criterion for a successful test is survival without gross pathology, rats can survive these forces. (Aerospace Med. 32(3):228.)

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Dickson, E.D.D. 1940 INCIDENCE OF AIRSICKNESS AMONGST AIRCREWS (DETAILS OF 23 CASES CATEGORISED UNFIT ON ACCOUNT OF DISABLING SYMPTOMS) (Flying Personnel Research Committee, Canada) F.P.R.C. Report No. 220b, December 1940

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Dieckmann, D. 1957 EINFLUSS VERTIKALER MECHANISCHER SCHWINGUNGEN AUF DEN MENSCHEN (Effects of Vertical Mechanical Vibration Upon Man) Int. Z. Angew. Physiol. (Berlin) 16: 519-564.

1,302

Dieminger, W. 1951 WELTRAUMFAHRT UND IONOSPHAERE (Space Travel and the Ionosphere)
In Merten, R. ed. HOCHFREQUENZTCHNIK UND WELTRAUMFAHRT (Zurich: S. Hirzel, 1951), pp. 7-14.

ABSTRACT: A survey of conditions to be encountered by an escape rocket. The problem of meteors as well as temperature and ionization effects are discussed.

1,303

Di Giorgio, A. M. 1951 LOCALIZZAZIONE OTTICA ASSOLUTA IN CONDIZIONI STATICHE E NELLA ACCELERAZIONE RETTILINEA E CENTRIFUGA. (Absolute Optic Localization In Static Conditions and In Rectilinear And Centrifugal Acceleration)
Rivista di Medicina Aeronautica, (Rome) 14: 190-208, April-June 1951.

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Dill, D. B. 1942 PHYSIOLOGY OF FLYING. HAZARDS AND REMEDIES.
J. Lab. and Clinical Med. Vol 28, Part I, pp. 585-589.

ABSTRACT: A brief delineation of six hazards of flight: anoxia, aeroembolism, acceleration, cold, vibration and fear or anxiety.

1,305

Dill, D. B. April 1942 EFFECTS OF PHYSICAL STRAIN AND HIGH ALTITUDES ON THE HEART AND CIRCULATIONS. American Heart Journal 23(4):441-454

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Dill, D. B. 1943 SYMPOSIUM ON WAR MEDICINE: PHYSIOLOGY OF FLYING: HAZARDS AND REMEDIES. J. Lab Clin Med. 28:585-598, Feb. 1943.

ABSTRACT: Flying hazards that are physiological in nature are those facing aviation medical personnel. Remedies are discussed for the hazards of anoxia, aeroembolism, acceleration, vibration, and anxiety.

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Dion, M. G. 1956 EQUIPMENT FOR MEASUREMENT OF AIRSPEEDS, MACH. NUMBERS AND TEMPERATURES.
Tech. Sci. Aeron. 3:118-124.
R. A. E. Translation No. 645

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District of the Army Corps of Engineers, Office of the District Engineer, Los Angeles District Aug. 1945 MUROC AIR FORCE BASE JOB NO. ESA 210-23 DRAWINGS NOS. 1037/25, 1037/26, 1037/27, and 1037/28 PREPARED UNDER USAF CONTRACT W-04-353 ENG-795A. 8 Aug. 1945 (Detail drawings of 2000 ft. rocket launching track installation)

1,309

Di Taranto, R. A., & J. J. Lamb 1958 THE SPACE ENVIRONMENT - - A PRELIMINARY STUDY. Elect. Mfg., Oct. 1958

1,310

Dixon, Frederick, & J. L. Patterson, Jr. 1953 DETERMINATION OF ACCELERATIVE FORCES ACTING ON MAN IN FLIGHT AND IN THE HUMAN CENTRIFUGE. (Naval School of Aviation Medicine, Pensacola, Fla.) Project. No. NM 001 059.04.01; ASTIA AD-39 383

ABSTRACT: Chapter I: The concepts of force and acceleration are discussed. Physical units and coordinate systems are also covered. Chapter II: The external force patterns acting on man in flight and in the human centrifuge are treated. Methods are given for calculating the magnitude and direction of the resultant external force in various types of airplane maneuvers. Chapter III: A classification of centrifuge types is presented along with analyses of characteristic external force patterns which can be simulated. Chapter IV: The concept of apparent physiological force is introduced. Theoretical considerations are presented which show that the application of simple relativity principles permits the straightforward force analysis of classical physics to be applied to the biological organism considered as the reference frame. Chapters V and VI: Formulas are derived for the physiologic force patterns which act on man in flight and in the human centrifuge. Chapter VII: A discussion of acceleration measuring instruments is presented, with special emphasis on inertial-type linear accelerometers. Chapter VIII: Methods are given for converting force components which are readily determined along anatomical axes of the structures supporting man in flight and in the centrifuge, into force components along defined physiologic axes through a subject. (ASTIA)

1,311

Dixon, F. and J. L. Patterson, Jr. 1961 DETERMINATION OF ACCELERATIVE FORCES ACTING ON MAN IN FLIGHT AND IN THE HUMAN CENTRIFUGE. In Gauer, O. H. and G. D. Zuidema, Gravitational Stress in Aerospace Medicine (Boston: Little, Brown, and Co., 1961) Pp. 243-256.

1,312

Dixon, F. P. and L. D. Stimpson 1963 A SYSTEMS APPROACH TO VEHICLE DESIGN FOR EARTH RE-ENTRY FROM AN INTERPLANETARY MISSION. Paper: American Astronautical Society Symposium on the Exploration of Mars, Denver, Colorado, June 6-7, 1963. Preprint 11

ABSTRACT: Earth return from Mars and Venus manned ventures during the 1970's places stringent requirements upon the earth re-entry vehicle design. These requirements are related to the high approach velocities ranging from 13 to 19 km/sec and include the possibilities of retro-propulsion, modulated lift and drag, heavy heat sheilds, advanced materials, control techniques which include maneuverability for landing site selection, and necessary safety provisions. Feasibility studies are presented for earth re-entry of a six-man crew by three basic vehicle configurations which include an Apollo-type, a Drag-Brake, and a High Lift-to-Drag vehicle with the main emphasis being placed upon the minimization of total re-entry vehicle weight.

The effect of radiative heating in conjunction with convective heating upon vehicle design is analyzed, and coupled with the modulated lifting requirement, results in optimum tradeoffs between heat shield and retro-propulsive weights. Realistic ablation technology limitations place upper bounds upon purely aerodynamic re-entry based upon present knowledge of radiation heating behavior and advanced materials technologies.

The three vehicle types remain competitive in total weight; however, they differ considerably as to re-entry corridor depth, landing site selection, g-loading and control complexity. The High L/D vehicle is recommended for further study since it appears to have superior performance over the Apollo and Drag Brake vehicles for earth re-entry from possible Early Manned Planetary and Interplanetary Round-Trip Expeditions in the 1970-75 period.

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Dobies, E. F. 1957 THE EQUATIONS OF MOTION OF A TUMBLING RE-ENTRY BODY. (Jet Propulsion Lab., Calif. Inst. of Tech.) JPL Prog. Rept. No. 20-339, Pasadena, 22 Nov. 1957.

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Dobronravov, V. 1957 ON THE WAY TO THE COSMOS
In Soviet Bloc International Geophysical Year Information 12:4-7.
First published: Kryl'ya Rodiny No. 6, pp. 20-22. June 1957.

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Dobrotin, B. M. and I. N. Kostev 1935 PARACHUTE JUMPING INTO WATER
Vyestn. Vozd. Flota 17(8):23.

1,316

Dodge, C. H., & C. C. Wunder 1962 SURVIVAL AND GROWTH OF JUVENILE TURTLES EXPOSED TO CONTINUOUS CENTRIFUGATION. Physiologist 5(3):130, Aug. 1962

ABSTRACT: With hatchling Red-Eared Turtles (Pseudemys scripta elegans), growth could be either enhanced or retarded depending upon field intensity. During 9 weeks of centrifugation at 5 g, turtles grew 112±26% more than their controls. At still higher fields, growth decreased as the field increased. However, at fields as intense as 28 g, a few turtles displayed measurable growth. Times for 50% mortality were 3, 7, and 31 days at 28, 24, and 21 g respectively. At 6, 10, and 13 g there was no significant mortality. The superior ability of turtles to survive high gravity can be attributed to their aquatic environment and the shell, which acts as a natural anti-g suit. (AUTHOR) (Aerospace Medicine 34(3):276, March 1963)

1,317

Dodge, C. H. & C. C. Wunder 1963 GROWTH OF JUVENILE RED-EARED TURTLES AS INFLUENCED BY GRAVITATIONAL FIELD INTENSITY.
Nature (London) 197:922-923, March 2, 1963.

1,318

Dodge, R. 1923 HABITUATION TO ROTATION
J. Experimental Psychology 6(1):1-35, Feb. 1923.

ABSTRACT: The question of whether the objective and subjective effects of rotation are modified by habituation is a serious one in aviation. The first scientific observations of habituation to rotation in man were published by C. R. Griffith. The present experiemtns involved the use of photographic records. They furnish complete confirmation of Griffith's results together with important additional data. Another field of interest covered in this paper is the adaptation to repeated vestibular stimulation. The effect of repeated stimulation on the vestibular mechanism is of particular importance to an understanding of human variability.

1,319

Dodge, R. 1923 THRESHOLDS OF ROTATION.
J. Experimental Psychology 6(1):107-137, Feb. 1923.

ABSTRACT: Under experimental conditions, the threshold for rotation of rapid onset seems to be somewhere between one and two degrees per second, but a velocity of four degrees per second was too slow to produce uniformly correct judgments of rotation. Real assurance of the correctness of judgment of rotation obviously depends on angular velocity exceeding four degrees per second.

The difference between rotations of sudden onset and rotations of similar maximum velocity whose acceleration had the form of sine waves appears to be negilgible within the limits of our experiments. Arithmetical acceleration, on the contrary, presented unfavorable conditons for the perception of rotation in the case of subject RD and favorable conditions for subject F.

The most irregular results occured in connection with the oscillatory rotations.

1,320

Dolbnin, T. V. 1934 SHOES REQUIRED BY PARACHUTE JUMPERS
Vyestn. Vozd. Flota 17(12):13-15.

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Dolbnin, T. V. 1938 PARACHUTE TRAUMA AND MEANS OF PREVENTION
Vo.-sanit. Dyelo (2):49-57. 1938

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Dolbnin, T. V. 1938 ZUR FRAGE DER URSACHE VON MISSLUNGENEN FALLSCHIRM-ABSPRÜNGEN (On the Question of Causes of Unsuccessful Parachute Jumps)
Vo.-sanit. Dyelo 10(7):49-52.

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Dole, S. H. 1958 ENVIRONMENTAL REQUIREMENTS FOR EXTENDED OCCUPANCY OF MANNED SATELLITES.
(The RAND Corporation, Santa Monica, Calif.) P-1577, Dec. 12, 1958

ABSTRACT: A review of the physical environmental conditions needed to keep a man functioning efficiently in an earth satellite. The main environmental conditions considered are composition and pressure of the atmosphere, gravitational forces, temperature, and radiation. Illustrative examples of the associated payload weights required per man as a function of mission duration are given.

1,324

Dole, S.H. 1960 DESIGN CRITERIA FOR ROTATING SPACE VEHICLES. (Rand Corp., Santa Monica, Calif.) Research Memo No. RM-2668, Contract AF 49(638)700, Proj. RAND, 18 Oct. 1960. ASTIA AD 249 503.

ABSTRACT: Several undesirable physiological side effects can arise from rotating a manned space vehicle in order to provide a simulated gravity field. The phenomena that may produce these side effects are herein analyzed to determine in each case the design restrictions that should be accepted in order to avoid adverse conditions. Based on this set of restrictions, a design envelope, which allows the designer considerable latitude, is based on the following limits: (1) maximum angular velocity, 4 rpm; (2) maximum head-to-foot difference in g's, 15%; (3) minimum rim velocity, 10 ft/sec; (4) maximum simulated gravity field, 1.5 g's; and (5) minimum simulated gravity field 0.01 g. (Author)

1,325

Doll, R. E. and J. R. Berkshire 1961 BIBLIOGRAPHY: PSYCHOLOGICAL RESEARCH IN THE U. S. NAVAL SCHOOL OF AVIATION MEDICINE -- JULY 1950-JUNE 1960. (USN School of Aviation Medicine, Pensacola Air Station, Fla.) Feb. 6. 1961

ABSTRACT: This bibliography covers those inservice research publications of the USN School of Aviation Medicine which might be of interest to psychologists. The period of publication covered is from July, 1950, through June 1960. The report titles are grouped by subject matter as follows: acoustics, anxiety, attitudes, grades and standards, morale, peer ratings, perception, selection, methodology, safety, tests, training, vision, and miscellaneous. An author index is included. (Tufts)

1,326

Domanski, T. J. 1956 HUMAN STRESS RESPONSE IN JET AIRCRAFT OPERATIONS. (School of Aviat. Med., Randolph AFB, Tex.) Rept. No. 57-16 ASTIA AD 128 591

1,327

Doolittle, J. H. 1925 AIR RACING
National Aeronautic Association Review 3(11):163-164, Nov. 1925

1,328

Doolittle, J. H. 1925 ACCELERATIONS IN FLIGHT
(National Advisory Committee for Aeronautics, Washington, D. C.)
Rept. No. 203, Feb. 28, 1925

SUMMARY: The accelerations in suddenly pulling out of a dive are greater than those due to any maneuver started at the same speed. The accelerations obtained in suddenly pulling out of a dive with a modern high-speed pursuit airplane equipped with well-balanced elevators are shown to be within 3 or 4 per cent of the theoretically possible accelerations. How close this agreement would be in the case of a similar airplane equipped with unbalanced elevators would be determined by additional experiments. Accelerations due to flying the airplane in average "rough air" do not exceed 2.5 g. The maximum acceleration which a pilot can withstand depends upon the length of time the acceleration is continued. It is shown that the pilot experiences no difficulty under the instantaneous accelerations as high as 7.8 g., but that under accelerations in excess of 4.5 g., continued for several seconds, the pilot quickly loses his faculties. While this is disconcerting to the pilot, it is not necessarily dangerous for one in good physical condition unless continued for a period of 10 to 12 seconds. (AUTHOR)

1,329

Dorcus, R. M. 1927 A COMPARISON OF POST-ROTATION NYSTAGMUS DURATION FOR REPEATED STIMULATION WITH THE HEAD FIXED AND FREE. J. Comp. Psychol. 7:177-179

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Dorcus, R. M. 1932 THE EFFECT OF CONTINUOUS ROTATION ON THE ALBINO RAT. J. Comp. Psychol. 13:7-10

1,331

Dorcus, R. M., & O. H. Mowrer 1936 AN EXPERIMENTAL ANALYSIS OF THE VESTIBULAR POINTING TEST. Ann. Otol. Rhinol. Laryngol. 45:33-58

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Dorcus, R. M. 1942 THE INFLUENCE OF PHYSIOLOGICALLY EFFECTIVE DOSES OF EPINEPHRINE ON VESTIBULARLY INDUCED NAUSEA. (Civil Aeronautics Administration, Washington, D. C.) Rept. No. 5; Nov. 1942

CONCLUSIONS:
1. The obtained results are that epinephrine produces no changes in frequency

of nausea or vomiting in response to vestibular stimulation under the conditions of this experiment.
2. This may safely be interpreted as demonstrating that under these conditions epinephrine does not facilitate nausea and vomiting.
3. It does not, however, exclude the possibility that epinephrine may tend to prevent or alleviate nausea.
4. It was found, incidentally to the main problem, that the normal resting blood pressures of those who were subsequently nauseated, were on the average equal to those of the non-susceptibles, and that their blood pressure changes from epinephrine were equal.
5. The results cast doubt on one aspect of the hypothesis that motion sickness is a consequence of fear. If fear actually increases the frequency of air sickness, the effect, insofar as it can be gauged from this experiment, does not seem to be a direct physiological result of the increased secretion of epinephrine, known to occur during fear. (CAA)

1,333

Dorman, P. J., & R. W. Lawton 1956 EFFECT ON G TOLERANCE OF PARTIAL SUPINATION COMBINED WITH THE ANTI-G SUIT. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5606
See also J. Avia. Med. 27(6):490-496, Dec. 1956

ABSTRACT: A total of 305 runs on nine trained centrifuge subjects and 233 runs on twenty-four Navy pilots were performed. Using grayout (peripheral light loss) as an endpoint, 66.7 per cent of the fleet pilots were able to withstand 7 g for 15 to 30 seconds sitting upright, wearing a standard Navy Z-2 suit inflated to 7-9 p.s.i. pressure. The remainder failed the 7 g, 30-second run. The 65 degree supine position alone failed to improve the performance of this latter group. All of these subjects were then retested in the 65 degree supine position wearing an inflated Z-2 suit (7-9 p.s.i. pressure). One hundred per cent of subjects thus tested successfully withstood 7 g for 30 seconds, although the unprotected tolerance in some subjects was as low as 2.5 g. (AUTHOR)

1,334

Dosch, V. F. 1956 MEASUREMENT OF THE DYNAMIC RESPONSE OF THE AMAL HUMAN CENTRIFUGE.
(Aeronautical Computer Laboratory, USN ADC)
Report TC-26-56, Oct. 1956.

1,335

Dostal, R. and T. Kersey 1960 SPACE MEDICINE
The Iowa Engineer 60(5):18-20. Feb. 1960.

ABSTRACT: This is the second in a series of two papers. This paper explains the psychological effects of confinement, hypoxia, excess oxygen, ecological food systems, and space hibernation.

1,336

Douglas Aircraft Co. GRAPH: TOLERABLE DECELERATION DISTANCE VS APPROACH ANGLE (Douglas Aircraft Co., Inc., El Segundo, Calif.) ES 157042

1,337

Douglas Aircraft Co. GRAPH: ACCELERATION TOLERANCE
(Douglas Aircraft Co., Inc., El Segundo, Calif.) Rept. ES 141880

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Douglas Aircraft Co. FLIGHT FITNESS
(Douglas Aircraft Co. Inc., El Segundo, Calif.)

1,339

Douglas Aircraft Company 1951 ACCELERATION AND THE HUMAN BODY.
(Douglas Aircraft Company, Inc., El Segundo Division, Calif.)

A Graph.

1,340

Douglas Aircraft Co. Engineering Dept. 1953 ACCELERATION AND THE HUMAN BODY.
In Proceedings of Symposium on Frontiers of Man-Controlled Flight, Institute of Transportation and Traffic Engineers, Univ. of Calif., Los Angeles, April 1953.

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Douglas Aircraft Co. 1956 DOUGLAS-TULSA TEST FACILITIES.
(Douglas Aircraft Co., Inc., Tulsa, Oklahoma) TU-24168, June 1956.

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Douglas Aircraft Col, Inc. 1962 NOTES ON THE EFFECTS OF HUMAN ACCELERATION TOLERANCES ON DESIGN FOR THE TERRAIN FOLLOWING AIRCRAFT.
(Douglas Aircraft Co., Inc., El Segundo, Calif.) Rpt. no. ES- 40621
ASTIA AD-278 653

1,343

Douglas, D. W. and H. R. Seal 1961 INTERNALIZED ANIMAL TELEMETRY SYSTEM — ELECTRONIC CONSIDERATIONS.

ABSTRACT: A single-channel biological telemetry system is described, in which a miniature solid-state transmitter is surgically implanted permanently in experimental animals, its carrier being moculated by physiological information and transmitted through the intact skin to a remote receiver and demodulator, where the physiological data are then recorded. Discussed are such problems as RF propagation through electrolytes which are at circuit ground, recharging a surgically implanted battery by use of an external low frequency RF field, and obtaining high modulation sensitivity with optimum stability. Also discussed are the relative merits of various telemetry techniques when applied to physiological monitoring of this type and the problems associated with multiple data transmission. (Aerospace Med. 32(3):229. March 1961)

1,344

Douglas, W. K. 1960 SELECTION AND TRAINING OF SPACE CREWS. Lectures in Aerospace Medicine, 11-15 January 1960 (Conducted at the School of Aviation Medicine USAF Aerospace Medical Center.)

1,345

Douvillier, J.G., Jr., H.L. Turner, J.D. McLean & D.R. Heinle 1960 EFFECTS OF FLIGHT SIMULATOR MOTION ON PILOTS' PERFORMANCE OF TRACKING TASKS (National Aeronautics and Space Administration, Washington, D.C.) NASA TN D-143 February, 1960. ASTIA AD 231 341

ABSTRACT: The effect of motion of a flight simulator on pilots' performance of a tracking task has been investigated by comparing the air-to-air tracking performance of two pilots in flight, on a motionless flight simulator, and on a flight simulator free to roll and to pitch. Two different attack displays were used. It was found in tracking a maneuvering target that (1) the results from the moving flight simulator resembled the results from flight much more than did those from the motionless simulator; and (2) that in flight the conventional circle-dot display was superior to a drone display. For simpler tracking tasks it was not possible to detect these differences.

1,346

Douvillier, J. G., and R. E. Coate 1962 THE COORDINATE-TRANSFORMATION EQUATIONS FOR A PILOTED FLIGHT SIMULATOR WITH SEVERAL DEGREES OF FREEDOM. (National Aeronautics and Space Administration, Washington, D. C.) NASA Technical Note D-1150; ASTIA AD 270 086

ABSTRACT: A method for developing coordinate-transformation equations for a

multiple-degree-of-freedom flight simulator is presented. The equations are applicable in particular to the NASA five-degree-of freedom piloted flight simulator; in general, however, the method of their development is applicable to transformation equations for other, similar simulators of fewer or of more degrees of freedom. Because the NASA simulator has a very limited range of displacement in one of its modes of motion the equations are written for four degrees of freedom. Examination of the sigularities of the equations showed it possible to reproduce any combination of four of the six components of motion, three angular and three linear, of the vehicle being simulated. In most cases, there is more than one way to simulate each combination, the most desirable was determined by the restrictions imposed by the singularities of the equations. (Author)

1,347

Dowd, G. L., Jr. 1931 CAN MAN PILOT ROCKET PLANES AT 5,000 MILES AN HOUR? Pop. Sci. Mon. 118(2):42-43, 134.

1,348

Downey, V. M., F. V. Lorentzen and E. H. Lambert 1949 EFFECT OF THE CROUCH POSITION ON THE INCREASE IN TOLERANCE TO POSITIVE ACCELERATION AFFORDED BY AN ANTI-BLACKOUT SUIT.
J. Aviation Med. 20(5):289-299.

ABSTRACT: A change from the upright sitting position to a crouch position in which the eye level was lowered 11 cm. increased the tolerance of centrifuge subjects to positive acceleration by an average of 1.2 G as determined by use of visual symptoms, blood content of the ear and the ear pulse as criteria of G tolerance.

The protective value of the G-4 anti-blackout suit was 54 per cent greater when assayed in the crouch position than it was in the upright sitting position.

Four of ten subjects were unable to support their heads in the crouch position employed at accelerations of 7 G and greater.

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Downing, Theodore O. 1961 FAT EMBOLI IN GOATS - I. PULMONARY FAT EMBOLISM IN GOATS DYING FROM THE EFFECTS OF MASSIVE TRAUMA.
(U. S. Army Chemical Research and Development Laboratories, Maryland)
CRDLR 3106, Nov. 1961. Project 4C99-02-002.

ABSTRACT: Lung tissues from goats that died from the effects of massive

trauma were examined, in order to establish the incidence of fat embolism in goats, to ascertaine the effect on the goat of the embolic involvement, and to determine the relationship between fat embolism severity and the concentration of clostridial organisms in would exudates.

1,350

Draeger, R.H., J.S. Barr et al. 1945 A STUDY OF PERSONNEL INJURY BY "SOLID BLAST" AND THE DESIGN AND EVALUATION OF PROTECTIVE DEVICES (U.S. Naval Med. Res. Instit. & U.S. Naval Hosp., Bethesda, Md.) Res. Proj. X-517; Rept. No. 1; March 1945.

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Draeger, R. H., J. S. Barr, and W. W. Sager 1946 BLAST INJURY. J.A.M.A. 132:762-767.

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Draeger, R.H. 1947 SHOCK OR BLAST INJURIES
In Shock and Vibration Bulletin No. 2
(Office of Naval Research, Naval Research Lab., Washington, D.C.)
Pp. 7-9, March 1947.

ABSTRACT: The problem of shock or blast is logically divided into two categories, namely, the effects upon material and the effects upon personnel. The problem of damage to material, including ships, planes, guns, instruments, and equipment of all kinds has been partially solved. Damage or injuries to personnel which result from shock or blast are less well understood, and very little has been done regarding methods of study. This article reviews the injuries caused by pressure waves during explosion. These injuries discussed include air blast injuries, water blast injuries, and solid blast injuries.

1,353

Draeger, R.H., D.E. Goldman, & C.B. Cunningham 1947 SHOCK AND VIBRATION BULLETIN NO. 2 - MARCH 1947. (Office of Naval Research, Naval Research Laboratory, Washington, D.C.) ASTIA ATI 75123.

ABSTRACT: Topics covered at a symposium on shock and vibration are presented. A committee was set up to clarify and unify ideas and to report such terminology

definitions, and standards as will help in the uniformity, understanding, and progress in the field of science. The effects of personnel shock, blast, and vibration were also discussed. It was demonstrated that the purpose of such investigations was to provide protection for human beings and structures involved in Fleet operations. In addition, a detailed description together with photographs is given of the German Askania vibrograph.

1,354

Draeger, R.H., R.H. Lee, & B.E. Jennings. 1956 SOLID BLAST STUDY OF PROTECTIVE SHOES AND MATS. (Navy Mine Defense Lab., Panama City, Fla.) Evaluation Rept. ASTIA AD 124 203, Dec. 1956.

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Dranetz, A. I., & J. L. Upham 1955 A PHASE MODULATED TRANSISTORIZED PRESSURE OR ACCELERATION TELEMETERING CHANNEL. (Paper, 1955 National Telemetering Conference, Chicago, May 18-20, 1955)

ABSTRACT: A phase modulated system has been designed for the telemetering of airborne recording of accelerations and pressure in missiles and aircraft. Utilizing differential transformer transducers as the sensing devices, this system can be used to telemeter accelerations up to ± 180 g having frequency components from 0 cps to more than 500 cps, and pressure up to ± 30 psi over the same frequency range.

1,356

Drone, K. C. 1961 DESIGN STUDY FOR AN ACCELERATION RESEARCH DEVICE. Rept. for 1 July 60 - 20 Jan. 61 on Biophysics of Flight. (Wright-Patterson, AFB, Ohio) ASD TR 61-425, August 1961. ASTIA AD 268 621

ABSTRACT: Starting with the presently recognized requirements of accelerations, levels of various exposure conditions, and combinations of stresses in aerospace systems, a design study was made of an acceleration research device which would simulate these conditions. It was required that this accelerator use proven construction methods and be economically feasible. In simulating the various performance requirements there were certain areas that were quite significant in the over-all design: (1) Power requirements during the first second of maximum centrifuge onset is approximately 86,000 horsepower and necessitates a stored energy means to keep electrical power requirements below 20,000 horsepower; (2) Gyroscopic actions plus simulated vibration conditions at the end of the centrifuge arm dictate that major attention be given to arm natural frequencies and dampening qualities; (3) Resultant acceleration effects plus cab

inertias necessitated some reduction in cab RPM's and onset rates to keep torque and horsepower requirements within feasibility limits; and (4) Coriolis forces must be considered in both the effect upon the subject being tested and cab structure. (Author)

1,357

Drooker, J.C. 1954 WARTIME EXPERIENCE WITH SKULL INJURY AND BLAST AND THEIR EFFECT UPON THE EAR Arch Otolaryng., Chicago 58:546-574

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Drury, D.R. and G.H. Scott et al 1944 INVESTIGATIONS IN AVIATION PHYSIOLOGY WITH PARTICULAR ATTENTION TO THE EFFECTS OF ACCELERATION, DECOMPRESSION, ANOXIA, AND COLD AND METHODS TO COMBAT THESE EFFECTS. (National Research Council, Committee on Aviation Medicine, Committee on Acceleration) Final Rept. OEMcmr-288. 26 April 1944.

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Drury, D. R. 1947 HUMAN CENTRIFUGE
Stanford Med. Bull. 5:148-150.

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Drury, D.R. 1947 PHYSIOLOGICAL, BIOCHEMICAL, AND ANATOMICAL EFFECTS OF ACCELERATION ON THE BODY RELATIVE TO PILOT POSITION IN HIGH SPEED AIRCRAFT. (University of Southern Calif., School of Medicine, Los Angeles) USN Contract No. N6ori77, Task Order 1, Project no. 161-014, January 1947

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MOTION PICTURE

Drury, D.R., et al. 1948 STUDIES OF THE PATHOLOGY PRODUCED UPON GOATS BY EXPOSURE TO HEAD TO FOOT RADIAL ACCELERATIONS: NEGATIVE G. (Presented at the Nineteenth Annual meeting of the Aero Medical Association in Toronto, Canada, June 1948)

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Duane, T.D., E. L. Beckman & K.R. Coburn n.d. LIMITATION OF OCULAR MOTILITY DURING POSITIVE ACCELERATION (Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.)

1,363

Duane, T. D., R. L. Wechsler, J. E. Ziegler, & E. L. Beckman 1952 EFFECTS OF ACCELERATION UPON THE CEREBRAL METABOLISM AND CEREBRAL BLOOD FLOW. PHASE II. STUDIES ON CEREBRAL PHYSIOLOGY OF MONKEYS AT 12 NEGATIVE G. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5204, 21 May 1952, ASTIA ATI 157 813

ABSTRACT: A survey of the effects of repeated exposures to 12 negative G for 40 seconds was carried out on the monkey, and his response to this imposed stress evaluated. Cerebral circulation was measured by recording the passage of fluorescein through cortical vessels with the use of a photofluorometer attached to a cranial lucite window previously placed in the monkey's skull. Respiration was recorded via a thermocouple within the tracheal cannula. A quantitative measurement of the blood gases was performed upon blood withdrawn from the cerebral circulation during maximum G; electroencephalographic and electrocardiographic recordings were obtained by several methods; and the vascular pressure gradient across the brain was measured by pressure transducers in the carotid artery and in the confluens sinuum. Whenever possible, all recordings were made concurrently.

At 12 negative G for 40 seconds there was evidence of continuing cerebral circulation, apnea with secondary arterial anoxemia, and a lowering of the cerebral venous oxygen content suggesting cerebral anoxia. A transient enhancement of the electrical activity of the cortex was followed by gradual depression of varying degrees. The arterial and venous pressures were elevated, but their A-V gradient decreased severely during stress. Cardiac irregularities occurred with abnormally high T waves suggestive of severe cardiac anoxia. A failure of the cerebral venous oxygen content to return to the pre-run level ten minutes after acceleration indicates either an abnormality of cerebral metabolism or a decreased cerebral blood flow. (DACO)

1,364

Duane, T. D., J. E. Ziegler and H. Hunter 1952 HUMAN TOLERANCE TO COMBINED ACCELERATION.
(Naval Air Development Center, Aviation Medical Acceleration Lab., Johnsville, Pa.) Report no. NADC-MA-L5207, 3 Dec. 1952. ASTIA AD 54 282

ABSTRACT: Experiments were carried out on human subjects and primates (chimpanzees) seated in an F9F ejection seat, which was mounted on the deck of the gondola of a human centrifuge. Transverse g (back to chest and chest to back) were applied up to 15 g for 5 seconds, resulting in physical discomfort, such as pressure on the rib cage, and petachiae on the back. However, this body loading was well within the voluntary human tolerance and installation of a padded body support reduced discomfort. Following preliminary explorative experiments with primates, subjects were exposed to positive (head to seat) g forces up to a maximum of 15 g. The subjects were first tested under normal accelerations (3 to 4 g per second increase or decrease) in order to establish their blackout level, and then subjected to g levels higher than their blackout level. It was shown that by stepping up the acceleration levels, the blackout levels could be increased, while the time intervals of consciousness were reduced.

1,365

Duane, T. D. et al 1952 STUDIES ON CEREBRAL PHYSIOLOGY OF MONKEYS AT 12 NEGATIVE G.
J. Aviation Med. 23(5):479-489, 544. October 1952.

ABSTRACT: A survey of the effects of repeated exposures to 12 negative G for forty seconds was carried out on the monkey, and his response to this imposed stress evaluated. Cerebral circulation was measured by recording the passage of fluorescein through cortical vessels with the use of a photofluorometer attached to a cranial lucite window previously placed in the monkey's skull. Respiration was recorded via a thermocouple within the tracheal cannula. A quantitative measurement of the blood gases was perfomed upon blood withdrawn from the cerebral circulation during maximum G; electroencephalographic and electrocardiographic recordings were obtained by several methods; and the vascular pressure gradient across the brain was measured by pressure transducers in the carotid artery and in the confluens sinuum. Whenever possible, all recordings were made concurrently.

At 12 negative G for forty seconds there was evidence of continuing cerebral circulation, apnea with secondary arterial anoxemia, and a lowering of the cerebral venous oxygen content suggesting cerebral anoxia. A transient enhancement of the electrical activity of the cortex was followed by gradual depression of varying degrees. The arterial and venous pressures were elevated, but their A-V gradient decreased severely during stress. Cardiac irregularities occurred with abnormally high T waves suggestive of severe cardiac anoxia. A failure of the cerebral venous oxygen content to return to the pre-run level ten minutes after deceleration indicates either an abnormality of cerebral metabolism or a decreased cerebral blood flow.

1,366

Duane, T. D., R. L. Wechsler, J. E. Ziegler, and E. L. Beckman 1952 STUDIES ON CEREBRAL PHYSIOLOGY OF MONKEYS AT 12 NEGATIVE G, PHASE II.
J. Avia. Med. 23:479-489.

See also American Journal of Medical Science 224:112 (1952).

ABSTRACT: Anesthetized healthy monkeys (Macaca mulatta) with lucite calvaria, were subjected to 12 negative g on a centrifuge while various physiological measurements were taken. Repeated exposures of 40 seconds each resulted in cerebral edema and in subcutaneous and submucosal hemorrhages in the head and neck region, but were not fatal to the animals. At - 12 g, cerebral circulation continued at a somewhat slower rate compared to unexposed controls (9.4 and 7.1 seconds, respectively). During maximum g, respiratory movements ceased but were resumed spotaneously 15 seconds after completion of exposure. While there was a decrease in the cerebral arteriovenous difference during negative g, this difference rose above the pre-run level 10 minutes after the experiment. The electroencephalogram revealed a trend toward progressive depression, with individual variations. The arterial and venous pressures increased but the pressure gradient decreased severely during stress. Bradycardia and high T wave were both suggestive of severe anoxia.

1,367

Duane, T. D., R. L. Wechsler, J. E. Ziegler and E. L. Beckman 1952 STUDIES ON CEREBRAL PHYSIOLOGY OF MONKEYS AT 12 NEGATIVE G, PHASE II.
American Journal of Medical Science 224: 112
See Also J. Aviation Med. 23:479-489.

ABSTRACT: Cerebral circulation, respiration, blood gases, and vascular pressure gradients across the brain were measured on monkeys exposed to 12 negative g for 40 seconds. Electroencephalogram and electrocardiogram were also recorded. The findings were as follows: (1) cerebral circulation continued throughout the experiment; (2) apnea set in with secondary arterial anoxemia and a lowereing of the cerebral venous oxygen content, indicating cerebral anoxia; (3) arterial and venous pressures were elevated, but the arterio-venous pressure gradient decreased severely during the stress; (4) cardiac irregularities were observed, suggesting cardiac anoxia; and (5) the cerebral venous oxygen content failed to return to the original level after the experiment, indicating a disturbed cerebral metabolism or decreased cerebral blood flow.

1,368

Duane, T. D. 1953 PRELIMINARY INVESTIGATION INTO THE STUDY OF THE FUNDUS OCULI OF HUMAN SUBJECTS UNDER POSITIVE ACCELERATION. PHASE III.
(Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5303; ASTIA AD-20 519

ABSTRACT: The literature was surveyed with respect to 2 prevalent theories concerning blackout. Experiments verified the hypothesis that blackout is a retinal ischemic phenomena. Blackout in humans subjected to positive acceleration was accompanied by a retinal arteriolar ischemia. A close correlation was noted between subjective visual losses and the 3 stages of ophthalmoscopic changes: arteriolar pulsation, arteriolar exsanguination and collapse, and return of arteriolar pulsation and transient venous distention. A correlation was found between the systolic pressure and the symptoms and signs of blackout. Observations of the fundus oculi of chimpanzees subjected to positive and negative g forces indicated that under negative g, a venous engorgement and narrowing of the arteriolar trees occurred. In rabbits a decrease in intracranial and intraocular pressures occurred during positive g, and an increase in pressures occurred during negative g. (ASTIA)

1,369

Duane, T. D., E. L. Beckman, et al 1953 SOME OBSERVATIONS ON HUMAN TOLERANCE TO EXPOSURES OF 15 TRANVERSE G.
(Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.) Report no. NADC-MA-5305; ASTIA AD 20 518.

ABSTRACT: The physiological effects of positive and negative G applied transversely in supine and prone positions were investigated. The 50-ft human centrifuge with a standard F9E ejection seat was used in all the test runs. Normal, healthy, male volunteers experienced 99 runs between 3 G for 2 sec and

15G for 5 sec in the supine position; 53 runs of the smae magnitudes were experienced in the prone position. Ear pulse, ear opacity and modified Lead 1 of ECG were recorded. Conventional lap belts and shoulder harnesses were used. Head fixation was maintained by a perforated face curtain with handles modified to provide signal buttons for central and peripheral lights as well as a distress buzzer. Black-and-white motion pictures were taken during some of the runs. In the supine position, the pulse wave which began to flatten at 5 G was absent at 9 to 10 G, and all subjects responded rapidly to peripheral and central lights at 15 G for 5 sec. Occasional moist rales and hoarseness occurred in 1 subject at 13 G for 3 sec, and a few subjects deviated to the right when attempting 1-foot stands. One subject received a submucosal hemorrhage in the tympanic membrane. Vertigo, stiffness, and weariness were experienced by all subjects. ECG, EEG, and ear opacity recordings were inadequate for satisfactory analysis. In the prone position, a slight sinus arrythmia was present in some subjects during the postrun period, and petechiae appeared in the legs of subjects not protected by elastic bandages. Motion pictures revealed body displacement, and the subjects experienced burning pains in the knees and calves during 15-G runs. ECG, ear-pulse, ear-opacity, and signal-light recordings were inadequate for satisfactory analysis. (ASTIA)

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Duane, T. D. 1954 OBSERVATIONS ON THE FUNDUS OCULI DURING BLACKOUT.
A.M.A. Arch. Ophth. 51:343-355.

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Duane, T. E., E. L. Beckman, J. E. Ziegler and H. Hunter 1955 SOME OBSERVATIONS ON HUMAN TOLERANCE TO ACCELERATIVE STRESS. III. HUMAN STUDIES OF 15 TRANSVERSE G.
J. Aviation Medicine 26(4):298-303, August 1955.

ABSTRACT: Five subjects were exposed to 15 transverse g for five seconds in the supine position. Also, five subjects were placed in the prone position and exposed to the same accelerative conditions. Blackout and unconsciousness did not occur and the physiological effects produced were of a transient nature. An adequately stressed seat was sufficient protection for the supine position. Since the conventional shoulder harness and lap belt were not suitable for levels above 7 g when the stress was applied in the prone position, additional thorax and leg barriers were employed. (Author)

1,372

Duane, T. D., E. L. Beckman and K. R. Coburn 1962 LIMITATION OF OCULAR MOTILITY AND PUPILLARY DILATION IN HUMAN BEINGS DURING POSITIVE ACCELERATION.
In Invest. Ophthal. 1:136-141, Feb. 1962.

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Duane, T. D., D. H. Lewis, S. D. Weeks and J. F. Toole 1962 THE EFFECTS OF APPLIED OCULAR PRESSURE AND OF POSITIVE ACCELERATION ON PHOTIC DRIVING IN MAN.
(Naval Air Development Center, Johnsville, Pa.)
NADC-MA-6214, 28 Dec. 1962. ASTIA AD 298 112

ABSTRACT: Several subjects who demonstrated the phenomenon known as photic driving of the electroencephalogram were employed in experiments with the ophthalmo-dynamometer and with positive acceleration on the human centrifuge. In both of these forms of stress when the intraocular pressure exceeded the retinal arteriolar diastolic pressure a direct correlation was demonstrated to peripheral field constriction and loss of the previously apparent photic driving in the electroencephalogram. The latter did not reappear when the intraocular pressure exceeded the retinal arteriolar systolic pressure but did reappear as soon as the intraocular pressure was beneath the retinal arteriolar diastolic pressure. This suggests that photic driving is related to the rod portion of the human retina, since with retention of central vision, which is primarily a cone function, photic driving remained inhibited. (Author)

1,374

Duane, T. D., D. H. Lewis, S. D. Weeks & J. F. Toole 1963 THE EFFECTS OF APPLIED OCULAR PRESSURE AND POSITIVE ACCELERATION ON PHOTIC DRIVING IN MAN.
Neurology (Minneap) 13:259-262, March 1963.

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DuBois, E. F. and W. R. Miles 1945 FIFTH CRASH INJURY CONFERENCE.
(National Research Council, Committee on Aviation Medicine, Washington, D. C.) Special CAM Report, 30-31 October 1945.

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DuBridge, L.A. 1961 ADVENTURES IN SPACE.
Calif. Inst. Technol. Quart., 2:2-8, Spring 1961

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Dugas, D.J. 1962 TARGET-SEARCH CAPABILITY OF A HUMAN OBSERVER IN HIGH-SPEED FLIGHT. (Rand Corp., Santa Monica, Calif.) Memo No. RM-3226-PR, December 1962. ASTIA AD 294 599

ABSTRACT: The necessary conditions for the visual process are presented, and two modes of search are discussed in detail. One mode is an example of the

familiar sector-scan pattern, and the other is a more specific method adapted to searching for rail-mobile targets. The limitations placed by speed-and-altitude combinations on visual performance in these two situations are summarized. Curves are presented which represent the capabilities of an observer under ideal conditions; but in a real search mission, allowances must be made for factors unique to the situation that tend to degrade the performance of the observer (e.g., fatigue, poor visibility, and vibration of the aircraft). In comparing the two modes of search it was found that some of the difficulties encountered in searching for small targets can be alleviated by using an appropriate search pattern. It is important to acquire as much information as possible about the targets beforehand so that the observer can employ the most effective search procedures. The human optical system apparently will not constitute the most serious speed limitation on the reconnaissance aircraft except at very low altitudes (less than 1500 ft). It can be expected that structural limits of the aircraft will generally be encountered long before the maximum tolerable speed for vision is reached. (Author)

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Duguet, J. 1946 EFFETS PHYSIO-PATHOLOGIQUES DES ACCELERATIONS SUR L'ORGANISME DE L'AVIATEUR (THE PHYSIO-PATHOLOGICAL EFFECTS OF ACCELERATION ON THE ORGANISM OF THE AVIATOR)
Biologie Medicale 35 (11): 197-219

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Dunlap, J.W., 1947 HUMAN PROBLEMS IN THE OPERATION OF HIGH SPEED AIRCRAFT. (Office of Naval Research, Special Devices Center, New York, N.Y.) August 1, 1947

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Dunlap, K., and R.M. Dorcus 1926 THE EFFECT OF RATE OF RETARDATION ON POST-ROTATION NYSTAGMUS. J. Comp. Psychol. 6:329-335

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Dunlavey, E. O. 1956 CENTRIFUGE TESTING OF SINGLE DEGREE OF FREEDOM GYROS (Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.) Rept. no. GM-TN-41; GM 43.5-57; WDD Document no. 7-883, Contract AF 18(600)1190, 7 Nov. 1956; ASTIA AD 217 310

ABSTRACT: A discussion is presented on some of the problems associated with centrifuge testing of single degree of freedom gyros. Direct attachment of

the gyro to the centrifuge arm, with the gyro output axis parallel to the centrifuge axis, is shown to be a simple, yet accurate, way to obtain wheel-off mass unbalance and compliance torque data. These wheel-off type gyro tests can be performed on commercially available equipment and they should provide much useful gyro design data. Further refinement in accuracy can be accomplished by measuring and correcting for misalignment between the gyro case and centrifuge axes. Two methods are presented for measuring this misalignment during centrifuge operation. Accurate wheel-on type gyro tests require the use of a stable platform, since a counter-rotating table can introduce excessive misalignment errors. Centrifuge arm vibration can subject the test gyro to both translational plus rotational vibrations. These inputs may cause significant errors if the arm motion contains frequency components above the centrifuge frequency. (Author)

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Duval, R. A. 1944 A FLYING ACCIDENT POSSIBLY DUE TO THE EFFECT OF CENTRIFUGAL FORCE.
J. R. Nav. Med. Serv. 30:54-56.

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Duvoisin, R. C., F. Kruse, Jr., and D. Saunders 1961 CONVULSIVE SYNCOPE INDUCED BY THE VALSALVA MANEUVER IN SUBJECTS EXHIBITING LOW G-TOLERANCE. (Paper, 32nd Annual Meeting of the Aerospace Medical Assoc., Palmer House, Chicago, Illinois, April 24-27, 1961)

ABSTRACT: The authors studied a group of patients who, by voluntarily performing a Valsalva maneuver, could reporduce episodes presenting the EEG and clinical features observed by Gastaut in convulsive syncope due to cardiac asystole. The group included two student pilots referred because of "convulsions" occurring in flight under positive G-stress. Their case histories are presented to demonstrate a mechanism of syncope important to aviation medicine and to illustrate the differentiation of convulsive syncope from epilepsy. (Aerospace Medicine 32(3):229. March 1961)

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Dvorák, J. 1951 URAZOVOST PŘI SESKOKU PADÁKEM (Injuries during Parachute Jumps)
Vojenské Zdravotnické Listy, Prague, 20:135-136, May-June 1951.

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Dvorak, Josef 1958 ZDRAVOTNICKE PROBLEMY LETU V KOSMICKEM PROSTORU (Health Problems of Flights in the Cosmic Space)
Prakticky lekar 38(10): 401-403.

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Dvorak, J., P.K. Isakov, & J. Hospodar 1960 CLOVEK V MEZIPLANETARIM PROSTORU (MAN IN INTERPLANETARY SPACE) (Prague: Orbis, 1960)

ABSTRACT: The book is based mainly on Soviet data and presents the physical aspects of outer space from the biological point of view. Attention is given to the effect of space factors on the body and methods and equipment for human flight in outer space are described. Details of the first experiment with the dog Layka in space flight are given. Return to the Earth, the selection and training of astronauts, scientific results of space flights, and space medicine are treated. No personalities are mentioned. There are 7 references, all Czech. (CARI)

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Dvorak, J., P. K. Isakov and J. Hospodar 1960 MAN IN INTERPLANETARY SPACE — A SMALL MODERN ENCYCLOPEDIA (Clovek v Meziplanetarnim Prostoru) Ceskoslovenska Spolecnost Pro Sireni Politickych A Vedeckych Znalosti, Prague, pp. 1-160, 169-211. (Trans. by Aerospace Technical Intelligence Center, Wright-Patterson AFB, Ohio, Trans. No. MCL-907.)
ASTIA AD 261 786

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Dvorak, J., Isakov, P. K. & J. Hospodar 1961 MAN IN INTERPLANETARY SPACE - A SMALL MODERN ENCYCLOPEDIA (Clovek v Meziplanetarnim Prostoru) (Foreign Technology Division, Wright Patterson Air Force Base, Ohio) MCL-907/1+2, 23 May 1961. ASTIA AD 261 786.

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Dvorak, J., P. K. Isakov & J. Hospodar 1961 EFFECT OF COSMIC VELOCITIES ON THE ORGANISM.
In: Man In Interplanetary Space - A Small Modern Encyclopedia.
ASTIA AD 261 786

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Dvorak, J., P. K. Isakov & J. Hospodar 1961 INFLUENCE OF OTHER FLIGHT FACTORS
In: Man In Interplanetary Space - A Small Modern Encyclopedia.
ASTIA AD 261 786

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Dvorak, J., P. K. Isakov & J. Hospodar 1961 EFFECT OF WEIGHT CHANGES. In: Man in Interplanetary Space - A Small Modern Encyclopedia. ASTIA AD 261 786.

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Dybowski, W. 1936 WPLYW SZYBKOSCI I JEJ ZMIAN NA ORGANIZM LOTNIKA (L'INFLUENCE DE LA VITESSE AT DE SES CHANGEMENTS SUR L'ORGANISME DE L'AVIATEUR) (The Influence of Speed and the Changes Upon the Organism of the Aviator)
Lakarz Wojskowy (Warsaw) 27: 335-342 (with French summary)
See also: Polsk. Przegl. Med. Lotn. (Varsovie) 4: 183-190; 1935.

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Dye, E.R. 1949 KINEMATIC BEHAVIOR OF THE HUMAN BODY DURING CRASH DECELERATION (THIN MAN PROJECT).
(Cornell Aeronautical Lab., Inc., Buffalo, N.Y.) Report No. OM-596-J-1 10 Oct. 1949. ASTIA ATI 78582.

ABSTRACT: A piece of experimental apparatus consisting of a jointed full scale proportionally weighted sheet metal man was designed and built. This dummy was placed in a two dimensional cockpit and the cockpit accelerated by shock cords to simulate crash conditions. Co-planar motions of the major joints of the body and head are traced on paper and uniform time intervals are marked on the scribed motion paths by a spark device. Energy of the impact blow to the head is measured with a simple energy gauge. Data can be taken for variou seat strap and shoulder harness arrangements and for the unrestrained body condition. Preliminary test runs were made to establish the effectiveness of the equipment.

Tests were conducted on human subjects to determine muscular restraint to joint rotation so that the data could be used to simulate tense conditions in the "Thin Man" crashes.

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Dye, E. R. 1953 PROTECTION OF THE HUMAN HEAD FROM BLOWS DELIVERED BY A FLAT SURFACE.
Safety Education 32: 8-11.

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Dye, E. R. 1954 CORNELL UNIVERSITY TESTS SHOW JUST WHAT HAPPENS IN A CRASH . . . AND HOW TO PROTECT YOURSELF. Woman's Day 18(2):32-33, 85-86, Nov.1954

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Dye, E. R. 1956 KINEMATICS OF THE HUMAN BODY UNDER CRASH CONDITIONS. Clinical Orthopaedics 8:305-309, 956.

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Dytrt, L. F. and W. Specht 1945 IMPACT DETERMINATIONS. General Electric Review 48(6):50-54, June 1945.

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Dzendolet, E. 1960 MANUAL APPLICATION OF IMPULSES WHILE TRACTIONLESS Hum. Factors 2(4):221-227, Nov. 1960.

ABSTRACT: To determine what types of impulses could be applied by a S while tractionless, 20 naive Ss were tested on an air-bearing "scooter" and a strain gauge transducer or force bar. The task was to push the plunger, with one motion, as far as it would go in the tube while sitting on the scooter and grasping a handhold with the left hand. The task was performed with air blowing through the air-bearing pads of the scooter making the S tractionless, and under normal frictional conditions. Forces against which, and travel distances through which the plunger was pushed were varied. Both quantitative and qualitative results were presented. (Tufts)

ACCELERATION

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Eakin, B.H. 1946 INSTRUCTIONS FOR USE OF ACCELEROMETER MK 2 (U.S. Naval Gun Factory Washington 25, D.C.) Naval Ordnance Laboratory Memorandum 8494, 9 Oct. 1946, AD 115 113

ABSTRACT: This publication contains a description of the Accelerometer MK 2 and instructions in preparing it for use. It also gives instructions for loading and presetting the accelerometer and mounting and reading it.

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Eccles, J.C. n.d. REPORT ON PHYSIOLOGICAL PERFORMANCE AND ACTION OF HUMAN CENTRIFUGES, AS REQUESTED BY ANTI-G SUB-COMMITTEE OF THE F.P.R.C., 17 JULY 1943. (Flying Personnel Research Committee, Royal Australian Air Force) RAAF FR52

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Eckel, W. 1954 ELEKTROPHSIOLOGISCHE UND HISTOLOGISCHE UNTERSUCHUNGEN IM VESTIBULARISKERN GEBIET BEI DREHREIZEN (Electrophysiological and Histological Investigations of the Vestibular Nucleus During Rotary Stimuli) Arch. Ohren- Nasen- u. Kehlkopfh. (Berlin) 164:487-513.

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Ecker, P.G., R.J. Crosbie, and H. Hunter 1953 AN INVESTIGATION OF THE EFFECTS OF ACCELERATION FORCES ON A PILOT DURING AN AUTOMATIC INTERCEPTOR ATTACK (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-L5304, June 2, 1953. ASTIA AD 13 805

ABSTRACT: An F9F ejection seat was installed in the gondola of the human centrifuge and subjects were exposed to acceleration runs from 1 to 3 ½ G, accompanied by an oscillating roll over in amplitude of $54^{\circ} \pm 20^{\circ}$ at a frequency of 0.5 to 0.75 cycles per second and an oscillating pitch in amplitude of $+ 36^{\circ}$ to $- 36^{\circ}$ at a frequency of 0.6 cycles per second. It is felt that, under the present conditions of the run, the pilot will have no divviculty in recovering control of the aircraft following the roll away from the target.

1,403

Eckstrand, G. A. & M. R. Rockway 1961 SPACECREW TRAINING: A REVIEW OF PROGRESS AND PROSPECTS. (Wright-Patterson Air Force Base) ASD TR 61-721; ASTIA AD 274 190.

ABSTRACT: Current progress and future prospects in the field of spacecrew training are reviewed. Descriptions of all current astronaut training programs are presented, and a number of general conclusions with reference to such training are drawn, based upon the manned space operations which have been conducted to date. In addition to the actual experience which has been gained in training spacecrew personnel, a review is presented of recently completed and current research which is directly relevant to this problem. Areas in which research should be accelerated are identified. (Author)

1,404

Edelberg, R., et al. 1952 COMPARISON OF EFFECTS OF HUMAN TOLERANCE TO ACCELERATIONS OF SLOW AND RAPID ONSET. J. Aviation Med. 27(6):482-489, Dec. 1952. ASTIA AD 208 151

ABSTRACT: Reflex activity of the circulation during exposure to g has been recognized, but its full capacity has not been evaluated. The "gradual onset run" (GOR) allows evaluation of this capacity and its magnitude turns out to be greater than commonly believed. It can add up to 3.5 g to the conventional blackout level, (average increment, 1.9 g). A hypothesis is presented to show how the GOR produces this increment. The increment has a high correlation with the amount of protection received from a g-suit for any given subject, a relationship which is interpreted as implying a reflex mechanism in g-suit protection. The GOR has application in predicting changes in a pilot's g-tolerance in the g-suit and in evaluating student pilots with a history of low g-tolerance. (Author)

1,405

Edelberg, R., and H. S. Weiss 1952 CENTRIFUGATION OF ANIMALS ABOUT AN AXIS THROUGH THE BODY.
Federation Proceedings, 11 (1^{I}): 40.

Abstract: Dogs, anesthetized with Nembutal and lying on either side, were spun on a horizontal turn able with the heart at the center of rotation. Respiratory rate, EKG, and direct measurement of blood pressure from 4 vessels were recorded simultaneously. The centrifugal force induced by the spin about the heart opposes venous return, resulting, at speeds above 120 r.p.m., in a picture of acute hypoxia. Cardiac output is decreased as indicated by the marked reduction in arterial pressure pulse pressure and A-V pressure differences. Tachycardia develops and is primarily attributal to the abrupt acute fall in carotid pressure. Breathing ceases in the inspiratory phase probably as a result of a caudad displacement of the disaphragm. Animals survived exposures to 200 r.p.m. for 2 minutes but developed subendocardial and cerebral subarachnoid hemorrhages. Similar Subendocardial Hemorrhages have been produced by the beating of an "empty" heart. The subarachnoid ecchymoses are attributed to the sudden rise in systolic pressure from zero to almost 450 mm. Hg immediately after the run.

1,406

Edelberg, R. 1952 TUMBLING (paper, conference on "Problems of Emergency Escape in High Speed Flight," Sept. 29-30, 1952, at Wright-Patterson AFB, Ohio) ASTIA AD 14 346

ABSTRACT: Tumbling motions were simulated on a turn-table capable of speeds up to 200 r.p.m. Speeds of 100 r.p.m. did not produce unconsciousness in human test subjects when the center of rotation was located at the lower portion of the heart. Above 100 r.p.m., pain was perceived and hemorrhages occurred, but mental and physical performance remained unimpaired. Experiments with dogs showed that the impairment of the circulation becomes less at any given speed as the center of rotation is moved toward the lower abdomen. Human experiments with the center of rotation at the level of the abdomen are in progress. From the dog experiments it appears desirable that the center of rotation be applied at heart level for short-duration spins. Since production of vertigo is contingent on stimulation of the semicircular canals by some changing force, at spins of constant rate no vertigo is experienced because the radial forces are constant. The resulting sensation is that of being in a strong gravitational field acting toward the head and feet at the same time, rather than one of being rotated. A "strength-duration curve for human tolerance" indicating threshold values for conjunctival hemorrhage is presented.

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Edelberg, R. and H. S. Weiss 1953 THE PHYSIOLOGY OF SIMPLE TUMBLING. PHASE II. HUMAN STUDIES.
(Wright Air Development Center, Wright-Patterson AFB, Ohio)
WADC TR 53-139, June 1953.

1,408

Edelberg, R., H. S. Weiss, & P. V. Charland 1953 HYDROSTATIC BEHAVIOR OF VASCULAR COLUMN DURING TUMBLING. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio)

ABSTRACT: During emergency escape from high speed aircraft, there often occurs a head-over-heels tumbling which may produce radial accelerations as high as 25 g, acting in opposite directions at each end of the body. The hydrostatic pressures developed in the vascular column should increase with the square of the distance from the center of rotation, a prediction validated by experiment, and the absolute pressure at any point would be expected to equal the central pressure plus the hydrostatic increment. However, when dogs were rotated on a spin-table with the center of rotation through the heart at speeds which either reduced or virtually eliminated cardiac output, peripheral pressures were considerably lower than expected. One possible explanation was the development of subatmospheric pressures at the center of rotation. Sub-ambient pressures at head level during positive acceleration have been reported (Henry, Gauer, Kety and Kramer, 1951) and in fact the pressures measured at the center of rotation by intra-aortic catheterization of the dogs fell as low as 80 mm Hg sub-ambient. They agree closely with the central pressures calculated from peripheral measurements.

Further, when water-filled columns of comparable dimensions were rotated, central pressures as low as 250 mm Hg below ambient were developed. Lastly, at moderate speeds, when some cardiac output is still maintained and the flow precludes an interrupted column, it is necessary to assume the development of sub-atmospheric central pressures to account for the low peripheral pressure values. (Federation Proceedings 12(1):37, March 1953)

1,409

Edelberg, R. 1953 PROBLEMS OF EMERGENCY ESCAPE IN HIGH SPEED FLIGHT: TUMBLING (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC Document #53WC-1470

1,410

Edelberg, R., H. S. Weiss, P. V. Charland & J. I. Rosenbaum 1954 THE PHYSIOLOGY OF SIMPLE TUMBLING. PART I. ANIMAL STUDIES. (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC Tech. Rept. 53-139. Jan. 1954. ASTIA AD 36 304.

ABSTRACT: The tumbling that follows emergency escape from an aircraft by seat ejection or that occurs during prolonged free-fall poses a threat to the escaping crewman. Tumbling was simulated in the laboratory on a horizontal spin table using anesthetized dogs as subjects preliminary to human experimentation. The axis of rotation was through the heart or at various locations up to 20 cm caudad. The centrifugal forces proved effective in producing peripheral pooling with a consequent reduction in heart filling and cardiac output as evidenced by the reduced pulse pressure and arteriovenous pressure difference. The decrease in perfusion pressure and the accompanying apnea was enough to produce hypoxia at speeds greater than 140 rpm, as evidenced by oral cyanosis. Concurrently, the elevated hydrostatic pressures were sufficient to produce hemorrhage in the extremities. A tachycardia or bradycardia may occur, depending on the location of the center of rotation. In general, pathology is less when the center of rotation is at the heart than when located at the more caudad positions, but circulation is less impaired as the center is moved caudad. (DACO)

1,411

Edelberg, R. 1955 BLOOD PRESSURES DURING SIMULTANEOUS TUMBLING AND DECELERATION.

ABSTRACT: Immediately after emergency ejection, a pilot may be exposed to drag forces as high as 25 g in a negative g attitude. It has been suggested that

tumbling, if rapid enough, may decrease rather than increase the severity of the resulting negative g hydrostatic effects. The situation was simulated by rotating dogs up to 200 rpm on a spin-table located at the periphery of the human centrifuge. The centrifuge simultaneously imposed 'drag forces' up to 10 g which changed direction sinusoidally. It was found that superimposed tumbling between 60 and 200 rpm greatly reduced the edema and hemorrhage normally produced by negative g alone. Similarly the vascular damage and engorgement of combined accelerations was less severe than after tumbling alone. Up to ± 10 g of drag force, the effects of jostling on the viscera were not significant. Blood pressures, measured with Gauer-Wetterer intra-vascular manometers to eliminate the need for hydrostatic correction, were often considerably lower than theoretical pressures. Furthermore, this difference became greater at higher rates of rotation. This effect may, under various circumstances, be due to the low natural frequency of the vascular column, to partial collapse of the column, or to the development of sub-ambient pressures at the center of rotation. The reduction of hydrostatic damage is not due to lower pressures but to the alternation in direction of force with the consequent change in duration of exposure. Circulation is less impaired than in simple tumbling, as evidenced by the smaller reduction in arterial-venous pressure difference. (Federation Proceedings 14:41-42, Mar. 1955)

1,412

Edelberg, R. 1955 HYDROSTATIC EFFECTS OF COMBINED TUMBLING AND DECELERATION. Shock and Vibration Bull. 22:20-23.

1,413

Edelberg, R., J.P. Henry, J.A. Maciolek, E.W. Salzman and G.D. Zuidema 1956 COMPARISON OF HUMAN TOLERANCE TO ACCELERATIONS OF SLOW AND RAPID ONSET. J. Aviation Med., 27(6):482-489

ABSTRACT: Reflex activity of the circulation during exposure to g has been recognized, but its full capacity has not been evaluated. The "gradual onset run" (GOR) allows evaluation of this capacity and its magnitude turns out to be greater than commonly believed. It can add up to 3.5 g to the conventional blackout level, (average increment, 1.9 g). A hypothesis is presented to show how the GOR produces this increment. The increment has a high correlation with the amount of protection received from a g-suit for any given subject, a relationship which is interpreted as implying a reflex mechanism in g-suit protection. The GOR has application in predicting changes in a pilot's g-tolerance in the g-suit and in evaluating student pilots with a history of low g-tolerance.

1,414

Edelberg, R. 1956 REFLEX ACTIVITY AS A DETERMINANT OF TOLERANCE TO ACCELERATION. (In Proceedings of Twentieth International Physiological Congress, Brussels, Belgium, 1956)

1,415

Edelberg, F. 1961 THE PHYSIOLOGY OF COMBINED ACCELERATIONS. In Gauer, O. H. and C. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine. (Boston: Little, Brown, and Co., 1961). Pp. 140-149.

1,416

Edelberg, R. 1961 THE RELATIONSHIP BETWEEN THE GALVANIC SKIN RESPONSE, VASOCONSTRICTION, AND TACTILE SENSITIVITY
J. Exp. Psychol. 62(2): 187-195, Aug. 1961

ABSTRACT: The relationship over short periods of time between cutaneous tactile threshold and autonomic activity, as reflected in GSR or in degree of vasoconstriction, was determined by a method allowing continuous monitoring of the S's threshold to 250 cps vibration. The 28 Ss were tested, following a period of training and equilibrium, for a minimum period of five minutes during which three autonomic responses were deliberately elicited by a loud noise or asking the S to sniff sharply or take a deep breath. In addition, the effects of viriation in attention, of stretching or relaxing of the skin, and the anatomical site tested on tactile threshold were explored. (Tufts)

1,417

Eden, K., and J.W.A. Turner 1941 LOSS OF CONSCIOUSNESS IN DIFFERENT TYPES OF HEAD INJURY.
Proc. Roy. Soc. Med. 34:685-691, Sept. 1941.

ABSTRACT:

1. A series of 200 cases of different types of head injury, both closed and open, have been examined with reference to the loss of consciousness sustained.

2. There are two different ways in which the brain may be injured by a blow to the head: there is a generalized effect in which the force is transmitted throughout the skull to the brain as a whole, which results in immediate unconsciousness - concussion; and a localized bruising effect, often with signs of focal damage to the brain - contusion. In the absence of concussion unconsciousness occurs only as a result of contusion of a severe degree, and may then be delayed in onset and prolonged in duration.

3. Injuries due to massive violence, such as road accidents and heavy falls, commonly cause concussion, with or without contusion. In a large proportion of wounds due to projectiles and small missiles (including scalp wounds, depressed fractures and penetrating wounds of the brain), concussion is absent, even in the presence of contusion.

4. Loss of consciousness following a penetrating wound of the brain may result from a superadded massive blow to the head, such as a fall to the ground, or a complication such as cerebral hemorrhage; or it may indicate widespread contusion from a wound deep in the base of the brain.

5. The important factor which determines the presence or absence of concussion in head injury is the area of skull struck, providing that there is adequate momentum.

1,418

Edholm, O. G. 1940 EFFECT OF GRAVITY ON THE BLOOD PRESSURE OF THE CAT. J. Physiol. 98:79-96, 1940.

1,419

Edholm, O. G. 1942 THE COMPENSATORY MECHANISM OF THE SPLANCHNIC CIRCULATION DURING CHANGES OF POSTURE. J. Physiol. 101:1-10, 1942.

1,420

Edwards, A.S. 1949 THE EFFECT OF BODILY ROTATION UPON INVOLUNTARY SWAY AND FINGER TREMOR. Amer. J. Psychol. 62:590-591.

ABSTRACT: Using 50 college student subjects tested with the author's ataxiameter, it was found that body sway was greatly increased following rotation. Statistically significant results were not obtained with 100 Ss when finger-tremor was tested with the tromometer before and after rotation. (Psychol. Abs. 24:417, 1950)

1,421

Edwards, P. R., H. N. Hunter, & E. Kephart 1954 DATA SENSING AND RECORDING TECHNIQUES ESTABLISHED FOR THE HUMAN CENTRIFUGE. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5306, 29 Jan. 1954

1,422

Edwards, P. R., H. N. Hunter, & E. Kephart 1955 DEVELOPMENT OF BIOLOGICAL RESEARCH APPARATUS FOR USE IN ACCELERATION AND DECELERATION STUDIES. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 303, 31 December 1955; PHASE I

ABSTRACT: A calibrated device consisting of a pressure chamber and hydrophone with a circuitry for frequency and amplitude control has been constructed, tested, and found to be satisfactory.

1,423

Edwards, P. R., R. Zabelicky, & E. Kephart 1955 DEVELOPMENT OF BIOLOGICAL RESEARCH APPARATUS FOR USE IN ACCELERATION AND DECELERATION STUDIES. PHASE IV. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 303; 31 Dec. 1955

ABSTRACT: A complete system with a 16 mm Mitchell camera, x-ray apparatus and accessories has been subjected to tests on the centrifuge and it was found that 16 mm film was not feasible for the detail required. Another complete system with a modified 35 mm Mitchell camera and an F.7i Wray lens has been subjected to tests on the centrifuge and found to be satisfactory.

1,424

Eggers, A. J. 1957 SATELLITE RECOVERY PROPOSAL
Aviation Wk. 67:101, Nov. 18, 1957

ABSTRACT: Picture illustrates proposal for bringing a satellite back to earth made by A. J. Eggers of the NACA. "Hemispherical, finned vehicle would encounter deceleration and heating within human capacity if re-entry was made at a small angle with the horizontal."

1,425

Eggers, A. J., Jr. and T. J. Wong 1958 RE-ENTRY AND RECOVERY OF NEAR-EARTH SATELLITES, WITH PARTICULAR ATTENTION TO A MANNED VEHICLE. (National Aeronautics and Space Administration, Washington, D. C.) NASA Memo 10-2-58A, Oct. 1958

1,426

Eggleston, J.M., and D.C. Cheatham 1959 PILOTED ENTRIES INTO THE EARTH'S ATMOSPHERE. (Paper presented at IAS Nat'l Summer Meeting 16-19 June 1959 Los Angeles, Calif.) IAS paper no. 59-98

ABSTRACT: A summary of research conducted at the Langley Research Center of the Nat'l. Aeronautics and Space Administration on the requirements of stability, control, deceleration, and piloting techniques necessary for a controlled descent from orbit into and through the earth's atmosphere.

1,427

Eggleston, J. M., S. Baron and D. C. Cheatham 1960 FIXED-BASE SIMULATION STUDY OF A PILOT'S ABILITY TO CONTROL A WINGED SATELLITE VEHICLE DURING HIGH-DRAG VARIABLE-LIFT ENTRIES
(National Aeronautics and Space Administration, Washington, D. C.)
NASA TN D-228, April 1960.

1,428

Eggleston, J.M., & H.D. Beck 1961 A STUDY OF THE POSITIONS AND VELOCITIES OF A SPACE STATION AND A FERRY VEHICLE DURING RENDEZVOUS AND RETURN.
(National Aeronautics & Space Administration, Washington, D.C.)
NASA TR R-87.

ABSTRACT: A study is made of the families of nonthrusting ascent trajectories during rendezvous with an orbiting space station and the descent trajectories to the earth's atmosphere. Equations of motion are derived and results are shown for two typical orbits of the station (one circular and one elliptic orbit). Boundaries of launch (at the time of booster burnout) and rendezvous conditions are given and the effects of delays in launch time are discussed.

1,429

Ehni, F.P. and W.F. Haldman 1962 STUDY OF SOFT RECOVERY FROM TWO-STAGE VEHICLES PART II. VERTICAL DESCENT TRAJECTORIES INCLUDING AERODYNAMIC HEATING
(Air Force Office of Scientific Research, Washington, D.C.) May 1962,
Rept. no. AFOSR/DRA 62-7, Proj. 7856, ASTIA AD-277 911

ABSTRACT: Vertical descent trajectories are presented in graphical form for bodies entering the earth's atmosphere starting at an altitude of 320,000 ft. with entry speeds varying from 35,000 to 7,500 fps. Two sets of trajectories were computed: one with fixed drag-area-to-weight ratios ranging from 10 to .001

and one set, where the drag-area-to-weight ratio is varying to achieve reentry with decelerations limited to 75, 30 and 15 g. The variation of the drag-to-weight ratio during descent was expressed in terms of a drag-area factor C. The computations were performed on an analog computer. Presented are graphs for velocity, deceleration, dynamic pressure, heating rate, total heat, temperature, and, for the limited deceleration case, the drag-area factor, plotted versus time and/or altitude. The physical equations are presented and their analog computer mechanization is discussed. (Author)

1,430

Ehricke, K. A. 1955 ON THE DESCENT OF WINGED ORBITAL VEHICLES. Astronautica Acta 1:137-155

1,431

Ehricke, K.A. 1956 ASTRONAUTICAL AND SPACE-MEDICAL RESEARCH WITH AUTOMATIC SATELLITES In; Earth Satellites As Research Vehicles. (Proc. of the symposium held 18 April 1956 at the Franklin Inst in Philadelphia) Monograph no. 2, June 1956

ABSTRACT: Discusses the use of automatic satellites for the advancement of manned astronautics. Based on the systems and operations concept, the discussion includes technical as well as scientific aspects. A distinction is made between technological satellites and biosatellites. The technical and scientific research aspects in conjunction with technological satellites are outlined and their correlation with various phases of manned astronautics is shown. The survey of the space-medical research by means of biosatellites also considers the relevant technical and scientific aspects.

Flight dynamic aspects are discussed, presenting the energy spectrum of terrestrial, cislunar as well as lunar satellites and of hyperbolic probes (limited to Venus and Mars reconnaissance).

An analysis of accuracy requirements leads to a discussion of the significance of earth-satellite-earth communication, including the possibility of terrestrial monitoring of satellite-earth communication (equipped with small propulsion systems) by over-riding the vehicle's guidance and attitude control system. Finally, trajectories, decelerations and temperatures of descending spherical satellites are presented.

1,432

Ehricke, K. A., & A. H. Pence 1957 RE-ENTRY CHARACTERISTICS OF RECOVERABLE SPHERICAL SATELLITES, SATELLOIDS, AND LUNAR VEHICLES. (Convair, Ft. Worth, Texas) Rept. No. AZP-001; June 1957

1,433

Ehricke, K. A. 1957 RE-ENTRY OF SPHERICAL BODIES INTO THE ATMOSPHERE AT VERY HIGH SPEEDS. (American Rocket Society, New York, N. Y.) ARS Preprint 428-57

1,434

Ehricke, K.A. 1959 A SYSTEMS ANALYSIS OF FAST MANNED FLIGHT TO VENUS AND MARS. (Convair-Astronautics, Ft. Worth, Texas) Rept. No. AZM-072, Part I, March 11, 1959.

1,435

Ehricke, D. A. 1962 THE LOGISTICS OF RE-LAUNCH FROM THE MOON. In Lectures in Aerospace Medicine, January 8-12, 1962 (School of Aerospace, Medicine, Brooks AFB, Texas)

1,436

Ehrsam, G.W., Jr. 1960 FEASIBILITY STUDY FOR AN ADVANCED DEVICE FOR STUDYING THE EFFECTS OF ACCELERATION ON MAN. (Aerospace Med. Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio) WADD Tech. Report 60-197, March 1960. ASTIA AD 236 044

ABSTRACT: Present centrifuges cannot simulate adequately the types of acceleration patterns anticipated for future manned vehicles. Realistic simulation requires the production not only of a controlled radial acceleration field but also of the superimposed rotational motions of pitch, roll, and yaw and the vibratory translations encountered about these axes as a result of buffeting and other flight disturbances. Therefore, arm radius, inertia, and control problems are complicated by the requirement for oscillations which will permit study of true flight.

The analysis of a device to produce realistic simulation is presented by component areas. In a highly sophisticated centrifuge, the optimum selection of components may not be possible until the results of a more detailed design investigation are available. The analysis of each major area indicates, however, that the construction of the proposed device is feasible.

1,437

Eiband, A. M., S. H. Simpkinson & D. O. Black 1953 ACCELERATIONS AND PASSENGER HARNESS LOADS MEASURED IN FULL-SCALE LIGHT-AIRPLANE CRASHES. (National Advisory Committee for Aeronautics, Washington, D. C.) NACA TN 2991, August 1953, ASTIA AD-15 669

ABSTRACT: Full-scale light-airplane crashes simulating stall-spin accidents were conducted to determine the decelerations to which occupants are exposed and the resulting harness forces encountered in this type of accident. Crashes at impact speeds from 42 to 60 miles per hour were studied. The airplanes used were of the familiar steel-tube, fabric-covered, tandem, two-seat type. In crashes up to an impact speed of 60 miles per hour, crumpling of the forward fuselage structure prevented the maximum deceleration at the rear-seat location from exceeding 26 to 33g. This maximum g value appeared independent of the impact speed. Restraining forces in the seat-belt--shoulder-harness combination reached 5800 pounds. The rear-seat occupant can survive crashes of the type studied at impact speeds up to 60 miles per hour, if body movement is restrained by an adequate seat-belt--shoulder-harness combination, so as to prevent injurious contact with obstacles normally present in the cabin. Inwardly collapsing cabin structure, however, is a potential hazard in the higher-speed crashes. (NACA)

1,438

Eiband, A. M. 1959 HUMAN TOLERANCE TO RAPIDLY APPLIED ACCELERATIONS: A SURVEY OF THE LITERATURE. (National Aeronautics and Space Administration, Wash., D. C.) NASA Memo No. 5-19-59E; ASTIA AD-218 269; June 1959

ABSTRACT: Data applicable to space flight and to crash impact forces were obtained from a literature survey and analyzed and discussed. These data are compared and presented on the basis of a trapezoidal pulse to show the effects of body restraint and of acceleration direction, onset rate, and plateau duration on the maximum tolerable magnitude of rapidly applied accelerations. Recommendations indicated by the survey are made for increasing impact survivability by use of adequate body support in both the forward-and aft-facing seated positions. A categorized bibliography of information on human tolerance to rapidly applied accelerations is included. (AUTHOR)

1,439

Ek, J. L., B. W. Jongkees and J. Klijn 1959 THE THRESHOLD OF THE VESTIBULAR ORGAN.
Acta Otolaryng (Stockholm) 50: 292.

1,440

Ek, J., L. B. W. Jongkees, & J. A. J. Klijn 1960 ON THE EFFECT OF CONTINUOUS ACCELERATION. Acta oto-laryng. 51:416-419

1,441

Ekman, G. 1960 PSYCHOPHYSICAL RELATIONS IN THE PERCEPTION OF SPACE, TIME AND VELOCITY
(Stockholm U., Sweden) Project 9778(805); Contract AF 61(052)-300; AFOSR, DLS

ABSTRACT: The subjective variables of (perceived) space, time, and velocity have been separately investigated and have been found to be related to corresponding physical (stimulus) variable by power functions. This research will determine the interrelations among perceptual continua, e.g. determination of what function subjective velocity is of subjective space and subjective time. A series of experimental variations will be employed which will yield results concerning the constants of the power functions which are of interest. A few examples of the conditions which will be investigated are : (1) Direction of motion; various angles in all quadrants. This is an example of variations which are supposed to affect subjective distance and consequently subjective velocity; (2) Surrounding perceptual field; the motion will pass through patterns constructed according to the principles of certain geometrical illusions, and subjective distance (and velocity) are expected to be affected in predictable direction; (3) Length of motion track with time constant and vice versa; (4) Intensity and contrasts in the motion-background field; and (5) Relative motion.

1,442

Eldredge, D.H. 1955 THE EFFECTS OF BLAST PHENOMENA ON MAN: A CRITICAL REVIEW
(St. Louis: Committee on Hearing and Bio-Acoustics, Armed Forces- National Research Council) Project NR 140-069, Contract Nonr-1151(01), 1955.
ASTIA AD74028

ABSTRACT: A critical review has revealed that the open literature concerning the effects of blast on man is not extensive and is principally concerned with (1) injury to the ear; (2) body injuries severe enough to produce combat casualties; (2) cerebral blast concussion; and (4) battle fatigue or hysteric-anxiety state. An attempt is made to extract and organize the important studies and hypotheses encountered, and supplementary data are included from experience gained with high-intensity sound. A selected bibliography of 175 references, compiled by S.K. Hirsh, is included; it is mainly concerned with specific methods and techniques that have been used to measure possible impairment of function. (AD abstract, modified)

1,443

Eleinknecht, D. S., W. M. Bland, Jr., and E. M. Fields 1962 SPACECRAFT AND SPACECRAFT SYSTEMS.
(In Results of the First U. S. Manned Orbital Space Flight, February 20, 1962)
(NASA Manned Spacecraft Ctr., Huston, Texas) Pp. 5-30

1,444

Ellingson, H.V. 1960 AVIATION MEDICINE. In; Piersol, G.M., and E.L. Bortz, ed., Cyclopedia of Medicine, Surgery and Specialties: Review Service. (Philadelphia, F.A. Davis Company, 1960) pp. 221-246

ABSTRACT: The scope and implications of aviation and space medicine are summarized. Consideration is given to the general and specific stresses which may be encountered, to medical and psychiatric problems, air travel and transportation of patients, pilot and astronaut selection, protective equipment and clothing, and to flying safety and accidents involving nuclear weapons.

1,445

Ellingson, H. V. 1962 AVIATION MEDICINE
In G. M. Piersol, et.al., ed., The Cyclopedia of Medicine, Surgery and Specialties, Review Service, 1962. (Philadelphia: F. A. Davis Co., 1962) pp. 213-237.

ABSTRACT: This chapter reviews the entire field of aerospace medicine and is aimed at providing current, revised information to the medical profession. General topics discussed include the following: space medicine (closed systems, weightlessness, artificial gravity, human engineering, psychological factors, radiations, instrumentation); aviation physiology (g-tolerance, vibration, pressure breathing, oxygen toxicity, motion sickness); personal equipment (pressure suits, oxygen equipment); the specialties (otorhinolaryngology, ophthalmology, neuropsychiatry, cardiology); aircrew selction and maintenance (selection tests, care of flyers, Federal Aviation Agency); air travel (epidemiology of air travel, private flying, transportation of patients, oxygen in transport, treatment of motion sickness); flying safety (accident investigation); and reactions to flight (dysbarism).

1,446

Ellis, W.H.B. 1955 STUDIES OF HUMAN RESPONSES TO LINEAR ACCELERATIONS DURING CARRIER TAKE-OFFS AND LANDINGS. (RAF, Instit. of Aviat. Med., Farnborough, Eng.) FPRC Rept. No. 905, Jan. 1955.

1,447

Ellison, A. E. 1960 SKI INJURY PROBLEM.
Ski Magazine 24:52-57

1,448

Elmadjian, F. 1963 BIOCHEMICAL STUDY OF LARGE PRIMATE RESPONSE TO SEVERE ENVIRONMENTAL STRESSORS
(Worcester Foundation for Experimental Biology, Shrewsbury, Mass.)
Contract AF 29(600)-2439. ARL-TDR-63-18, May 1963

ABSTRACT: Biochemical studies were conducted on immature chimpanzees undergoing 20 hours without food and water, at temperatures of 70°, 80°, 90°, 95°, and 100° F at 50 percent humidity; acceleration-deceleration tests; and the suborbital flight of chimpanzee No. 65 (HAM). Twelve urine determinations and seven plasma determinations were obtained with the view of evaluating respiration (acid-base balance), nitrogen metabolism, adrenal-pituitary, and sympathico-adrenal systems. (Author)

1,449

Elwood, M. 1954 OBSERVATIONS ON THE USE OF RABBITS AS INDICATORS OF THE PHYSIOLOGICAL EFFECTS OF BLAST INSIDE A TANK UNDER ATTACK (Clothing and Equipment Physiological Research Establishment (Gt. Brit.) Technical memo no. 22; JSRP Control no. 561049; April 1954; ASTIA AD-112 086

1,450

Ender, W.K. 1949 STUDY- EJECTION SEAT TRAJECTORY - TIME REQUIRED TO APPROACH TERMINAL SPEED WITHOUT THE USE OF A DROGUE CHUTE.
(Douglas Aircraft Co., Inc., El Segundo, Calif.)
Report No. ES-15220

1,451

Ely, W. J. 1960 SIXTH ANNUAL ARMY HUMAN FACTORS ENGINEERING CONFERENCE.
(Army Human Factors Engineering Conference, U. S. Army Engineer Research and Development Laboratories, Ft. Belvoir, Va.) ASTIA AD 251 312

ABSTRACT: This report consists of a series of abstracts of papers presented at the Sixth Annual Army Human Factors Engineering Conference.

1,452

Emme, A. 1962 COSMIC EXPLORERS.
Sovetskaya Rossiya, 20 Oct. 1960.
(Translation Services Branch, Foreign Technology Division, Wright-Patterson AFB, Ohio) FTD-TT 62-602/1-4, 8 May 1962.

ABSTRACT: Before flying into space we must know exactly how various representatives of life will react to everything connected with the flight. A branch of science being developed on earth is the science of space ecology. This deals with the relation of man to cosmic surroundings and his life on other planets. During a recent flight, a radio-television system made possible constant visual contact with occupants of the ship. The g-forces at launch greatly affected the heartbeat and respiration. During acceleration the animals required more oxygen than usual. However, they had no trouble eating under weightless conditions. Mice were used to test cosmic radiation. Another object of space study was nucleic acid, the hereditary factor of all organisms. These molecules can be called "bare genes" or "free genes." Impacts by cosmic particle can cause great disturbances in the structure of this acid; these will be studied physicochemically.

1,453

Enfield, D.L. 1959 ABRUPT DECELERATION STUDIES RELATED TO AUTOMOBILE CRASH FORCES. (Paper, Meeting Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: Anthropometric dummies and human volunteers have been exposed to experimental car crash deceleration. Statistically-determined typical accidents were duplicated using salvage vehicles and dummy passengers. The types of crash force thus measured were applied to human volunteers by test devices. Force magnitude was gradually increased until a human tolerance limit was reached. (J. Aviation Med. 30(3):183, March 1959.)

1,454

Engel, J.N. and Copp, M.R. 1959 ANALYSIS OF ACCELERATION, AIRSPEED, AND GUST-VELOCITY DATA FROM A FOUR-ENGINE TRANSPORT AIRPLANE OPERATING OVER A NORTHWESTERN UNITED STATES -ALASKA ROUTE. (National Aeronautics and Space Administration) NASA Memo. 1-17-59L, February 1959

ABSTRACT: The data, which were obtained with an NACA VGH recorder, were evaluated and then compared with the results previously reported in NACA Technical Note 3475 for two similar airplanes operating over large variations in gust experience were noted for the three operations. In general accelerations due to gusts occurred much more frequently than those due to operational maneuvers.

1,455

Engel'gardt, V. 1961 LIFE, REASON AND THE UNIVERSE
Izvestiya (USSR) 92(13638):3

ABSTRACT: Space flight is discussed, with reference to weightlessness, cosmic radiation, G-forces, and the new area of investigation, "exobiology".

1,456

Engstrom, B.A. 1957 THE EFFECTS OF SIMULTANEOUS DECELERATION, TUMBLING AND WINDBLAST ENCOUNTERED IN ESCAPE FROM SUPERSONIC AIRCRAFT. (Wright Air Development Center, Air Research and Development Command, Wright-Patterson AFB, Ohio) WADC TN- 54-18, July 1957. ASTIA AD 118 328.

ABSTRACT: As a continuation of the supersonic ejection seat program, two tests using live chimpanzees as subjects were performed. The ejections occurred at a velocity of Mach 1.5 at altitudes of 20,000 and 17,700 feet, using a standard Air Force ejection seat as modified by the Cook Research Laboratories. Both subjects were lost in spite of the fact that in the first test the subject was brought down by parachute. In this case, death resulted from breakup of the ejection seat upon entry into the windblast. Although the ejection seat retained its structural integrity, in the second test, this subject was lost because of premature deployment and resulting loss of the recovery parachute canopy.

1,457

Engstrom, B. A., & R. A. Meyer 1959 PERFORMANCE OF TRAILING AERODYNAMIC DECELERATORS AT HIGH DYNAMIC PRESSURES. PART III. WIND TUNNEL TESTING OF RIGID AND FLEXIBLE PARACHUTE MODELS. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADC TR 58-284, Part III, ASTIA AD-248 951L

ABSTRACT: This report presents the results of the third phase of a continuing study of the Performance of Trailing Aerodynamic Decelerators at High Dynamic Pressures and covers experiments performed in the Unitary Plan Wind Tunnel at the Langley Research Center, Virginia. The work was also a continuation of the effort initiated under Contract No. AF 33(616)-3346. The major results of the Phase III test program were as follows: (1) solid metal canopies without suspension lines which were properly vented exhibited stable flow at all times regardless of changes in porosity, Mach number, dynamic pressure, and various other parameters; (2) the addition of suspension lines to the solid canopies caused unstable flow to exist at all times; (3) reducing the number of suspension lines or adding flow stabilizers did not improve flow patterns; (4) fabric canopies behaved poorly in general and appeared to be somewhat dependent upon the location of a conical interline shock wave; (5) a definite improvement was noted when the number of gores was increased; (6) average drag coefficient was a function of average

inflated area ratio; and (7) shaped gores improved behavior somewhat, the 45 degree conical ribbon giving the most stable performance of all fabric configurations tested. (AUTHOR)

1,458

Engstrom, B.A. 1962 PERFORMANCE OF TRAILING AERODYNAMIC DECELERATORS AT HIGH DYNAMIC PRESSURES. PHASES V AND VI.
(Cook Research Labs., Chicago, Ill.) Contract AF 33(616)7016, Project 6065, WADC TR 58-284, pt. 5, Feb 1962. ASTIA AD 275 423

ABSTRACT: A series of multistage rocket test vehicles was launched which deployed aerodynamic decelerators at predetermined altitudes and velocities. Tests were conducted using extended hemispherical shaped parachutes. Exploratory tests were accomplished and data collected over a test regime extending up to Mach 3.0 at 70,000 ft. In addition, data was presented on one test of a FIST ribbon parachute deployed at an altitude of 162,990 ft. and a Mach number of 1.022. Data was also presented on 2 tests conducted involving balloon type decelerators. Useful test data was presented for each parameter investigated. It was concluded that self inflatable aerodynamic decelerators perform satisfactorily up to a Mach number of approximately 2.0. At higher Mach numbers the flow conditions and shock wave interactions caused erratic performance which resulted in canopy damage of considerable magnitude. (Author)

1,459

Enkenhus, K. R., E. L. Harris et al 1961 THE SIMULATION OF RE-ENTRY CONDITIONS IN THE WIND TUNNEL.
In 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961 Washington, D. C. (Mt. Prospect, Ill.: Institute of Environmental Sciences, 1961) pp. 489-502

1,460

Enslinger, N. R. and E. A. Brunauer 1958 FEASIBILITY AND DESIGN STUDY OF A CENTRIFUGE FACILITY
(Mechanics Res. Division, American Machine and Foundry Company, Chicago, Ill.) TN-MR-9415A, Aug. 1958.

1,461

Entres, S. L. 1955 A CONTACT ACCELEROMETER.
(Royal Aircraft Establishment, Farnborough) TECH MEMO GW 253, Aug. 1955

ABSTRACT: A device is discussed briefly in this paper which permits the measurement of the peak acceleration of a low impedant steady state vibration by a "chatter" method above and below the value of one g. The useful range of acceleration amplitude that can be measured is from about 0.1 g to 7 g and that of the frequency from about 4 c/s to 500 c/s, The significance of this "Contact Accelerometer" as it may be called, is its simplicity of design and operation, its stability, accuracy and absence of electronics. It may be used for calibrating or checking of accelerometers of the piezo and other types.

1,462

Errebo-Knudsen, E.O., et al 1953 VERDENS-RUMMETS EROBRING (CONQUEST OF SPACE)
(Copenhagen: Reitzel, 1953)

1,463

Errebo-Knudsen, E.O. 1953 MENNESKELEGEMET OG RUMMET (THE HUMAN BODY AND SPACE)
In: Errebo-Knudsen, E.O., et al, Verdens-rummets erobring (Conquest of Space)
(Copenhagen: Reitzel) Pp. 51-67.

1,464

Errebo-Knudsen, E. O. 1956 FLYVEMEDICIN: SAERLIG MED HENBLIK PA ORGANISATIONEN I DENMARK (AVIATION MEDICINE: WITH SPECIAL CONSIDERATION OF ITS ORGANIZATION IN DENMARK) Ugeskrift for laeger (kobenhavn) 118(17):495-499, 10 May 1956

ABSTRACT: Areas of research in aviation medicine and the experimental methods simulating flight conditions are described. The international status of aeromedical research and different agencies conducting this research are surveyed. A summary is presented of the historical development of aviation medicine in Denmark and the contemporary state of affairs.

1,465

Errebo-Knudsen, E.O. 1960 RUMFARTSMEDICM: DE BIOLOGISKE PROBLEMER RED OPHOLD UDEN FOR JORDENS ATMOSFAERE (SPACEFLIGHT MEDICINE: BIOLOGICAL PROBLEMS OF TRAVELING OUTSIDE THE EARTH'S ATMOSPHERE)
Naturens Verden (Copenhagen) Pp. 1-8, 30-32, Jan. 1960 (In Danish)

ABSTRACT: The results of Russian and American studies in spaceflight, as presented in papers at the 2nd World and 4th European Congress of Aviation

Medicine in Rome, October, 1959, are summarized in this paper. The potential dangers in space flight are reviewed with details of Project Mercury. Various biological, neurological, and psyciological problems are reviewed. The possibility of human life on other planets in our solar system is discounted.

1,466

Erskine, L. A. 1959 THE MECHANISMS INVOLVED IN SKIING INJURIES
American J. Surgery 97:667-671, May 1959
NOTE: Reel 7, Flash 7, Item 14

SUMMARY: I have tried to go over briefly the factors which are present when an injury takes place while skiing. In an effort to help the attending surgeon in his handling of these injured, the equipment, clothing, psychological factors and the ballistics have been mentioned. The pertinent accident statistics, which are sketchy to begin with, are summarized, and we must conclude that: (1) The injuries which occur at high speeds are the serious ones, that is, the spiral fractures of the shafts of the long bones, etc. (2) Skiing accidents occur in the younger age group (sixteen to twenty-eight years of age) at a statistically higher rate than in the older age groups. (3) As would be expected, most occur in those who have skied less than one year and/or who have not had professional instruction. Finally, it is obvious that skiing is on the increase, and its popularity will undoubtedly continue. We must accept an inevitable minimum of serious accidents among good skiers. If one is going to ski, he should use good equipment, receive professional instruction, and not ski beyond his ability; if so, he stands a reasonable chance of enjoying himself without being hurt. (AUTHOR)

1,467

Escanglon, E. 1950 SPACE-FLIGHT AND ITS CONNECTIONS WITH HUMAN PHYSIOLOGY Astronomie, 64:279-287. July/Aug. 1950.
Abst.: J. Brit. Interplan. Soc., 11:294.

1,468

Esgar, J.B. and Morgan, W.C. 1960 ANALYTICAL STUDY OF SOFT LANDINGS ON GAS-FILLED BAGS. (National Aeronautics and Space Administration) NASA Technical Report. R-75, ASTIA AD-242 357.

ABSTRACT: An analytical procedure was developed that is valid for bags of various arbitrary shapes and is applicable to planetary or lunar landings for sinking speeds that are small compared to the sonic velocity of the gas within the bag. For landing on the earth at speeds consistent with normal parachute descent, the relative merits of four bag shapes were evaluated both with and without gas bleed from the bags. Deceleration and onset rates acceptable for well-supported humans seem feasible.

I,469

Esgar, Jack B. 1962 SURVEY OF ENERGY-ABSORPTION DEVICES FOR SOFT LANDING OF SPACE VEHICLES
(National Aeronautics and Space Administration, Washington) NASA TN D-1308

ABSTRACT: Energy-absorption methods that may be useful for impact attenuation of space vehicles landing on lunar or planetary surfaces were surveyed. Relative merits of various systems are discussed, their effectivenesses are compared, and conclusions are drawn as to the more promising types of systems.

1,470

Esnault-Pelterie, Robert 1930 L'ASTRONAUTIQUE (ASTRONAUTICS)
(A. Lahure, Paris, 1930)

ABSTRACT: A classic French work on astronautics.

1,471

Esnault-Pelterie, R. 1935 L'ASTRONAUTIQUE COMPLEMENT. COMMUNICATION FAITE A SL SOCIETE DES INGENIEURS CIVILS DE FRANCE L: 25 MAI 1934.
(The Astronautic Complement. Communication From the Society of Civil Engineers of France on 25 May 1934.)
(Paris, 1935)

1,472

Esteban, M. 1942 SO-CALLED "BLACK VISION" AND "RED VISION" ON AVIATORS.
Arch. Soc. Oftal. Hispano-am 1:251-268.

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Estep, R. 1959 A SPACE BIBLIOGRAPHY THROUGH 1958
(Documentary Research Division, Research Studies Institute, Air University, Maxwell AFB, Ala.) AU-283-58-RSI

ABSTRACT: Lists 1832 references with subject and author indexes. Covers items in books and periodicals available at Air University, especially for the period from 1930 thru 1958.

1,474

Estes, E.H. 1954 TILT TABLE RESPONSE AND ITS RELATION TO "G" TOLERANCE. (U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.) Research Report No. NM 001 059.30.03, 22 March 1954. ASTIA AD 35 223

ABSTRACT: A low to moderate correlation has been shown between the following measurements and "G" tolerance in a group of 50 men: a) Change in pulse rate with tilt, both immediately and over a period of time, b) Change in the magnitude of the frontal plane ventricular gradient with tilt, and c) Change in the frontal plane QRS-T angle with tilt. The control level of systolic blood pressure was also found to have a similar degree of relationship with the unconscious level of "G" tolerance. These various measurements were also found between the various measurements and "G" tolerance was not sufficient to be of predictive value in a given individual.

1,475

Estrin, L. M. 1938 PREVENTION OF PARACHUTE INJURIES
Khirurgiya (9):117-119.

1,476

Etkin, B. 1961 THE ENTRY OF MANNED MANOEUVREABLE SPACECRAFT INTO PLANETARY ATMOSPHERES: A LECTURE. (Lecture, Symposium on Interplanetary Explorations, Institute of Aerosphysics, University of Toronto, Canada, Oct. 26-27, 1961) (University of Toronto, Canada, Institute of Aerosphysics, Ontario) UTIA Review No. 20. ASTIA AD-273 699

ABSTRACT: Deceleration to which the vehicle and its occupants are subjected, heat resulting from temperatures developing in the skin and structure, and navigation or guidance of the vehicle to a desired point on the surface are discussed as they relate to the landing of space vehicles. It appears that none of these three major problem areas will present insuperable difficulties for the re-entry of manned space vehicles. The normal processes of applied research and engineering development may confidently be expected to lead to the successful accomplishments of such missions in the future. (J. Aerospace Medicine 33(10):1278, Oct.1962)

1,477

Ettelson, B. L., et al. 1960 INTERNAL ANIMAL TELEMETRY - A FEASIBILITY TEST PROGRAM. (Paper, American Rocket Society 15th Annual Meeting, December 1960) ARS Paper No. 1426-60

1,478

Ettelson, B. L. et. al. 1961 INTERNAL ANIMAL TELEMETRY: A FEASIBILITY TEST PROGRAM.
ARS J. 31(9):1190-1195, Sept. 1961.

ABSTRACT: An improved method of animal instrumentation is described. The method uses an implanted sensor and telemeter to allow transmission of physiological data from unencumbered, intact, test animals to a receiver-signal conditioner for subsequent air to ground telemetry. To explore further the potential advantages of this system in high stress situations, a single physiological parameter is transmitted through the intact skin of an internally instrumented simian under combined environmental conditions on a centrifuge. (Tufts)

1,479

Etter, K.R. 1961 GEOLOGICAL CONSIDERATIONS FOR PRECISION HIGH SPEED ROCKET TRACKS.
(U.S. Air Force Missile Development Center, Holloman AFB, N. Mexico)
Report no. AFMDC TR 61-21. ASTIA AD 259 631

ABSTRACT: The relationship of orogenic (mountain building) forces to the high earthquake incidence in California is shown to be directly connected through the mechanism of strong movements on living faults, especially the San Andreas fault system. Air Force Flight Test Center (AFFTC) is nearly surrounded by wrench fault zones, the loci of potentially destructive quakes. Air Force Missile Development Center (AFMDC) is bordered by gravity faults of essentially quiescent nature, which fact, along with a geologic history of relative stability as part of the continental nucleus, leads to the conclusion that destructive events of tectonic nature are much less likely to affect the facilities established in central New Mexico, than would be the case in Southern California. (Author)

1,480

European Office Air Research & Development Command 1960 SUPPLEMENT TO THE BIBLIOGRAPHY OF TECHNICAL NOTES AND TECHNICAL REPORTS. (European Office Air Research and Development Command, Shell Bldg., 47, Rue Cantersteen, Brussels, Belgium) ASTIA AD-243 250

1,481

Evans, B. H. 1961 INERTIAL COMPONENTS STUDY.
(Space Technology Labs., Inc., Los Angeles, Calif.)
Report no. 7205-0002-RU-000, June 30, 1961. ASTIA AD 261 607

ABSTRACT: The evaluation of the Autonetics VM-4 velocity meter was completed; evaluations of the Autonetics G6A gyro, the AC Spark Plug 25 PIGA accelerometer, the AC Spark Plug 2 FBG, and the AC Spark Plug 16 PIGA accelerometer were continued. The 16 PIGA evaluation included the first successful centrifuge evaluation of a pendulous gyro accelerometer. Studies of gyro and accelerometer testing methodology were continued. Evaluation of the Bell Accelerometer Model III-B and the Kearfott Gyro Model 2519 were concluded. (Author)

1,482

Evans, C. B. S., E. B. Konecci, and H. Glassner 1962 PHYSIOLOGY OF THE LABYRINTH: QUANTITATIVE STUDIES ON THE EFFECTS OF ANGULAR ACCELERATION IN EXPERIMENTAL ANIMALS.
(Paper presented at 33rd annual meeting of the Aerospace Medical Assoc., 9-12 April 1962, Atlantic City)

ABSTRACT: The purpose of this presentation is two-fold: (1) to report briefly our findings from experimental investigations of the labyrinth physiology in vertebrates under rotational accelerations and (2) to exhibit a motion picture incorporating the synchronous display, during rotation, of the (a) labyrinthine cupula motions, (b) the vestibular nerve action potentials as translated on the oscillograph accompanied by its sound recording, (c) view of the attached accelerometer and chonometer and (d) nystagmus movements of the eyes.

These studies are being conducted to determine quantitatively the reactions of the labyrinth's sensory components and their specific innervations to the effects of varying degrees of rotary acceleration and g-forces, and the presence (or absence) of the nystagmus reactions in terms of amplitude, frequency, duration and direction. (Aerospace Med., 33(3):335, March 1962)

1,483

Evans, F. G., & H. R. Lissner 1948 "STRESSCOAT" DEFORMATION STUDIES OF THE FEMUR UNDER STATIC VERTICAL LOADING. Anat. Rec. 100:159-190

ABSTRACT: Since Gurdjian and Lissner have clearly demonstrated the feasibility of the "stresscoat" technique for studies on the stresses and strains in bone as related to form and function; the present study, employing the same technique, was undertaken. The femur was chosen because it presents problems of bone architecture and mechanics not encountered in the skull, the only skeletal part so far studied by this technique. Furthermore, since it has been studied by other methods, the femur provides a means whereby the results obtained with the "stresscoat" technique can be compared with those in which other methods were used.

The results obtained from 16 "stresscoat" tests run on 10 adult human femora are presented. Six of the tests were run at one time and 10 at another. The average load borne before the first cracks appeared in the "stresscoat" lacquer was 720 pounds for the first series of tests and 646 pounds for the second series. The sensitivity of the lacquer in the first and second test series was 0.0018 and 0.0012 inches per inch, respectively.

1,484

Evans, F. G., H. R. Lissner, & H. E. Pedersen 1948 "STRESSCOAT" DEFORMATION STUDIES OF THE FEMUR UNDER DYNAMIC LOADING. (61st Annual Meeting Amer. Assoc. Anat.) Anat. Rec. 100:24-25

1,485

Evans, F. G., H. R. Lissner, & H. E. Pedersen 1948 DEFORMATION STUDIES OF THE FEMUR UNDER DYNAMIC VERTICAL LOADING. Anat. Rec. 101:225-241, June 1948

ABSTRACT: This paper is the second in a series of studies of femoral deformations. The first (Evans and Lissner, '48) dealt with deformations produced by static vertical loading, while the present one is concerned with those obtained under dynamic vertical loading.

The results of the studies are: (1) "Stresscoat" tests of 14 adult male femora under dynamic vertical loading produced deformation patterns on the superior aspect of the neck and the anterolateral (convex) aspect of the proximal and middle thirds of the shaft. (2) The deformation patterns consisted of cracks in the "stresscoat" lacquer. (3) The cracks arise from tension stress in the underlying bone and lie transverse to the direction of tension. (4) The diameter of the neck and of the shaft, as well as the curvature of the latter, influence the bone's degree of bending and the extent of the pattern, so that it is more concentrated in the middle of the bones with a relatively great curvature. (5) The location of the patterns obtained by dynamic vertical loading is essentially similar to those seen in static vertical loading. In both types of tests it is seen that the superior aspect of the neck and the anterolateral (convex) aspect of the shaft are under tension stress while the opposite aspects of the bone are under compression stress. (6) The tests clearly demonstrate that a relatively small load, 15.8 inch pounds of energy, dynamically applied can produce similar deformation patterns in the same parts of the femur as do loads of 400-715 pounds statically applied.

1,586

Evans, F. G. 1949 DEFORMATION STUDIES OF THE FEMUR UNDER STATIC AND DYNAMIC LOADING. Anales del Instituto de Biologia (Mexico) 20:473-491

1,587

Evans, F. G., J. F. Hayes and J. E. Powers 1953 "STRESSCOAT" DEFORMATION STUDIES OF THE HUMAN FEMUR UNDER TRANSVERSE LOADING. Anat. Rec. 116:171-188

ABSTRACT: The present investigation is a continuation of previous studies (Pedersen, Evans and Lissner, 1949) on the mechanical behavior of the human femur under various conditions of loading and orientation. This paper deals with the strains and stresses produced by transverse loading of the anterior, posterior and medial aspects of the femoral shaft at points 1/4, 1/2 and 3/4 the length of the shaft measured from the tip of the greater trochanter. Corresponding loadings of the medial aspect of the shaft were not made as fracturing forces are rarely applied directly to that aspect of the bone.

1,588

Evans, F. G., & H. R. Lissner 1953 DEFORMATION STUDIES OF THE ADULT HUMAN PELVIS UNDER DYNAMIC LOADING. (66th Annual Meeting Amer. Assoc. Anat.) Anat. Rec. 115:382

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Evans, F. G., & H. R. Lissner 1954 STUDIES ON THE EFFECT OF STATIC LOADING ON THE LUMBAR INTERVERTEBRAL DISCS. (23rd Annual Meeting of Amer. Assoc. Phys. Anthrop.) Amer. J. Physical Anthropology 12:295

1,590

Evans, F. G. 1955 LES PROPRIETES BIOMECANIQUES ET PHYSIQUES DES OS HUMAINS. VI Congres Federatif International d'Anatomie, Paris 25-30 Juillet, July, 1955, pp. 65-66

1,591

Evans, F. G., & H. R. Lissner 1955 STUDIES ON THE COMPRESSIVE STRENGTH OF HUMAN LUMBAR DISCS AND VERTEBRAE. (69th Annual Meeting Amer. Assoc. Anat.) Anat. Rec. 121:290

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Evans, F. G. 1955 STUDIES IN HUMAN BIOMECHANICS. Dynamic Anthrop. Annals of the N.Y. Acad. Sci. 64:609-611.

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Evans, F. G., & H. R. Lissner 1955 PELVIC DEFORMATIONS UNDER DYNAMIC LOADING (Proceedings 24th meeting Amer. Assoc. of Phys. Anthrop.) Amer. J. Physical Anthropology 13:397, June 1955

1,594

Evans, F. G., M. Lebow, & H. R. Lissner 1956 THE RELATION OF VELOCITY AND ACCELERATION TO SKULL FRACTURE. (69th. Annual Meeting of Amer. Assoc. of Anatomists, Marquette Univ., Milwaukee, Wis.) Anat. Rec. 124:287, Feb. 1956

1,595

Evans, F.G. and M. Lebow 1957 STRENGTH OF HUMAN COMPACT BONE UNDER REPETITIVE LOADING.
J. Appl. Physiol. 10(1):127-130, Jan. 1957.

ABSTRACT: The fatigue life, under a constant load of 5000 lb/in.$_2$, was determined for 67 specimens of compact bone of a standardized size obtained from five above-knee amputations. The specimens were unembalmed and tested wet in a Sonntag flexure fatigue machine with an automatic counter and shut-off. The average fatigue life to failure was 1,982,650 repetitions for 47 tibial specimens; 1,188,453 repetitions for 15 femoral specimens and 2,841,400 repetitions for 5 fibular specimens. The tibial specimens were analyzed according to thirds and quadrants. The average fatigue life of the middle third was 57% greater than that of the distal third and 206% greater than that of the proximal third. The average fatigue life of the posterior quadrant was 7% greater than that of the lateral quadrant, 23% greater than that of the medial quadrant and 50% greater than that of the anterior quadrant. Immobilization greatly reduces the fatigue life of bone, the average for specimens from a tibia of a paraplegic man being 194% less than that for specimens from other tibias. When the specimens from the paraplegic man were excluded the average fatigue life of the remaining 36 tibial specimens rose to 2,378,211 repetitions to failure.

1,596

Evans, F. G., H. R. Lissner and M. Lebow 1958 RELATION OF ENERGY, VELOCITY AND ACCELERATION TO SKULL DEFORMATION AND FRACTURE.
Surgery, Gync., and Obstet. 107(11):593-601.

1,597

Evans, F. G., & H. R. Lissner 1959 BIOMECHANICAL STUDIES ON THE LUMBAR SPINE AND PELVIS. J. of Bone & Joint Surgery 41A-2(2):278-290, March 1959

ABSTRACT: (1) Eleven pelves and lumbar spines (eight embalmed and three unembalmed) were tested under static vertical loading; five specimens of the sacrum and the lumbar spines and five to eight thoracic vertebrae and discs (two embalmed, three unembalmed) were tested by static anterior bending; and four specimens of the sacrum and lumbar vertebrae and discs (all embalmed) were tested by static lateral bending. (2) Embalming increased the average maximum load and energy absorbed during vertical loading but decreased the magnitude of the average deflection. (3) Specimens tested by anterior bending had a greater bending moment, regardless of the condition of the specimen (embalmed or unembalmed) than those tested by lateral bending. (4) Embalmed specimens tested by lateral bending had a greater average deflection than similar specimens tested by anterior bending. (5) The greatest average amount of energy (inch pounds) was absorbed during vertical loading and the least during lateral bending. Embalming increases the energy-absorbing capacity of the pelvis and lumbar spine during vertical loading. (6) Unembalmed specimens tested by anterior bending showed the greatest average deflection. (7) Among the embalmed specimens the load increased more rapidly than the deflection in most of the specimens tested by vertical loading and in all of the specimens tested by anterior bending. In embalmed specimens tested by lateral bending the load increased more rapidly than deflection at first but later leveled off. (8) The slope of the load-deflection curve was generally steeper for specimens tested by vertical loading than for those tested by anterior or lateral bending. The slope of the curves for embalmed psecimens was usually steeper than those for unembalmed ones. (9) No apparent relationship was found between the age of the individual whose spine was tested and the various biomechanical phenomena studied.

1,598

Evans, F. G., & G. O. Lease 1959 STRENGTH OF HUMAN METATARSAL BONES UNDER REPETITIVE LOADING. J. Appl. Physiol. 14(1):49-51

1,599

Evans, F. G., & L. M. Patrick 1961 IMPACT DAMAGE TO INTERNAL ORGANS. (Paper, Symposium on "Impact Acceleration Stress", San Antorio, Texas)

ABSTRACT: The paper presents statistics pertaining to the frequency of impact damage to thoracic, abdominal, and pelvic viscera. The damage or injury produced in the human body by acceleration is because the internal organs behave as visco-elastic materials. Furthermore, the magnitude of the stress and acceleration, or dynamic response, can be increased by the elasticity of the human torso as is known from the theory of elastic structures.

The proposed experimental program includes experiments on humans, animals, and cadavers. The types of injuries to be investigated include lacerations or lesions due to impact on sharp objects or from inertial forces or crushing from impact or restraint over large areas of the chest or abdomen. Hydraulic damage causing rupture of organs from internal pressure will also be investigated. The investigative techniques used will be drop tests and controlled acceleration. Instrumentation used in the experiments must not interfere with or modify the response of the organ. Pressure transducers, accelerometers, force measuring equipment and high speed photographic equipment will be a few of the instruments used in experiments.

1,600

Evans, F.G. & L.P. Patrick 1962 IMPACT DAMAGE TO INTERNAL ORGANS (In: Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography. National Academy of Sciences, National Research Council, Publication No. 977, pp. 159-172)

ABSTRACT: Contusions, lacerations and ruptures of internal organs may be produced by tensile, compressive and shearing stresses and strains arising from blows to various parts of the body. In hollow organs containing fluid or semi-fluid material hydrostatic phenomena are also involved. Internal injuries believed to be produced by various types of impacts will be illustrated and discussed. Areas where future research is needed will be emphasized.

1,601

Evans, F. G. 1962 MECHANICS OF BONE FRACTURE. (In M. K. Cragun, ed., The Fifth Stapp Automotive Crash and Field Demonstration Conference, Sept. 14-16, 1961) Pp. 144-156.

1,602

Evans, F. G., H. R. Lissner, & L. M. Patrick 1962 ACCELERATION-INDUCED STRAINS IN THE INTACT VERTEBRAL COLUMN. J. Applied Physiol. 17(3):405-409, May 1962

ABSTRACT: Results of more than 170 tests with the embalmed bodies of a 69-year-old white male and two Negro males 56 and 82 years of age which were subjected to a maximum acceleration of 20 g revealed an approximately linear relation between acceleration and strain in the sacral ala and lumbar vertebrae. This relationship was less linear for the thoracic and cervical vertebrae. The magnitude of compressive strain in the anterior aspect of the body of the third cervical vertebra (C_3) and the third lumbar vertebra (L_3) is a function of the degree of freedom of movement of the head and thorax. The strain in C_3 is progressively increased by increasing freedom of movement of the head and thorax but the opposite effect

occurs in L_3. The anterior aspect of the body of C_3 is subjected to compressive strain in the normal position of the head but extension of the head changes the strain to tension. Seating the cadaver on a polyurethane cushion 4 in. thick increased the peak strain in the vertebral column. No vertebral fractures or dislocations demonstrable by x-rays have been produced by maximum accelerations of 20 g. End-plate fractures of 28 fresh vertebrae were produced by an average load of 672 pounds (435-900 pounds) statically applied in a materials-testing machine. (AUTHOR)

1,603

Evans, R. G., E. S. Gurdjian, W. G. Hardy, L. M. Patrick, and H. R. Lissner 1961 INTRACRANIAL PRESSURE AND ACCELERATION ACCOMPANYING HEAD IMPACTS IN HUMAN CADAVERS.
Surg., Gync., and Obst. 113:185-190, Aug. 1961.

1,604

Eve, F.C. 1943 BLAST, SUDDEN DEATH AND THE EPIGLOTTIS.
Lancet 244:799-800, June 26, 1943.

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Everling, E. 1952 DIE BOGENGANGE ALS WINKELGESCHWINDIGKEITSMESSER (Semicircular Canals as Meters of Angular Velocity)
(Trans. of Forschungen und Fortschritte (Germany) 25(11/12):126-128, 1949)
(SLA Translations Center, Chicago, Ill.) 61-16038

1,606

Evrard, E. 1949 OBSERVATIONS EXPERIMENTALES RELATIVES AUX EFFETS DES VITESSES ASCENSIONNELLES RAPIDES SUR L'ORGANISME DE L'AVIATEUR (Effects of Rapid Ascentional Speed on Organism of Aviator: Experimental Studies)
Bruxelles médical (Brussels) 29: 3639-3657, 18 Dec. 1949 & 3689-3706, 25 Dec. 1949

1,607

Evrard, E. 1956 PHYSIOLOGIE DU VOL; HYGIÈNE DE L AVIATEUR: GUIDE PRATIQUE À L'USAGE DU PERSONNEL NAVIGANT. (PHYSIOLOGY OF FLIGHT; AVIATOR'S HEALTH: PRACTICAL GUIDE FOR THE USE OF FLYING PERSONNEL) (Bruxelles: Office de Publicite', 1956)

ABSTRACT: A textbook dealing with the theory and practical aspects of the physiology of flight is presented for the instruction of aircrew members. Consideration

is given to the atmosphere and related physiological problems, basic respiratory and circulatory physiology, the physiological effects of hypoxia, changes in barometric pressure, acceleration, and extreme temperatures, principles and techniques of the use of oxygen as protection against hypoxia, pressure cabins and pressure clothing, problems connected with escape from aircraft, the basic physiology and special phenomena of vision, sensory phenomena associated with flight, the problems of noise and vibration, air-sickness, medical aspects of survival, the problem of intoxication by vapors from aircraft, flight equipment, general rules of hygiene, and first aid.

1,608

Evrard, E., P. Bergeret and P.M. van Wulfften Palthe 1959 MEDICAL ASPECTS OF FLIGHT. (THE UNEXPLAINED AIRCRAFT ACCIDENT).
(New York, Pergamon Press, 1959) AGARDograph 30, pp. 308

ABSTRACT:Two symposia on the human element in the operation of an aircraft and the origin of aircraft accidents. This book presents a selection of 30 reports under the following chapter headings: 1) Flight safety and aircraft accidents, 2) Use of pathology in crash injuries, 3) In-flignt protection, and 4) Some special problems.

1,609

Ewing, E. G. 1951 LANDING OF SPACECRAFT
Pac. Rocket Soc. Bull. 4:B1-B6, Oct. 10, 1951

ABSTRACT: This paper, presented at the Second International Congress on Astronautics, surveys the possibilities of using parachutes.

ACCELERATION

F

1,610

Fabing, H. 1947 CEREBRAL BLAST SYNDROME IN COMBAT SOLDIERS.
Archives of Neurology and Psychiatry 57(1):14-57, January 1947.

ABSTRACT: A study of 80 consecutive cases of blast injury in combat soldiers was carried out. It was found that the disorder occurs among men of all ranks, in new troops as well as in veterans of combat. All types of explosive agents can cause the disorder. The unconsciousness produced by blast is characterized by a retrograde amnesia for the sound of the explosion and by a period of anterograde unconsciousness of variable length, but lasting an hour in the usual case. The unconsciousness is marked by dissociated, aimless behavior. On return to consciousness, the patient-complains of protracted headache. In addition, he complains of tinnitus. It was found that memory of the unconscious period could be recalled under chemical hypnosis and it was therefore an amnesia of the type seen in hysteria. Furthermore, it was noted that there was dramatic relief of symptoms in cases in which there was good conscious recall for the amnesic material. Clinical experimentation with the technic of chemical hypnosis led to a modification which proved successful in bringing about recovery of post blast amnesic material. The method employs intravenous injection of sodium pentothal to produce chemical hypnosis and exploration of the amnesic material, followed by rapid wakening with intravenous injection of nikethamide. It proved of therapeutic value in more than 90 per cent of patients.

1,611

Fabing, H.D. 1947 BLAST SYNDROME IN COMBAT SOLDIERS
Arch. Neurol. Psychiat. 57:14-57

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Fabre, J. & Y. Houdas 1961 PHYSIOLOGICAL DETERMINATION OF FACTORS RESPONSIBLE FOR SEVERE LESIONS AT THE TIME OF SUPERSONIC EJECTIONS.
Rev. Med. Aero (Paris) 2:190-192, Dec. 1961 (Fr)

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Fabre, J. & Y. Houdas 1962 A PROPOS D'UNE OBSERVATION D'UNE SUJET AYANT SUBI UNE EJECTION SUPERSONIQUE (CASE REPORT OF A SUBJECT HAVING UNDERGONE A SUPERSONIC EJECTION
Revue des Corps de sante des armees (Paris), 3(2): 247-251. April 1962. (in French)

ABSTRACT: This is the first French case, and the second or third known case, of ejection at supersonic speed (1,000 - 1,100 kilometers/hour) at an altitude of about 12,000 feet, in which the pilot survived. The pilot was comatose upon landing and his parachute torn during opening at high speed. Medical examination revealed left hemiplegia, right facial paralysis, and fracture of the 12th dorsal and 1st lumbar vertebrae. Coma persisted for 8 days; however, good psychomotor recovery followed. The origin of the disorders was attributed primarily to the effects of three factors: (1) blast, (2) deceleration, and (3) rotation of the seat and pilot.

1,614

Fabre, J. R. Puccinelli, Y. Houdas & P. Pingannaud 1963 PHYSIOLOGICAL EFFECTS OF DECELERATION OBSERVED AT THE TIME OF AVIATION ACCIDENTS.
Rev. Corps. Sante Armees 4:237-255, April 1963 (France)

1,615

Faget, M.A., B.J. Garland, and J.J. Buglia 1962 PRELIMINARY STUDIES OF MANNED SATELLITES, WINGLESS CONFIGURATION: NONLIFTING (National Aeronautics and Space Administration, Washington, D.C.) Technical note D-1254; March 1962; ASTIA AD-273 087

ABSTRACT: Consideration was given to a simple nonlifting satellite vehicle which follows a ballistic path in reentering the atmosphere. An attractive feature of such a vehicle is that the research and production experiences of the ballistic missile programs are applicable to its design and construction, and since it follows a ballistic path, there is a minimum requirement for autopilot, guidance or control equipment. After comparing the loads that would be attained with man's allowable loads, and after examining heating and dynamic problems of several specific shapes, it appears that, insofar as reentry and recovery are concerned, the state of the art is sufficiently advanced so that it is possible to proceed confidently with a manned-satellite project based upon the ballistic-reentry type of vehicle. (Author)

1,616

Fantham, H., & C. H. J. Daft 1956 APPARATUS FOR MEASURING AND RECORDING DECELERATION OF A VEHICLE. (U. S. Patent 2, 733, 116, Jan. 31, 1956)

ABSTRACT: Apparatus for measuring and recording deceleration of a vehicle comprising a base, two spaced parallel arcuate bars mounted on base in vertical plane

and with their lower ends substantially horizontal, the remainder of each bar curving upwards from said lower end, the first of said bars being of metal, angularly spaced insulated contact members mounted on the second of bars, an inertia member slidable on bars on deceleration of a vehicle in which the apparatus is placed, a record sheet, and electrical means for marking on record sheet the passage of the inertia member over each of contact members to establish an electrical connection between contact member and the arcuate metal bar.

1,617

Fasola, A. F., R. C. Baker and F. A. Hitchcock 1952 STUDIES OF DECELERATION Amer. Jour. Physiol.,171(3):723.

Abstract: A study of the tolerance of the human pectoral girdle to rapid deceleration was undertaken to determine a more suitable and less vulnerable part of the body for the attachment of safety harnesses, since evidence previously reported showed the placing of these harnesses in the abdominal region produced both morphological and physiological damage. Static and dynamic tests were conducted to determine the strength of the following structural components of the axillary region: coracoid, acromion, and coraco-acromial ligament. Tests were likewise conducted on the shoulder joint denuded of muscles with and without the accessory socket intact and in the cadaver. Four methods were used to determine the magnitude of the force necessary to cause damage to these structures: (1) direct reading of calibrated spring balance, (2) static loading, (3) mathematical determination from coefficient of elasticity of system, (4) electronic recording with Ramburg Accelerometer. Samples were taken from normal human cadavers and tested in the fresh state. An over-all average of samples and methods shows the coracoid vulnerable to a force of 175 pounds, acromion 170pounds, and coracoacromial ligament 150 pounds. A force of 150 pounds caused rupture of the shoulder joint capsule minus the accessory socket, and a force of 300 pounds caused damage with the accessory socket intact. 2300 pounds at each axilla caused damage in the cadaver when this force acted for 0.08 seconds. Fractures produced were similar in both the isolated and intact state.

1,618

Farrer, D.N., M.E. Grunzke, et al. 1963 CHIMPANZEE PERFORMANCE ON A CONTINUOUS AVOIDANCE TASK DURING ACCELERATION AT SUSTAINED LOW LEVELS (Aeromedical Research Lab., Aerospace Med. Div., Air Force Systems Command, Holloman AFB, New Mexico) Rept. No. ARL-TDR-63-6, March 1963. ASTIA AD 402088.

ABSTRACT: Chimpanzee performance during 1G, 2G and 4G was evaluated with a pilot study (one subject) and a crossover design (four subjects). Each test lasted 90 minutes (30 minutes at 1G; 30 minutes at either 2 G or 4 G; 30 minutes at 1G). Performance, heart rate, respiration rate and body temperature were monitored. It was concluded that a performance decrement results during exposure to 4 G (Chest to back, $+G_X$) for 30 minutes. The heart rate was high throughout all tests, but it increases while the subject monitors the cue lights and decreases during rest periods. The respiration rate does not consistently change as a function of either G force or work. Body temperature consistently decreased during the tests.

1,619

Pasola, A. F., R. C. Baker, & F. A. Hitchcock 1955 ANATOMICAL AND PHYSIOLOGICAL EFFECTS OF RAPID DECELERATION. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 54-218; ASTIA AD-92 025

ABSTRACT: Research was conducted to provide information concerning the strength of the human skeleton and the effects of rapid deceleration which is produced by safety devices. An investigation of morphological damage and the force required to produce damage was conducted by testing the strength of structures which comprise the pelvic girdle, including the acetabulae and femurs. Analyses were made of the ultimate breaking strengths of bones in the isolated and intact states and of the ultimate breaking strengths of a series of bones, ligaments, and muscles which comprise the joint; tests were conducted in static and dynamic conditions on unembalmed human cadaver material. Results indicated that the strength of the pelvic ring is directly related to the strengths of the anterior and posterior walls. Primary fractures of the pubic rami, unilateral or bilateral, produced secondary fractures or disjunction of the sacroiliac joint by disrupting the integrity of the counter arch of the pelvis. Fractures of the femur did not occur when the force was applied by cables to the interior surface of the neck of the femur. Fractures of the lateral wall of the pelvis and acetabulum did not produce fractures or disjunction of the sacroiliac joint. Experiments indicated that the mechanism by which cardiac damage is produced in rapid deceleration involves the action of the safety belt in suddenly blocking abdominal blood flow, both in the vena cava and the abdominal aorta. Some minor damage was noted to the heart, liver, and kidney of dogs which were subjected to a 56-g deceleration. (ASTIA)

1,620

Faubert, D. B., B. S. Cooper, & C. C. Clark 1963 TOLERANCE AND PERFORMANCE UNDER SEVERE TRANSVERSE (+Gx) VIBRATION. (Life Sciences Department, Martin Company, Baltimore, Md.) Rept. ER 12838; Feb. 1963

ABSTRACT: Seven male subjects, exposed to vertical vibration while in the supine position in a prototype Mercury couch, made 115 runs at peak couch accelerations ranging from 1Gx±1Gx to 1Gx±3.5Gx at 11, 22, 140, and 22 + 70 cps, and (1Gx±0.5Gx) at 11 cps + (1Gx±4Gx) at 140 cps. Tasks consisted of: (1) push button responses after detecting changes of two linear meters, parallel to the body y and z axes, which moved with the subject; (2) reporting meter number changes; and (3) response times to a panel abort light requiring manual operation of a panel switch. After familiarization runs, mean meter change response times were 0.5 seconds at rest, 0.7 seconds at 1Gx±1Gx at 11 cps, 1.0 second at 1Gx±2Gx at 11 cps, and greater than 1.5 seconds at 1Gx±3.5Gx at 11 cps, for a short duration, after which time subject discomfort precluded further meter response. Accelerometers located on the couch and also on the chest, helmet, and hip showed acceleration ratio amplifications (to 4x at the head) which can occur in this restraint system. Blurring of the vision was judged less severe than when under equivalent Gz vibration conditions. Blurring and body acceleration ratios decreased progressively at the higher

frequencies. At 1Gx±2Gx at 11 cps, some subjects experienced severe chest pains and headaches even when straining. At 1 Gx±1Gx peak at 11 cps, which we recommend designating as 1Gx±0.7Gx RMS with an accompanying power spectrum, here all at 11 cps, simple adequate performance was maintained for 60 seconds. Problems of vibration isolation are discussed. (Aerospace Medicine 34(3):254, March 1963)

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Fearing, F. S. 1926 POST-ROTATIONAL HEAD NYSTAGMUS IN ADULT PIGEONS. J. Comp. Psychol. 6:115-131

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Fearing, F., & O. H. Mowrer 1934 THE EFFECT OF GENERAL ANAESTHESIA UPON THE EXPERIMENTAL REDUCTION OF VESTIBULAR NYSTAGMUS. J. Gen. Psychol. 2:133-144

1,623

Feder, H. C. 1960 NOMOGRAPHS FOR MULTIPHASE ACCELERATION PROFILES. (Air Force Missile Development Ctr., Holloman AFB, N. Mex.) AFMDC TR 60-9, June 1960. ASTIA AD 239 708.

ABSTRACT: Experimental investigations of the technological and physiological effects of unidirectional accelerations require the computation of the parameters of the acceleration pattern. This report develops explicit equations between distance, velocity, acceleration, and time, thus greatly reducing the computational work of test analysis and evaluation.
Two nomographs were designed which permit reading distance with an error of less than 2 percent and velocity with error less than 0.2 percent. The three principal phases of the acceleration pattern are used to define a set of descriptive parameters. An impulse-dependent onset parameter, called relative onset rate, is discussed and, if used as a standard, would facilitate the comparison of tests made by different investigators.

1,624

Feder, Hubert C. 1960 CIRCULAR TRACK-CHAMBER -- A PROPOSED FACILITY FOR TESTING MAN-MACHINE SYSTEMS UNDER CONDITIONS OF SPACE FLIGHT AND LUNAR HABITATION (Air Force Missile Development Center, Holloman AFB, New Mexico) AFMDC-TN-60-14. ASTIA AD 247 541

ABSTRACT: The circular track-chamber as proposed, combines a 100-foot diameter circular track and a 100-foot diameter hemispherical vacuum chamber into one composite test facility. The purpose of this facility is to test the compatibility of man-machine systems. The anticipated test procedure encompasses the simultaneous and continuous testing of most of the parameters of a complete space flight history from launch through planet life to re-entry and recovery. The facility will handle payload-load factor products up to 2,000,000 pounds and can accommodate a crew of 20 men living and working in a planetary environment.

1,625

Feder, Hubert C. 1963 THE FLYWHEEL AS A CENTRIFUGAL ACCELERATOR (6571st Aeromedical Research Laboratory, Holloman Air Force Base, New Mexico) Technical Documentary Report No. ARL-TDR-63-9, April 1963. ASTIA AD 401 767.

ABSTRACT: Subjected to investigation is a flywheel accelerator as a component of a 160 to 200-foot diameter circular track. The 22 spoke, box-construction flywheel could be made from commercially available steel plates. Based on optimal design conditions, the upper application limit, governed by the welding property of the material used, was found to be a test weight - load factor capacity of 230,000 pound - 300 g. The discussion, based on a linear dependence of flywheel weight, moment of inertia, power and cost on test weight, and cross-section of box members at constant radius and stress, shows that the lower application limit of the flywheel reaches far into the application range of proposed, arm-type centrifuges and that the flywheel is a logical necessity, if the test capacity of existing centrifuges needs to be exceeded.

1,626

Feder, E. I., & E. J. Straus 1961 INCREASED RELIABILITY OF PIEZOELECTRIC ACCELEROMETERS FOR SHOCK MEASUREMENTS. In 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D. C. (Mt. Prospect, Ill.: Institute of Environmental Sciences, P. O. Box 191) pp. 565-569

SUMMARY: With the advent of higher and higher shock measurement requirements, the environmental engineer must be extremely careful in selecting his instrumentation. It must be recognized that the piezoelectric accelerometer can be used for both vibration and shock measurements; however, the characteristics of the instrument must be suited for the application. The introduction of damping of high resonant frequency seismic systems into an accelerometer serves to further increase the reliability of a particular measurement. The overall system of accelerometer, cathode follower, filter and recording instrument must be integrated and matched. Each unit represents an electric component through which the signal generated by the piezoelectric crystal must pass with a minimum of distortion or loss. When this condition is met, a faithful reproduction of the applied force will be obtained. (AUTHOR)

1,627

Feddersen, W.E. 196_ SIMULATOR RESEARCH: VALIDATION AND MOTION STUDIES. In U.S. Army Signal Corps, Combat Communications and Surveillance Report of the Seventh Annual U.S. Army Human Factors Engineering Conference, 3-6 October 1961. ASTIA AD 267 153

ABSTRACT: The research was undertaken as a first step in the validation of the Bell dynamic simulator and supporting equipment against the helicopter. The purpose of this study was to demonstrate with experimental data the extent to which performance results on the simulator approximate those obtained from the helicopter when the tasks are equivalent.

In line with these objectives, the approach was a three-pronged one in which various types of motion upon operator performance were investigated. The contribution of motion cues relative to no-motion in the simulator tracking situation is also under investigation. The third area has been an investigation of the various measures which can be used in the evaluation of operator performance as well as system performance.

Graphs are included to show the results of these three areas of investigation. The proficiency results are reported in terms of integrated absolute error scores about the various axes defining the hovering task, and the behavioral data, that is, the data indicative of the way in which the helicopter and simulator are controlled by the operator, are presented in the form of auto-correlation functions. (AUTHOR)

1,628

Feddersen, W. E. 1962 THE ROLE OF MOTION INFORMATION AND ITS CONTRIBUTION TO SIMULATION VALIDITY (Bell Helicopter Co., Ft. Worth, Texas) Rept. No. D228-429-001; ASTIA AD-281 855

ABSTRACT: The use of a motion simulator in the evaluation and testing of those display and instrumentation concepts which are central to the objectives of the Army-Navy Instrumentation Program (ANIP) poses the same question that is asked of any testing device; namely, to what extent does the device allow a valid evaluation of the developments under consideration. The ultimate in validity in such a situation would be achieved when operator behavior in the simulator corresponds precisely to control behavior in the system being simulated which, in this case, is a helicopter in all of its different flight modes. Since it is unrealistic to expect exact behavior correspondence in the two situation the task is one of determining the extent or degree of approximation.
This report summarizes the results of a series of three investigations, both simulator and flight test, designed to determine the relative proficiency allowed by motion information in the simulator in a hovering flight mode and, secondly, to determine with appropriate measures the degree to which control behavior in the helicopter is approximated by behavior in the simulator when the tasks are equivalent.

1,629

Federov, E.K. 1962 THE DECISIVE STEP IN THE CONQUEST OF COSMIC SPACE. Science and Culture (Calcutta), 28(1):11-14, Jan. 1962.

ABSTRACT: Soviet space efforts preparatory to manned space flight included studies dealing with: (1) the conditions encountered during space flight (accelerations, temperature changes, weightlessness, radiations) and means of protecting the astronaut from their effects; (2) providing normal living conditions in the space cabin; and (3) medical selection techniques and training format for astronauts. The system devised for the constant medical supervision of both the pilot's health and working capacity in all stages of flight is discussed. Y.A. Gagarin's orbital flight (April 12, 1961) is briefly mentioned.

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Fedorov, Ye. 1961 ACCOMPLISHMENT OF THE CENTURY
Izvestiya 4 cols.; 13 April 1961.

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Fedotov, Yu. 1960 BEFORE TAKE-OFF INTO SPACE
Krasnaya zvezda P. 3; 18 May 1960.

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Fedotov, Yu. 1960 EARTH-SPACE-EARTH
Krasnaya zvezda Pp. 3-4; 2 December 1960

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Fellenz, D.W. & R.J. Harris 1963 INFLUENCE OF WEIGHT PARAMETERS ON THE PROPULSION REQUIREMENTS OF ORBIT-LAUNCHED VEHICLES (National Aeronautics and Space Administration) NASA Technical note D-1525, May 1963

ABSTRACT: The effects of thrust-to-weight ration and structural weight assumptions on payload performance have been investigated for orbit-launched vehicles with lunar or escape missions. The propulsion systems considered were high-energy chemical and nuclear heat-exchanger systems. It is shown that the assumption of structural weights as being composed of terms pro-

portional to thrust level and propellant loading is necessary and practical for the discussion of the influence of thrust-to-weight ratio on payload performance. Results are given in parametric form showing payload ratio and related performance parameters as functions of thrust-to-weight ratio, representative engine and tankage specific weights for both propulsion systems tangential and circumferential thrust orientations, and different altitudes. The curves permit the rapid determination of maximum payload conditions as well as the discussion of performance parameters of off-optimum configurations

1,634

Feltman Research and Engineering Labs., tr. 1959 ROCKET TECHNOLOGY AND SPACE RESEARCH. Raketentechnik und Raumfahrtforschung, 3(2) Apr.-June 1959. (Feltman Research and Engineering Labs., Picatinny Arsenal, N.J.) PA translation No. 61, ASTIA AD-228 967.

CONTENTS:

Observations on the physiology of the senses during the transition from accelerations to weightlessness
Graphic determination of the main influence parameters and preliminary design parameters of missiles
Further observations on the Russian earth satellites
Technical reports:
The Atlas-Carrier rocket for important space navigation projects
The first artificial planetoid Mechta
Earth satellite Vanguard II with infra-red detectors
Space probe Juno II
Book reviews:
On the thermodynamics of combustion processes
Aviation medicine

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Fenichel, R.L., & G.H. Kydd 1958 ERYTHOCYTE HYDRATION UNDER POSITIVE ACCELERATION.
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-5805, Rept. No. 1, ASTIA AD 200 085.
See also J. Appl. Physiol. 13(3)393-396, Nov. 1958.

ABSTRACT: Rhesus monkeys were employed to study the effects of positive acceleration upon erythrocyte hydration. Blood samples were obtained from the monkey's carotid artery just before and immediately after exposure to a standard pattern of positive G. The mean corpuscular hemoglobin concentration (MCHC) fell an average of 5.8 percent. This striking fall in MCHC indicated that after

G exposure the monkey's erythrocytes were greatly increased in size. Fluid has shifted into the red blood cells. Since the MCHC measures the hemoglobin concentration within the red cell it was not surprising to find a mean decrease of 2.3 per cent in the hemoglobin concentration. The hematocrits remained constant during these experiments. A slight decrease in the relative viscosity of the blood was noted. This finding, however, was not statistically significant. Sulfhydryl concentration by itself and in relation to the hematocrit did not show a significant change after acceleration. (Author)

1,636

Fenichel, R.L., & G.H. Kydd 1958 ERYTHOCYTE HYDRATION UNDER POSITIVE ACCELERATION. J. Appl. Physiol. 13(3):393-396, Nov. 1958.
See also (Naval Air Development Ctr., Johnsville, Pa.)
NADC-MA-5805. ASTIA AD 200 085.

ABSTRACT: Rhesus monkeys were employed to study the effects of positive acceleration upon erythrocyte hydration. Blood samples were obtained from the monkey's carotid artery just before and immediately after exposure to a standard pattern of positive G. The mean corpuscular hemoglobin concentration (MCHC) fell an average of 5.8 percent. This striking fall in MCHC indicated that after G exposure the monkey's erythrocytes were greatly increased in size. Fluid has shifted into the red blood cells. Since the MCHC measures the hemoglobin concentration within the red cell it was not surprising to find a mean decrease of 2.3 percent in the hemoglobin concentration. The hematocrits remained constant during these experiments. A slight decrease in the relative viscosity of the blood was noted. This finding, however, was not statistically significant. Sulfhydryl concentration by itself and in relation to the hematocrit did not show a significant change after acceleration. (Author)

1,637

Fenichel, R.L. 1959 A STUDY OF THE EFFECTS OF POSITIVE ACCELERATION UPON ERYTHROCYTE HYDRATION IN HUMAN SUBJECTS.
(U.S. Naval Air Development Center, Johnsville, Pa.)
NADC-MA 5904, ASTIA AD 218 885.
See also Aerospace Medicine 33: 862-865, July 1962.

ABSTRACT: Human subjects were employed to study the effects of positive acceleration upon erythrocyte hydration. Venous blood samples were obtained just before the acceleration series was begun, after the third centrifuge run (2.5 G) and immediately after the subject was exposed to the last acceleration

run in the G series (5.5 G). The acceleration exposure began at the 1.5 G level and increased at 1/2 G increments, with 5 minute rest period between runs, and was terminated when the subject lost peripheral lights. The unprotected subject used in this study reached 5.5 G on the average, before losing peripheral lights. A decrease in Mean Corpuscular Hemoglobin Concentration (MCHC) was observed. A trend toward an increase in Mean Corpuscular Volume (MCV) and towards a decrease in Mean Corpuscular Hemoglobin (MCH) was noted. The trend toward the fall in MCHC indicated that after G exposure the erythrocytes of human subjects were increased in size. Fluid had shifted into the red blood cells. Comparison with the results obtained with humans at relatively low G levels with the results obtained from monkeys at overlapping and higher G levels indicated that with both species the MCHC decreased. (Author)

1,638

Fenton, F. H., Jr. 1960 MANUAL OF OPERATION FOR THE AMAL PUNCHED TAPE CENTRIFUGE CONTROL SYSTEM. (Aeronautical Computer Lab., U. S. Naval Air Development Center, Johnsville, Pa.) NADC-AC-6003, April 1960

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Ferguson, J.K.W. 1942 TESTS ON OXYGEN MASKS AND FLYING GOGGLES IN A WIND TUNNEL. (National Research Council of Canada, Toronto) C-2278, 23 December 1942.

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Ferguson, H. 1953 INVESTIGATION OF THE ACCELERATION AND JOLT HISTORIES DURING ESCAPE FROM HIGH SPEED AIRCRAFT. (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TR 52-278, Suppl. 1; Sept. 1953. ASTIA AD 27 126.

ABSTRACT: Improvements are obtained for the upper-bound acceleration-time curves previously derived (AD-5010) by replacing the constant drag coefficient assumed earlier by a uniform 1-step drag coefficient. In this way, account is taken of the expected sharp drag coefficient change which occurs as the escape unit passes through M=1.0. This leads to a discontinuity in each curve of the family of acceleration curves and results in a restriction on the altitude range for which the bounding acceleration is not suppressed at the end; it refers to lower bounds of negative accelerations rather than upper bounds of acceleration magnitudes. (ASTIA)

1,641

Fernandez C., J.R. Lindsay 1960 POSITIONAL NYSTAGMUS IN MAN AND ANIMALS
J. Nerv Ment Dis 130:499-95, June 1960

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Fernandez, C., R. Alzate, & J.R. Lindsay 1960 EXPERIMENTAL OBSERVATIONS ON POSTURAL NYSTAGMUS. LESIONS OF THE NODULUS.
(SAM, USAF Aerospace Medical Center, Brooks AFB, Texas)
Report No. 60-23, Jan. 1960.

ABSTRACT: This investigation supports the idea that the nodulus acts as an inhibitor of the vestibular centers. Disequilibrium and postural nystagmus in the vertical plane characterize the deficit following ablation of the nodulus. Unlike animals with lesions in the corpus cerebelli, these experimental animals exhibit no abnormalities in posture and no cerebellar ataxia.

1,643

Fernandez, C., & R. Schmidt 1962 HABITUATION OF NYSTAGMUS
(Paper, 33rd Annual Meeting of the Aerospace Medical Assoc., Chalfonte-Haddon Hall, Atlantic City, New Jersey, April 9-12, 1962)

ABSTRACT: Habituation of nystagmus elicited by repetitive caloric or rotatory stimulation was studied in cats with lesions in the central nervous system. Normal animals served as controls. Eye-movements were recorded by electro-nystagmography. Animals with ablation of either neocortex or anterior cerebellar lobe and animals with extensive damage to midbrain tegmentum exhibited habituation of nystagmus similar to that obtained in controls. Ablation of the cerebellar nodulus prevented acquisition of habituation until the cat compensates from cerebellar deficiency. Rate and extent of habituation varied from one parameter of nystagmus to another. Usually, but not always, amplitude and duration of the reflex were little modified while response decline was observed consistently in total number of jerks, frequency and velocity of both slow and fast component.

1,644

Fernandez, C., & R. Schmidt 1962 STUDIES ON HABITUATION OF VESTIBULAR REFLEXES II. EFFECT OF CALORIC STIMULATION IN DECORTICATED CATS. Annals of Otology, Rhinology, & Laryngology 71(2):299-320, June 1962
NOTE: Reel 7, Flash 7, Item 21

SUMMARY: Habituation of nystagmus elicited by repetitive caloric stimulation was studied in seven decorticated cats. The histopathologic studies revealed total ablation of neocortex, excepting small remnants in two cases, and extensive damage to basal ganglia and diencephalon.

All animals exhibited response decline of nystagmus demonstrating that neocortex and probably basal ganglia and diencephalon are not essential for inducing habituation. There was no conclusive data regarding transfer and long lasting retention of the response decline.
The locus and neurophysiological basis of the phenomenon are discussed.
(AUTHOR)

1,645

Fernandez, C., and R.S. Schmidt 1963 STUDIES IN HABITUATION OF VESTIBULAR REFLEXES. III. A REVISION. Aerospace Medicine, 34(4): 311-315, Apr. 1963

ABSTRACT: Habituation of nystagmus to repetitive caloric or rotatory stimulation was produced in the cat. This phenomenon, as in a negative learning process, presented the characteristics of acquisition, transfer and retention.

Total ablation of the neocortex with extensive damage to diencephalon did not interfere with acquisition of habituation but these structures may be important for retention of the response decline.

The phenomenon is apparently located in the vestibular centers, including vestibular nuclei and reticular formation of both medulla and pons.

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Filippi, Paolo 1949 THE UNIDIRECTIONAL PREPONDERANCE OF PROVOKED NYSTAGMUS. Riv. Oto-Neuro-Oftal. 24:340-368

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Filippovich, S.G. 1936 EVALUATION OF CONDITION OF INTERNAL ORGANS IN PARACHUTE JUMPERS. Klinicheskaya meditsina, (Moskva) 14:391-404

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Finan, J.L., S.C. Finan, & L.D. Hartson 1949 A REVIEW OF REPRESENTATIVE TESTS USED FOR THE QUANTITATIVE MEASUREMENTS OF BEHAVIOR--DECREMENT UNDER CONDITIONS RELATED TO AIRCRAFT FLIGHT. (USAF, AMC, Wright-Patterson AFB, Ohio) USAF TR 5830.

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Finney, J.W. 1961 RUSSIANS CONFIRM TITOV WAS SEASICK: CONDITION LAID TO PROLONGED STATE OF WEIGHTLESSNESS. New York Times, Oct. 5, 1961. Sec. C, p. 8.

ABSTRACT: Two Russian scientists confirmed the rumor that Maj. Gherman S. Titov felt seasick throughout most of his 25 hr. space flight in August, 1961. The sickness was attributed to prolonged weightlessness. There were indications during the weightless period of "a definite instability of central nervous system reactions." The astronaut experienced a feeling of disorientation and loss of balance normally supplied by the inner ear. The Russian scientists pointed out that the feeling of weightlessness can be removed by creating artificial gravity in the space ship. (CARI)

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Finkelstein, B. and B. McGhee 1959 LIQUID DIETS FOR USE IN HIGH-ALTITUDE, HIGH-PERFORMANCE VEHICLES (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADC-TR-59-32, March 1959

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Finninger, P.C. 1960 MEDICINA DE AVIACION.
(Thesis to obtain Titulo de Medico-Cirujano, University of Mexico, Mexico, D.F., 1960)

1,652

Firestone, C. 1935 AIR SPEEDS AND THEIR TRAUMATIC EFFECTS ON THE BRAIN. J. Aviation Med. 6(1):45-48

ABSTRACT: Injury to the brain from its pressure against the skull when flying at high speed has been discussed, and made much of. The experiments of Garsaux should not be adduced to this discussion, as he brought about a chain of events which originated in the vestibular tract.

Metal helmets will serve as an additional casing and cushioning, when higher speeds come and show necessity for such added protection. These helmets will also help protect the military flyer from rifle and to some extent from machine gun fire.

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Fischer, C.F. and F.T. Nicholson 1959 ACCELERATION SIMULATIONS ON THE HUMAN CENTRIFUGE. In Symposium on Space Med. Electronics. (The Franklin Institute, May 1959), p. 32.

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Fischer, J.C., Jr. 1961 THE EXPLOITATION OF THE MAXIMUM CAPABILITIES OF THE HUMAN BODY TO WITHSTAND MANEUVERING LOADS IN MANNED AEROSPACE VEHICLE DESIGN. (SAE, Natl. Aero. & Space Eng. & Mfg. Meeting, 9-13 Oct. 1961 Los Angeles, Calif.) Preprint 424 B

ABSTRACT: Discusses the design of future aerospace vehicles seeking to combine high maneuverability and minimum g-forces on pilots. A lenticular shaped vehicle, to be rotated before a turn so the pilot will face the new direction of acceleration, is proposed.

1,655

Fischer, L.J., and E.L. Hoffman 1957 DITCHING INVESTIGATIONS OF DYNAMIC MODELS AND EFFECTS OF DESIGN PARAMETERS ON DITCHING CHARACTERISTICS. (National Advisory Committee for Aeronautics, Washington, D.C.) NACA TN 3946. Feb. 1957.

ABSTRACT: Experimental results presented in tabular form. Data from other scale-model tests and reports on full-scale ditchings are discussed and various ditching aids are considered.

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Fisher, Krohn, and Zuckerman 1941 RELATIONSHIP BETWEEN BODY SIZE AND THE LETHAL EFFECTS OF BLAST.
(Ministry of Home Security, Research and Exper. Dept., Oxford, England)
Rept. RC 284, 10 Nov. 1941.
Also Report, Comm. Weapons, MPRC-BPC 14 6 /ws 11

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Fisher, A.C. 1955 AVIATION MEDICINE ON THE THRESHOLD OF SPACE
Journal of Aviation Medicine 26: 355
See also: Nat. Geog. Mag. 108(2): 241-278. Aug. 1955

ABSTRACT: A coverage of all aspects of space flight including acceleration, deceleration, and weightlessness.

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Fisher, A.C., Jr. 1955 AVIATION MEDICINE ON THE THRESHOLD OF SPACE: SERVICE DOCTORS, FACING MEDICAL PROBLEMS UNKNOWN ON EARTH, MAKE POSSIBLE MAN'S EXPLORATION OF THE HOSTILE HEAVENS
The National Geographic Magazine 108(2): 241-278, August 1955

ABSTRACT: The author reports on his visits to several military and civilian institutions that work on research into the human factors of flight. He describes the effects of the centrifuge at Johnsville, Pennsylvania. Escape from aircraft ditched in water is a subject under investigation at Pensacola, Florida. The author discusses a weightless ride during his visit at Edward's Air Force Base, California. Heat resistant and pressure suits for pilots are under development at Wright-Patterson Air Force Base, Ohio, and at Randolph Air Force Base, Texas. Hyperventilation is another field of research at Randolph Air Force Base. Extreme acceleration and deceleration forces are the subject of a conversation between the author and Col. John P. Stapp. Pilot ejection and the effects of fatigue are being studied at Wright-Patterson Air Force Base. The article is very detailed about the research in all of the fields. (CARI)

1,659

Fisher, J.C. 1949 NAVAL ORDNANCE LABORATORY DROP TESTER (40') XD-1A, DESIGN, CONSTRUCTION AND CALIBRATION OF (Naval Ordnance Lab., White Oak, Md.) 14 June 1949; ASTIA AD-103 435

1,660

Fisher, L.J. and R.P. Tarshis 1950 DITCHING TESTS WITH A 1/16 SIZE MODEL OF THE NAVY XP2V-1 AIRPLANE AT THE LANGLEY TANK NO. 2 MONORAIL. (National Advisory Committee for Aeronautics, Langley Field, Va.) NACA RM L50C23, May 1950.

ABSTRACT: Model investigations to determine the ditching characteristics of the Navy XP2V-1 airplane are described. Various landing configurations were simulated and the performance of the model was determined from visual observations, motion-picture records, and time-history accelerometer records. The results of the investigation indicate that the airplane should be ditched at the normal landing attitude with the flaps fully extended. Extensive damage to the fuselage will occur and the airplane probably will dive. If a trapezoidal hydroflap 4 feet by 2 feet by 1 foot is attached to the airplane at station 192.4, diving will be prevented.

1,661

Fisher, L. J. & E. L. Hoffman 1950 MODEL DITCHING INVESTIGATION OF THE DOUGLAS DC-4 AND DC-6 AIRPLANES (National Advisory Committee for Aeronautics, Langley Aeronautical Laboratory, Langley Air Force Base, Va.) NACA RM L9K02a, 4 May 1950.

ABSTRACT: Model investigations to determine the ditching characteristics and safest ditching procedures for Douglas DC-4 and DC-6 airplanes are described. Data were obtained by motion-picture and still-picture records and time-history deceleration records. It was concluded that the best ditchings with the DC-4 and DC-6 airplanes could be made by contacting the water at a nosehigh attitude with the landing flaps full down. The ditching behavior of both airplanes will be similar. In calm water or small waves, the attitude will decrease until the airplane stops in a slightly nose-down attitude. Little damage will be sustained at these conditions. In waves of the order of 6 feet high, considerable variation in behavior and damage may occur, depending on how the airplane contacts the waves.

1,662

Fisher, L.J. 1953 MODEL DITCHING INVESTIGATIONS OF THREE AIRPLANES EQUIPPED WITH HYDRO-SKIS. (National Advisory Committee for Aeronautics, Langley Field, Va.) NACA / RM L53G24A. Sept. 29, 1953.

ABSTRACT: Model investigations were made to determine the ditching characteristics of three typical multiengine airplanes equipped with possible arrangements of hydro-ski ditching gear. The behavior of the models was determined from visual observations, acceleration records, and motion pictures of the landings. It was concluded that a ditching gear of one or more hydro-skis would afford very satisfactory water landings as compared with landings without skis. The best landing with a hydro-ski ditching gear could be made in a near-level (slightly nose-up) attitude although any normal landing attitude would be satisfactory. It is possible that critical damage could be eliminated from ditching by using a hydro-ski ditching gear, thus greatly increasing the chances or survival and rescue.

1,663

Fisher, L. J., et al. 1957 DITCHING INVESTIGATIONS OF DYNAMIC MODELS AND EFFECTS OF DESIGN PARAMETERS ON DITCHING CHARACTERISTICS. (National Advisory Committee for Aeronautics, Washington, D. C.) NACA TN 3946, Feb. 1957

1,664

Fisher, Lloyd J., Jr. 1960 LANDING ENERGY DISSIPATION FOR MANNED REENTRY VEHICLES. (National Aeronautics and Space Administration, Washington, D.C) NASA TN D-453

ABSTRACT: Analytical and experimental investigations have been made to determine the landing-energy-dissipation characteristics for several types of landing gear for both parachute-supported and horizontal-landing vehicles. It appears feasible to readily evaluate these landing gears for hard-surface or water landings by computation methods and freebody landing techniques with dynamic models. Acceptable landing gear can be developed along lines similar to those presented if stroke requirements and human-tolerance limits are considered.

1,665

Fisher, Lloyd J., Jr. 1961 LANDING-IMPACT-DISSIPATION SYSTEMS (National Aeronautics and Space Administration, Washington, D.C.) NASA TN D-975.

ABSTRACT: Analytical and experimental investigations have been made to determine the landing-energy dissipation characteristics for several types of earth-landing impact systems having application to reentry vehicles. The areas of study are divided into three velocity regions: (1) those having primarily vertical velocity, (2) those having both moderate horizontal and moderate vertical velocity, and (3) those having primarily horizontal velocity. The impact systems discussed are braking rockets, gas-filled bags, frangible metal tubing, aluminum honeycomb, balsa wood, strain straps, and both skid and skid-rocket landings on hard-surface runways and on water. It appears feasible to evaluate landing-gear systems for reentry vehicles by computational methods and free-body landing techniques with dynamic models.

1,666

Fitts, P. M., ed. 1947 PSYCHOLOGICAL RESEARCH ON EQUIPMENT DESIGN (Air Materiel Command, Aero Medical Lab., Wright-Patterson AFB, Ohio) Rept. No. 19; ATI-125 983

CONTENTS:

Introduction to Psychological Research on Equipment Design;
Survey of Display Problems in the Design of Aviation Equipment;
An Analysis of Human Motor Abilities Related to the Design of Equipment and a Suggested Program of Research;
The Relative Effectiveness of Presenting Numerical Data by the Use of Tables

and Graphs;
Psychological Factors Involved in the Design of Air Navigation Plotte's;
Design of Clock Dials for Greatest Speed and Accuracy of Reading in Military (2400-Hour) Time System;
Speed and Accuracy of Dial Reading as a Function of Dial Diameter and Angular Separation of Scale Divisions;
An Experimental Evaluation of the Interpretability of Various Types of Aircraft Attitude Indicators;
Direction of Movement in the Use of Control Knobs to Position Visual Indicators;
A Study of the Most Effective Relationships Between Selected Control and Indicator Movements;
Comparative Interpretability of Two Methods of Presenting Information by Radar;
A Psychophysical Investigation of Ability to Reproduce Pressures;
The Coding of Airplane Control Knobs;
The Tactual Discrimination of Shapes for Coding Aircraft-type Controls;
A Study of Location Discrimination Ability;
Principles of Control Arrangement for Sequential Operation;
Efficiency of Several Types of Control Movements in the Performance of a Simple Compensatory Pursuit Task;
An Experimental Comparison of the Accuracy of Sighting and Triggering with Three Types of Gun-Sight Handgrip Controls;
The Effect of Anoxia on Visual Illusions;
Effect of Increased Positive Acceleration (G) on Ability to Read Aircraft Instrument Dials;
Summary and Evaluation;s

1,667

Fitzpatrick, F.L, and K.A. Stiles 1942 THE BIOLOGY OF FLIGHT. (New York: The Macmillan Company, 1942)

NOTE: This textbook for students of pre-flight aeronautics covers the subject of the effect of flight upon the human body. Each chapter is concluded with a brief summary of its contents.

CONTENTS: Living things in the air. The nature of flight. Altitude effects. Other pressure and temperature effects. Acceleration and the human body. The sense organs and flight. Physical fitness for flight. Air travel and disease control. Selected references. Selected motion pictures. Index.

1,668

Fitzpatrick, F.L. & K.A. Stiles 1942 ACCELERATION AND THE HUMAN BODY. In The Biology of Flight (New York: The Macmillan Company, 1942) Pp. 84-96.

ABSTRACT: From the foregoing statements it may be seen that both positive and negative accelerations present definite dangers, but that the former are more likely to be encountered in actual flying experience. The effects are primarily upon the circulation; positive accelerations result in blacking out, and negative accelerations bring about a congestion of blood in the head region. Transverse accelerations, on the other hand, are not likely to produce any ill effects.

Once more it may be observed that individual difference is an important part of the story. Some people are much more tolerant of accelerations than are others. A particular person may also vary in tolerance from day to day, depending on his physical condition at a given time. Ways and means of preventing ill effects have been studied with care, but not much can be maneuvers that produce dangerous accelerations, (2) to change the position of the body so that in effect the accelerations become transverse, and (3) to wear special equipment, such as an inflatable belt.

1,669

Fitzpatrick, F.L. & K.A. Stiles 1942 THE SENSE ORGANS AND FLIGHT. In The Biology of Flight (New York: The Macmillan Company, 1942) Pp. 97- 118

ABSTRACT: In this chapter the story of the sense organs in relation to flight experiences has been reviewed. The most important ot these organs are clearly the eyes and the ears, but the sense of touch has a good deal to do with maintaining balance and orientation. One fact that emerges from the discussion is that the senses are often "tricked" in flight experiences, a fact that is particularly true when the pilot is flying "blind." This is one reason why instrument flying has become so important in recent years.

We have also noted that, while ordinary airsickness cannot be fully explained, it is clearly due to a confusion of many sensations that originate in the sense organs. Some people are more susceptible to airsickness than are others, and a few are probably never able to overcome the handicap. We should remember that airsickness may be developed at any level of flight; it is not one of the conditions that appear only at high altitude.

The causes of flight fatigue and its dangers have also been outlined. Undoubtedly it was more of a menace in the early days of aviation than is now the case. In recent years many improvements of aircraft, methods of handling air traffic, and greatly to the comfort and security of fliers. The various causes of flight fatigue, however, cannot be removed entirely. We shall always have to reckon with this factor.

1,670

Fitzpatrick, W.H. and C.W. DeLong, ed. 1961 SOVIET MEDICAL RESEARCH RELATED TO HUMAN STRESS: A REVIEW OF THE LITERATURE. (Washington: U.S. Public Health Service, 1961) PHS Publication no. 853.

1,671

Fitzsimons, J.T. and M.K. Browne 1957 ELECTROCARDIOGRAPHIC CHANGES DURING POSITIVE ACCELERATION. (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. 1009.

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Flack, M. 1919 "FLYING SICKNESS." A DISCUSSION OF ITS CAUSE AND THE BEST MEANS OF COMBATTING IT. Sci. Amer. Suppl. 87:262

1,673

Flack, M. & A.P. Bowdler 1920 THE SELECTION OF CANDIDATES FOR FLYING. British Air Medical Investigation Committee Rept. VI., March 1918. Reprinted in The Medical Problems of Flying (London: H.M. Stationery Office, 1920)

1,674

Flack, M. 1930 AIR-SICKNESS AND SEA-SICKNESS. Proc. R. Soc. Med., 24(2)635-641

1,675

Flack, M. 1930 AIR-SICKNESS AND SEA-SICKNESS. Proc. Royal Soc. Med. 24:635-641, Pt. 1.

ABSTRACT: Air-sickness and sea-sickness have certain factors in common; they differ in the relative importance of the various factors. In both maladies the following may play a part: (1) Undue stimulation or hypersensitivity of the vestibular apparatus of the internal ear; (2) dilemma between visual, labyrinthine and deep-muscle sensations, accentuated by induced disturbance of ocular muscle balance; (3) physical factors such as stuffy atmospheres, smells, and lack of adequate ventilation; (4) anticipatory nervous anxiety; (5) the general health of the subject at the time of exposure to uneven movement, including the tone of the abdominal musculature.

1,676

Flaherty, B.E., D.E. Flinn, G.T. Hauty, & G.R. Steinkamp 1960 PSYCHIATRY AND SPACE FLIGHT. (USAF, School of Aviation Medicine, Aerospace Med. Ctr., Brooks AFB, Texas) Research Rept. 60-80, Sept. 1960, ASTIA AD 245 416.

ABSTRACT: The stresses of altitude, acceleration and dynamic weightlessness, temperature, radiation and meteorites, day-night cycle, and emotional factors are discussed as they relate to the man-machine system and space flight. The reactions of four subjects to thirty-six hours of confinement in the School of Aviation Medicine Space Cabin Simulator are described. Two of the subjects successfully completed the flight despite having experienced perceptual aberrations. The psychiatric evaluation of the two subjects are presented. The effects of isolation and sensory deprivation are discussed as they relate to the experiments.

1,677

Flaherty, B.E. 1961 PSYCHOPHYSIOLOGICAL ASPECTS OF SPACE FLIGHT. (New York; Columbia University Press, 1961)

ABSTRACT: A symposium on Psychophysiological Aspects of Space Flight, held 26-27 May 1960 at Brooks AFB, School of Aviation Medicine in four parts: Technical Background and Experience, Critical Problem Areas, Problems of Human Reliability, and Special Techniques of Control.

1,678

Flaherty, T.T. 1942 AIRSICKNESS DURING ACROBATICS. U.S. Nav. M. Bull., 40:902-6

1,679

Flam, E., & H. R. Fraiser 1960 INTEGRATED FLIGHT CAPSULE BOOST ROCKET REPORT. (Chance Vought Aircraft, Inc., Dallas, Texas) Rept. No. EOR-12844; Contract NOa(s) 59-6150-c; ASTIA AD-263 494L

ABSTRACT: Studies were made of propulsion systems for the capsule escape device. The performance requirements for capsule propulsion are best met by a solid rocket which is simpler, more reliable, and lighter than a liquid rocket for this application. The space envelope available in the capsule dictates the use

of two identical solid rockets each of which has performance as follows: 15,000 pounds thrust, 13,000 pounds total impulse, and 0.86 second burning time. The motor design utilizes a six-spoke wagon wheel grain. The grain burning surface will be dipped in inhibitor to keep the thrust build-up rate within limitations on G onset rate. Four nozzles are used on each motor in order to stay within the space envelope. This permits the entire instaliation to be contained inside the fuselage. Electrical initiation will be used. (AUTHOR)

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Flamme, A. 1930 LES LIMITES PHYSIOLOGIQUES DE LA VITESSE (THE PHYSIOLOGICAL LIMITS OF SPEED) 1. Congr. internat. Securite aer. Paris, 1930. Rapport Tome 2, p.5, Comm. IX.

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Flamme, A.L. 1931 INFLUENCE ET LIMITES PHYSIOLOGIQUES DE LA VITESSE ET DE SES DERIVES: (ACCELERATIONS, CHOCS, TREPIDATIONS). (The Effect and Physiological Limits of Force and Stress: (Acceleration, Impact, and Vibration) Arch. Med. Pharm Milit. 95:263-302.

1,682

Flamme, A.L. 1933 INFLUENCE ET LIMITES PHYSIOLOGIQUES DE LA VITESSE ET DE SES DERIVEES (Influence and Physiological Limits of Speed and It's Accompanying Conditions)
Revue des forces aériennes (Paris) 5(51): 1139-1151

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Flamme, A.L. 1936 CONSIDERATIONS MEDICALES SUR LE PARACHUTISM (Medical Considerations on the Parachutist)
Revue de l'armee de l'air (Paris) 2:977-1006

1,684

Flaugherty, T.T. 1942 AIRSICKNESS DURING ACROBATICS U.S. Navy Med. Bull. 40:902-906

1,685

Flecker, J.F. 1958 MAN IN SPACE.
Air Force, 41(3):109-117, 120-123, March 1958.

ABSTRACT: Reviews the battery of psychological testings which Donald G. Farrell underwent in a U.S. Air Force space-cabin mock-up, and (2) a multi-g acceleration experiment carried out by Colonel John Stapp, in which effects of high speed blastoff were duplicated. The results suggest surprisingly high human tolerance levels. Weightlessness could be produced experimentally for short intervals only, but results indicate that proper training in and orientation about conditions of weightlessness would improve human performance during zero gravity. Padded "highchairs" for seats, squeeze tubes for feeding, and suction-cupped shoes for walking are recommended. The creation of artificial gravity by means of rotation of the craft is considered less desirable for combating weightlessness problems. A closed biological cycle system is recommended. Such a system would be necessary to meet the oxygen requirement on long space flights and may solve the problems of space-flight feeding and of human waste disposal. Hazards of cosmic radiation and meteorites must still be dealt with, and certain psychological problems have not as yet been solved. It is predicted that the data on heretofore unanswered questions. Its pilots will face longer periods of zero gravity and will be compelled to make quick decisions under near zero-gravity conditions. They will be exposed to speeds of from Mach 5 to Mach 7. In conclusion, the author presents some speculation concerning space stations, lunar trips from these stations, and, trips to some of the planets.

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Fleisch, A. 1931 VENOMOTORENZENTRUM UND VENENREFLEXE. II. MITTEILUNG. BLUTDRUCKZUGLER UND VENENREFLEXE. (Venomotor Centers and Venal Reflexes. Bloodpressure Regulator and Venal Reflexes)
Pflüg. Arch. ges. Physiol. (Berlin) 226: 393-410

1,687

Flekkel' A.B. and E.V. Marukhanian 1959 (THE EFFECT OF LONG-ACTING RADIAL ACCELERATION ON CERTAIN VISUAL FUNCTIONS IN MAN)
Voenno Med. Zh. 8:54-8, August 1959.

1,688

Fletcher, D.E., C.C. Collins, & J.L. Brown 1958 THE EFFECTS OF POSITIVE ACCELERATION UPON THE PERFORMANCE OF AN AIR-TO-AIR TRACKING TASK. (U.S. Naval Air Development Center, Johnsville, Pa) NADC-MA 5807, 2 June 1958. ASTIA AD 201 176.
See also J. Aviation Med. 29(2):891-897

ABSTRACT: Each of 4 subjects participated in 72 centrifuge runs, each of 141 sec, which were presented in random order. The runs varied as to the control stick used, the level of acceleration in the 91st to 111th sec, and the duration, level, and location of acceleration in the 30th to 90th sec. The subject was instructed to use the control stick to keep a target aircraft centered on an oscilloscope. The target moved in an erratic pattern with simulated banking motion. At the 91st second the subject was signaled to check target-centering and press a button on the control stick as quickly as possible. Response time was recorded. The error scores improved considerably and the time scores improved slightly during the experiment. An analysis of variance of the time scores indicated that only the subject variable was significant. For the tracking error scores, where a score was the cumulated absolute deviation of the target from the center of the scope, all main variables and many interactions were shown to be significant by analysis of variance. The right-hand control stick was associated with more accurate tracking than was the center stick. The duration of acceleration affected the error scores in that mean scores were lower for 10 sec of acceleration than for 30 sec. The occurrence of 2 or 3 g of acceleration in the first as compared to the second half of the period from the 30th to the 90th sec did not significantly affect the scores. The level of acceleration affected the scores significantly but the value of the difference was not great. For accelerations in the 91st to 11th sec, the increase from 1 to 2 g and from 3 to 4 g were not significant but the increase from 1 and 2 g to 3 and 4 g was significant. (Author)

1,689

Fletcher, D. E., C. C. Collins, & J. L. Brown 1958 EFFECTS OF POSITIVE ACCELERATION UPON THE PERFORMANCE OF AN AIR-TO-AIR TRACKING TEST.
J. Avia. Med. 29:891-897
See also (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5807; ASTIA AD-201 176

ABSTRACT: Each of 4 subjects participated in 72 centrifuge runs, each of 141 sec, which were presented in random order. The runs varied as to the control stick used, the level of acceleration in the 91st to 111th sec, and the duration, level, and location of acceleration in the 30th to 90th sec. The subject was instructed to use the control stick to keep a target aircraft centered on an oscilloscope. The target moved in an erratic pattern with simulated banking motion. At the 91st second the subject was signaled to check target-centering and press a button on the control stick as quickly as possible. Response time was recorded. The error scores improved considerably and the time scores improved slightly during the experiment. An analysis of variance of the time scores indicated that only the subject variables was significant. For the tracking error scores, where a score was the cumulated absolute deviation of the target from the center of the scope, all main variables and many interactions were shown to be significant by analysis of variance. The right-hand control

stick was associated with more accurate tracking than was the center stick. The duration of acceleration affected the error scores in that mean scores were lower for 10 sec of acceleration than for 30 sec. The occurrence of 2 or 3 g of acceleration in the first as compared to the second half of the period from the 30th to the 90th sec did not significantly affect the scores. The level of acceleration affected the scores significantly but the value of the difference was not great. For accelerations in the 91st to 111th sec, the increase from 1 to 2 g and from 3 to 4 g were not significant but the increase from 1 and 2 g to 3 and 4 g was significant. (AUTHOR)

The effects of different levels and durations of positive acceleration on the human centrifuge are studied in this experiment. Four subjects each participated in 72 runs of 141-seconds. The subjects' task was to keep the target aircraft centered during each run, center the target at the 91st second, then press a button on the control stick as soon as possible. The three variables which were manipulated during the runs were 1) the presence of either a centrally-located or a right-hand control stick, 2) the introduction of one of the following during the missile guidance phase of each run: 1, 2, 3, or 4 G of acceleration, and 3) the introduction of one of nine different patterns of acceleration in the target acquisition phase. The results discuss the interrelations of these variables.

1,690

Fletcher, E. R., R. W. Albright, V. C. Goldizen, & I. G. Bowen 1961 DETERMINATIONS OF AERODYNAMIC DRAG PARAMETERS OF SMALL IRREGULAR OBJECTS BY MEANS OF DROP TESTS. (Civil Effects Test Operations, U. S. Atomic Energy Commission) Report CEX-59.14, Oct. 1961

ABSTRACT: During the 1955 and 1957 Test Operations at the Nevada Test Site (NTS), masses and velocities were determined for more than 20,000 objects, such as glass fragments from windows, stones, steel fragments, and spheres, which were energized by blast winds resulting from nuclear explosions. Following the field tests, a mathematical model was devised to help explain quantitatively the experimental results. This model required certain aerodynamic-drag information in regard to the displaced objects. It was the purpose of the study outlined in this report to determine the necessary drag properties for the objects by means of drop tests. In addition to the objects mentioned above, small laboratory animals, mice, rats, guinea pigs, and rabbits, were used in the drop tests. The data obtained from these tests were extrapolated to estimate the drag properties for man, and the results compared favorably with data from other sources. Also a method was developed to estimate the average drag properties of man from his total surface area, assuming that every possible orientation of a straight, rigid man with respect to the wind was equally likely. (AUTHOR)

1,691

Flickinger, D. D. 1958 AIR FORCE HUMAN FACTORS PROGRAM FOR DEVELOPING MANNED SPACE OPERATIONS. Air University Quarterly Review, Summer 1958

1,692

Flickinger, D. 1959 RESULTS OF ANIMAL INVESTIGATIONS IN SPACE VEHICLES TO DATE. (30th Annual Meeting Aeromedical Assoc., Los Angeles, Calif., April 27-29, 1959)

ABSTRACT: The material analyzed for this summary was contained in relatively few reports (literature dated 1949 through 1959, since the criteria set forth required that only those experiments be included which utilized rocket-engine thrust to propel the biopack into space equivalent atmospheres. This stipulation was made in order to provide pertinent data on not only the biological effects of the space environment itself but also those induced by the dynamic vehicular forces contained in the total flight. Three Russian (Galkin, et al., Bugrov, et al., and Chernov and Yakovlev) and three American (The Henry Group, Van der Wal and Young, and Army Navy Bioflight Project No. 1) reports of working groups are summarized, with major highlights abstracted in order of their date of publication.

1,693

Flickinger, D. 1959 GEN. FLICKINGER VIEWS SURVIVAL IN SPACE A.M.A. Proceedings, April 1959

Abstract: Research on metabolic requirements in closed environments employing simulated space chambers, as well as balloon flights with man-carrying capsules, have revealed that (1) oxygen consumption for one man sitting and awake is just above the basal level (240 cc. per man hour); (2) during long periods of space flight, when man's usefulness is limited, supplies can be conserved by inducing hypothermia and artificial hibernation with chlorpromazine thus decreasing the metabolic level; (3) there may be some metabolic usefulness in nitrogen and trace components in the atmosphere which could be exploited; (4) a process of natural adaptation and acclimatization and the use of drugs will enable man to live easier and function better in a space-flight environment; and (5) the temperature range during orbiting and re-entry are estimated to be well within long term comfortable and short term livable limits. It is considered desirable to have the subject oriented in such a way that, during the orbital phase of the flight, he is facing toward the direction of flight with his feet toward the earth. Although a small capsule would be more advantageous, available data indicate that, since husky, hardy crewmen would be preferred,

larger space would be required. Biological instrumentation should yield the following information: cabin humidity, acceleration, tracking and reasoning ability, galvanic skin response, visual appearance, cabin pressure, oxygen and power reserves, electrocardiogram, respiration rate, visual appearance, and vocal comments. Monitoring devices to allow the pilot to have continuous knowledge of his performance and two-way vocal and visual communication will have a great deal of psychological usefulness.

1,694

Flickinger, D.D. 1961 THE STATUS OF MAN'S ADVANCE ON THE VERTICAL FRONTIER. Lectures in Aerospace Medicine 16-20 January 1961, School of Aviation Medicine, Brooks AFB, Texas

1,695

Flickinger, D. 1962 RECENT PROGRESS AND FUTURE PROBLEMS IN SPACE BIOMEDICINE
In Antonio Ambrosini, Ed. RENDICONTI DEL CONGRESSO INTERNAZIONALE--L'UOMO E LA TECNICA NELL'ERA NUCLEARE E SPAZIALE, 18-21 APRILE 1962, (Proceedings of the International Congress--Man and Technology in the Nuclear and Space Age, 40th Trade Fair, Milan, April, 18-21, 1962) (Rome, Italy: Associazione Internazionale Uomo nello Spazio) Pp. 441-451

ABSTRACT: The principal problems which accompany manned space-flight are reviewed. The results of all space biomedical investigations obtained to date are presented and related to future progress in the biomedical field. To achieve this purpose the following are presented: (1) a brief clarification of terms such as space biosciences, space biomedicine, and space biotechnology; (2) a recapitulation of critical biomedical problems; (3) a review of biomedical requirements, both scientific and technological, which are critical to future programs; (5) a discussion of international space biomedical program possibilities. (N63-18936)

1,696

Flight Development Establishment n.d. INSTRUCTIONS FOR OPERATING AND MAINTAINING THE NAPIER 100 g CENTRIFUGE (Flight Development Establishment, D. Napier & Son Limited, Luton Airport, Bedfordshire, England) ASTIA AD 40785

ABSTRACT: In the design of conventional vehicles, forces due to accelerations are normally taken into consideration to ensure that they do not damage structures or prevent the moving parts from working correctly. Hitherto, most of these forces have arisen from linear acceleration and these have been conveniently

investigated by the use of established forms of test equipment and recording instruments. With the attainment of higher speeds, however, maneuverability requirements introduce the additional factor of high angular accelerations which impose additional radial loadings on the structures and mechanisms. The design and construction of parts to withstand these forces cannot be developed conveniently with conventional equipment, but the centrifuge permits the imposition of angular acceleration under laboratory conditions, and thus enables the testing of equipment under these new conditions to continue without excessive complication or cost. The centrifuge is capable of generating forces of unusual magnitude, and it will be found that time and effort can often be saved, if the design and operating data are fully understood before the design of any test rig for attachment to the centrifuge arm is put in hand. This publication contains detailed information on the centrifuge including dimensions, counterweights, accelerations, test rig limitations, and auxiliary services and equipment.

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Flight Research Engineering Corp. 1949 ACCELEROMETERS FOR TRANSPORT AIRCRAFT. (Flight Research Engineering Corp.) 11 March 1949

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Flight Safety Foundation ACCELERATION
Human Engineering Bulletin 55-5 H

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Flinn, D. E. 1960 PSYCHIATRIC FACTORS IN ASTRONAUT SELECTION. (Paper presented at the Symposium on Psychophysiological Aspects of Space Flight, School of Aviation Medicine, Aerospace Medical Center, Brooks AFB Texas, May 1960).

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Flugge, W. 1952 LANDING-GEAR IMPACT
(National Advisory Committee for Aeronautics, Washington, D.C.)
NACA TN-2743, Oct. 1952.

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Flying Personnel Research Committee n.d. PROPOSAL SCHEME FOR THE TRAINING, ETC., OF AIRCREWS AND MEDICAL OFFICERS ON THE EFFECTS OF ACCELERATION. (Flying Personnel Research Committee, Royal Australian Air Force) RAAF FR53

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Flying Personnel Research Committee 1940 AIRSICKNESS: AIR MINISTRY DISCUSSION: DATA ON 53 CASES ATTACHED. (Flying Personnel Research Committee, Farnborough) FPRC Rept. No. 220, 23 November 1940.

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Flying Personnel Research Committee 1941 MINUTES OF THE IV MEETINGS OF THE R.A.A.F. FLYING PERSONNEL RESEARCH COMMITTEE. (Flying Personnel Research Committee, Farnborough) FPRC Rept. 356f (WAM-101-5) 6 Nov. 1941.

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Flying Personnel Research Committee 1941 SYNOPSIS OF PHYSIOLOGY OF HIGH ALTITUDE FLYING. (Flying Personnel Research Committee, Farnborough) FPRC Rept. 305, June 1941.

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Flying Personnel Research Committee 1942 REPORT NO. 2 ON "BLACKOUT" WORK AT SYDNEY UNIVERSITY. (Flying Personnel Research Committee, Farnborough) FPRC Rept No 358-j

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Flying Personnel Research Committee 1942 BLACKING-OUT RESEARCH AT SYDNEY UNIVERSITY DURING 1941. (Flying Personnel Research Committee, Farnborough) FPRC Rept. 358h/ WAM-101-7, 8 Jan. 1942.

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Flying Personnel Research Committee 1943 BULLETIN OF SUB-COMMITTEE ON ACCELERATION (NRC) EXCERPTS. DEVELOPMENT AND USE OF HUMAN CENTRIFUGE: EQUIPMENT AND COST. (Flying Personnel Research Committee, Royal Australian Air Force) RAAF-FR49, 15 June 1943.

1,708

Flying Personnel Research Committee 1943 TRAINING AND SELECTION OF AIRCREW FOR SPECIAL DUTIES, ON THE EFFECTS OF HIGH "G" AND THE USE OF C.A.A.G. SUIT. (Flying Personnel Research Committee, Royal Australian Air Force) R.A.A.F-FR49. 15 June 1943.

1,709

Flying Personnel Research Committee 1943 COMPARISON OF SIDNEY AND AMERICAN CENTRIFUGES. (Flying Personnel Research Committee, Royal Australian Air Force) RAAF-FR 51. 17 July 1943.

1,710

Flynn, J.T. 1961 PROTECTION AGAINST CRASH INJURY
Flying, Sept. 1961. Pp. 47 & 77-78.

ABSTRACT: The author claims that even severe impact can be survived with proper safety gear and aircraft design. A detailed report of the effectiveness of the seat belt and harness is given with instructions on how they should be used.

1,711

Fogarty, L.E. & R.M. Howe 1961 FLIGHT SIMULATION OF ORBITAL AND REENTRY VEHICLES. PART II -- A MODIFIED FLIGHT PATH AXIS SYSTEM FOR SOLVING THE SIX DEGREE-OF-FREEDOM FLIGHT EQUATIONS. (Aeronautical Systems Div., Wright-Patterson AFB, Ohio) Oct. 1961. ASTIA AD 269 283.

ABSTRACT: The three translational and three rotational equilibrium equations for an orbital vehicle subject to aerodynamic and jet reaction forces are derived using a modified flight-path axis system for the translational equations. The dependent variables of the system are horizontal velocity component, vertical velocity component, and flight-path heading angle. The resulting equations are shown to have advantages for computer mechanization over alternative axis systems for the translational equations. Complete equations for determining vehicle orientation, instantaneous latitude and longitude, angle of attack, angle of sideslip, aerodynamic forces and moments, etc., are presented. Modifications in the translational equations which allow direct solution by an analog computer are also given. Analog computer mechanization of these equations in both real and fast time is described, including a novel technique for division which preserves favorable multiplier scaling. Specific machine results are presented which demonstrate accurate solution of close-satellite trajectories, including re-entry from satellite altitudes to sea level.

1,712

Foltz, E.L., F.L. Jenker and A.A. Ward 1953 EXPERIMENTAL CEREBRAL CONCUSSION. J. Neurosurgery, 10:342-352

ABSTRACT: Acceleration concussion was studied in cats and monkeys with continuous recording of the electrical activity of cortex and certain brain stem structures, spinal fluid and blood pressures, and EKG respirations.

1,713

Foltz, E. L., R. P. Schmidt, L. B. Thomas, & A. A. Ward, Jr. 1957 STUDIES ON THE PHYSIOLOGIC BASIS OF CEREBRAL CONCUSSION. (School of Aviation Medicine, Randolph AFB, Texas) Rept. No. 55-111; ASTIA AD-136 186

ABSTRACT: This report deals with the following restricted aspects of the problem: Changes in the central nervous system function induced by concussion; and the role of actylcholine metabolism in concussion and pharmacologic factors involved in therapy.

1,714

Ford, A. & J. L. Leonard 1958 TECHNIQUES FOR RECORDING SURFACE BIOELECTRIC DIRECT CURRENTS
(USN Electronics Lab., San Diego, Calif.)
NEL Res. Rep. 839, May 1958.

ABSTRACT: This paper describes the techniques for recording surface bioelectric d.c. which have been adopted at the USN Electronics Laboratory. Some of the numerous uses for d.c. recording are indicated, e.g., EMG, EEG, EKG, as well as the problem of d.c. artifacts and bioelectric overlap. General principles for avioding electrode artifacts, use of chlorided silver, and the detailed mechanics of electrode preparation are discussed, along with preparation of skin, methods of electrode placement, and effects of electrode area. Finally, the proper instrumentation for use with such electrodes is described. (Tufts)

1,715

Foreign Documents Div. 1963 BIOLOGY AND MEDICINE.
(Foreign Documents Div., Central Intelligence Agency, Washington, D.C.)
Scientific information, rept. Summary no. 4310, ASTIA AD 334 612,

ABSTRACT: This is a serialized report consisting of unevaluated information prepared as abstracts summaries, and translations from recent publications of the Sino-Soviet Bloc countries. (Author)

1,716

Foreign Tech. Div. 1961 AT SUPERSONIC VELOCITY
(Foreign Tech. Div., Air Force Systems Command, Wright-Patterson, Air Force Base, Ohio)
Trans. no. FTD-TT-61-203 . From Sovetskaya Litva, Pp. 3, 28 July 1961.
ASTIA AD 268 072

ABSTRACT: New types of ejection seats were developed in recent years. Instead of pyrotechnic cartridges, they use rocket engines. The most perfect samples allow ejections at velocities up to 24000 km/hr. Developed also were the first samples of special safety capsules. They are like small cabins formed by extensive walls. Such a capsule closes automatically and becomes hermetically sealed prior to catapulting, offering protection against counter stream of air, and safe landing. In addition, it serves as a container for rescue devices (parachutes, emergency supply, oxygen equipment etc.) and as a rescue raft in case of falling into the water. (Author)

1,717

Foreign Tech. Div. 1962 SCIENCE AND LIFE (SELECTED ARTICLES)
(Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio)
Trans. no. FTD-TT-62-1518 from Nauka i Zhizn, 9:2-10, 15-19 and 54-60.
ASTIA AD 294 530

1,718

Foreign Tech. Division 1963 DROPPING THE CARGO WITHOUT A PARACHUTE.
(Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio)
Trans. No. FTD-TT-62-1842 from Przeglad Techniczny, 14:2, 1962.
ASTIA AD 400 530.

1,719

Formelier, F.J., & R.H. Seltz 1963 EFFECTS OF LOW ALTITUDE HIGH SPEED FLYING UPON PILOT PERFORMANCE. (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 28-May 2, 1963)

ABSTRACT: This study was conducted to determine the quantitative deterioration of human performance as a result of stress provoking airplane flights. Five Navy test pilots performed various tasks during 32 flights in a jet airplane at high speeds and low altitude. A bioelectric package from the NASA Ames Laboratory was used to monitor the ECG, blood pressure, respiratory rate and volume of the pilot during flight, Twelve airplane parameters were also recorded on the same magnetic tape to measure the effect of turbulence upon pilot performance. Pre- and post-flight blood and urine samples were collected for biochemical analysis. Since the most significant physiological change noted was a reduction in respiratory tidal volume during the latter portion of some flights, the respiratory response of each subject was analyzed by an analogue computer. This was a routine effect not limited to flights during which subjective fatigue was reported. Some blood serum enzyme changes have also been noted. There was a very appreciable degradation of pilot performance with high levels of turbulence. An integration of all this information has been attempted and should prove valuable in predicting man's ability to control supersonic airplanes and spacecraft. (Aerospace Medicine 34(3):260, March 1963)

1,720

Fortunato, A. 1941 FISIO-PATOLOGIA DELLA "PICCHIATA". (Physiopathology of Dive Bombing) Rinascenza medica (Napoli), 18:91-92, Feb. 28, 1941.

ABSTRACT: Acceleration from the head to the feet may cause cerebral anemia with blackout. Acceleration from feet to the head may cause cerebral congestion, resulting in the pilot seeing red. Methods of counteracting the effects of acceleration are described.

1,721

Forster, B. 1958 ELECTRONYSTAGMOGRAPHIC STUDIES ON ROTARY ACCELERATION NYSTAGMUS AFTER ALCOHOL ADMINISTRATION.
Deutsch. Z. Ges. Gerichtl. Med. (Berlin) 47(2):282-288.

1,722

Fowler, E. P., Jr. 1947 FORMATION VERTIGO. OCULO-VESTIBULAR DISORIENTATION IN FORMATION FLYING. Milit. Surg. 100:330-335.

ABSTRACT: Several things could be done to reduce the death rate from formation vertigo. (1) Instrument panels, especially the flight instruments, should be in standard positions and never obscured by other objects. It should never be necessary to duck the head to see the artificial horizon or the needle and ball. (2) the phenomenon should be explained to all pilots in detail for even ace pilots have suffered from the conditions when returning from a long and fatiguing mission. The practical points to remember are (a) keep orientation by glancing at one's own instruments (b) never fix on a single point on the lead plane, (c) lead planes should make all movements as gradual as possible, (d) fly tight enough formation in fog and overcast so that the lead plane can be easily seen, (e) possibly turn on the landing lights or have extra orange lights on the fuselage of the plane so they can be seen further, (f) last but not least, try to give the pilots some training in fog flying in training planes before sending them to a fog bound theater of operation.

1,723

Francois, M., I. Meyerson and H. Pieron 1925 DU TEMPS DE LATENCE DES REACTIONS D'EQUILIBRATION AUX BRUSQUES ACCELERATIONS LONGITUDINALES (Latency Reaction Time of Equilibration to Sudden Longitudinal Acceleration) C.r. Acad. Sci. (Paris) 181:1181-1183

1,724

Franke, E. K. 1948 MEASUREMENT OF THE MECHANICAL IMPEDANCE OF THE BODY SURFACE
(Air Development Center, Wright-Patterson AFB, Ohio)
MCREXD No. 695-71 C, June 1948

1,725

Franke, E. K. 1951 MECHANICAL IMPEDANCE OF THE SURFACE OF THE HUMAN BODY
Journal of Applied Physiology 3:582-590, April 1951

1,726

Frankel, C. 1958 THIRD GREAT REVOLUTION OF MANKIND.
New York Times Mag., Feb. 9, 1958. P. 11

ABSTRACT: How and why the satellites symbolize a new "age of acceleration."

1,727

Frankenhaeuser, M. 1956 EFFEKTER AV RADIALACCELERATION PA PSYKISKA FUNKTIONER (Effects of Radial Accelerations on the Psychic Functions)
Meddelanden fran flyg-och navalmedicinska namnden (Stockholm) 5(1):20-23

ABSTRACT: Time perception under acceleration was investigated on the human centrifuge. The stimuli used were auditory signals (1, 5, 10, 15, and 20 sec.) recorded on a magnetic tape and presented via earphones. The subject reproduced either the entire or half of the duration of stimulus (1) under normal conditions before acceleration, (2) during acceleration at 3 g, and (3) under normal conditions after the acceleration. The stimulus signal was underestimated to a greater extent during acceleration, the difference being statistically significant and the 1% level of confidence at the 10, 15, and 20-sec. stimulus durations. (ASTIA)

1,728

Frankenhaeuser, F. M. 1957 EFFECTS OF PROLONGED RADIAL ACCELERATION ON PERFORMANCE. (Psychological Lab. of the Univ. of Stockholm) Rept. No. 48., Aug. 1957.

ABSTRACT: Effects of prolonged radial acceleration on performance were studied in eight series of experiments: (1) Visual choice reaction time, (2) Visual acuity, (3) Accuracy of movement, (4) Perceptual speed, (5) The Stroop Test, (6) The "100-3" test, (7) Multiplication and (8) Time perception.

Results obtained during 2 to 10 minute exposures to 3 g and under normal conditions before and after centrifugation, were compared. During radial acceleration performance was impaired in all but one of the tests used. (DACO)

1,729

Frankenhaeuser, M. 1957 EFFECTS OF GRAVITATIONAL STRESS ON TIME PERCEPTION (Psychological Lab., University of Stockholm, Sweden) Rept. No. 52, Oct. 1957.

ABSTRACT: The psychophysical method of ration setting was applied to the problem of time perception as affected by gravitational stress in a human

centrifuge. Auditory signals of durations varying from 1 to 20 seconds were used as a stimuli. It was shown that the positively accelerated function relating subjective to physical time under normal conditions, was more pronounced during exposures to 3 g. Possible reasons are discussed.

1,730

Frankenhaeuser, M. 1958 EFFECTS OF PROLONGED GRAVITATIONAL STRESS ON PERFORMANCE. Acta Psychol. (Amsterdam) 14(2):92-108, 1958
See also Nordisk Psykol. 10:48-64, 1958

ABSTRACT: Effects of prolonged radial acceleration on performance were studied by determining visual-choice reaction time, visual acuity, accuracy of movement, time perception, and perceptual speed. In addition, the following tests were carried out: (1) the Stroop test, estimating reading speed and color detection as well as reactions to self-induced stress; (2) the 100-3 test, measuring concentration ability; and (3) the multiplication test. Results obtained during 2- to 10-minute exposures to 3 G and under normal conditions before and after centrifugation were compared. During radial acceleration, performance was impaired in all of the tests with the exception of the test on perceptual speed. (AUTHOR)

1,731

Frankenhaeuser, M. 1960 SUBJECTIVE TIME AS AFFECTED BY GRAVITATIONAL STRESS. Scand. J. Psychol. (Stockholm) 1(1):1-6

ABSTRACT: Subjective time as affected by positive radial acceleration (from four to ten minutes at 3 g) in a human centrifuge was studied in seven subjects by a modification of the method of ratio production. The subjects were tested under three experimental conditions: (1) during normal conditions before the centrifuge experiments, (2) during exposure to three g, and (3) during normal conditions after the series of centrifuge experiments had been completed. Auditory signals of different durations (1.5, 5.0, 10.0, 15.0, and 20.0 seconds) were used as stimuli and subjects were asked to perform two different tasks: (1) to reproduce the entire duration, and (2) to reproduce half the duration of the stimulus signal The results showed a marked change in subjective time during gravitational stress. Subjective time, as measured by the methods employed, was a positively accelerated function of objective time and the positive acceleration was enhanced during centrifugation. The demonstrated change in time experience was caused by a difference in retention of preceding time intervals, retention being impaired during centrifugation. (AUTHOR)

1,732

Frankenhaeuser, M., K. Sterky, and G. Jaerpe 1962 PSYCHOPHYSIOLOGICAL RELATIONS IN HABITUATION TO GRAVITATIONAL STRESS
Perceptual and Motor Skills, 15 (1): 63-72. Aug. 1962

ABSTRACT: Habituation to acceleration in a human centrifuge was studied with four healthy individuals, observing hcanges in the subjective reactions and several physiological indices (heart rate, urinary adrenalin and nonadrenalin excretion). Positive acceleration below the threshold for loss of consciousness was applied. Subjective reactions were estimated on a ratio estimation scale using as a baseline each subject's most stressful experience. The results showed that upon consecutive exposures there was a progressive decrease in adrenalin excretion and subjective emotional reaction to gravitational stress. The intensity of the subjective reactions was almost proportional to the amount of adrenalin excreted. There were no systematic changes in noradrenalin excretion or heart rate.

1,733

Frankford Arsenal 1946 INTERNAL VIBRATIONS EXCITED IN THE OPERATION OF PERSONNEL EMERGENCY ESCAPE CATAPULTS. (Frankford Arsenal, Philadelphia, Pa.) Memo Rept. MR-340; 26 Nov. 1946; ASTIA AD-51 792

ABSTRACT: Studies of the catapults, T2 and T4, emergency escape personnel, show that the accelerations transmitted throughout the body by the catapult differ in magnitude and phase from the acceleration applied to the center of gravity of the system. Typical acceleration measurements on dummy and human subjects are shown. Comparisons of these records with independent measurements of pressure-time in the catapult and with travel-time data show that strong internal vibrations of the several massive components of the ejected system are superimposed upon the motion of its center of gravity. As a consequence of these vibratory components, the internal elastic stresses in the body, depending on the phase of the vibration, at their peaks will exceed the values which would be required for the acceleration of an equivalent rigid body to the required terminal velocity under action of the same applied forces. Since the estimated safe limit for these elastic stresses is not very high compared to the stress level to obtain the required center of gravity acceleration, the excitation of such internal vibratory motion imposes a distinct limitation in the application of the catapult to personnel escape.

1,734

Frankford Arsenal 1953 FACILITIES OF THE ACCELERATION TEST LABORATORY BUILDING (Frankford Arsenal, Philadelphia, Pa.) ASTIA AD-34 196

ABSTRACT: A description is given of the following equipment or facilities: (1) the high-g air gun, a modified 5-in. Naval weapon used to simulate the shock of a field weapon under laboratory conditions; (2) the drop test tower, facilities

for control arming or safety drop for various types of mechanical and electromechanical time fuzes; (3) the air-leakage test fixture, a device used for evaluation primarily of development fuzes with regard to resistance to water and air leakage; (4) the water-leakage test fixture; (5) the low-g centrifuge, a device used for testing acceleration and timing mechanisms up to 80 g; (6) the Tenney engineering temperature-humidity controlled chamber, a device used for testing artillery ammunition components under severe weather conditions; (7) the L. A. B. vibration tester, a device designed for vibration frequencies up to 4000 c/min; (8) the MB vibration tester; (9) the Parke-Thompson airdriven spinner; (10) equipment for the impregnation of sintered-iron rotating bands; (11) Atlas twin-arc weatherometer; (12) miscellaneous mechanical test devices; (13) a frequency standard unit; and (14) miscellaneous electronic equipment.

1,735

Frankl, V.E. & O. Potzl 1952 UBER DIE SEELISCHEN ZUSTANDE WAHREND DES ABSTURZES: EINE PSYCHOPHYSIOLOGISCHE STUDIE. (ON MENTAL CONDITIONS DURING FREE FALL: A PSYCHOPHYSIOLOGICAL STUDY.
Monatschrift fur Psychiatrie und Neurologie (Basel) 123(6):362-374

ABSTRACT: Psychological and pathophysiological aspects of free falling are illustrated by two examples (a worker falling from a scaffold and a mountain climber). These experiences manifest themselves as a continuous sequence of memory images arranged in order of their happening, from the earliest childhood up to the present.

1,736

Frankland, J. 1942 EFFECTS OF IMPACT ON SIMPLE ELASTIC STRUCTURES.
(United States Navy) Rept. No. 48, Project Meteor 653.1
April 1, 1942. ASTIA AD 40833.

ABSTRACT: Elementary terms and factors concerned in the problem of impact loading are defined and a number of representative cases of impact loading and their effects upon a simple undamped system with one degree of freedom are discussed in Section 2. For non-oscillating disturbances these effects are governed mainly by the abruptness of original application and by the duration of the disturbance in terms of the natural period of vibration of the system. For oscillating disturbances there is an added influence similar to resonance in the steady-state condition. Section 3 presents some means of judging to what degree the behavior of the idealized system of Section 2 is realized among actual ship and other structures. Applications of the foregoing to the strength of structures under impact are considered in Section 4, with a discussion of the variations in yield and ultimate strength of metals under high rates of loading. Suggestions are made for a basis of design of decks, superstructure, and gun foundations under blast and gun-recoil loads.

The application of these principles to the design of instruments for making observations during impact tests and to an interpretation of their records is considered briefly in Section 5. In the appendices a formal mathematical treatment of the subject is presented.

1,737

Franklin, George C. 1956 REPORT ON HUMAN CENTRIFUGE TEST. (Convair, A division of General Dynamics Corp., San Diego, Calif.) Rept. No. ZG-8-033, 29 Oct. 1956

1,738

Franklin Institute 1958 TEN STEPS INTO SPACE (Franklin Institute) Monograph No. 6

ABSTRACT: Ten semitechnical lectures on astronautics were delivered in the period March-May 1958 under the sponsorship of the Franklin Institute: "The Long History of Space Travel, " W. Ley; "The Rocket and the Reaction Principle", K. Stehling; "Rocket Fuels-Liquid and Solid, "H.W. Ritchey; "Satellite Instrumentation-Results for the IGY," S.F. Singer; "Celestial Mechanics-Orbits of the Satellites," P. Herget; "The Explorer," G. Heller; "Error Analysis of Single and Two-Force Field Spacecraft Orbits,", K.A. Ehricke; "Probing the Atmospheres of Venus and Mars," J.I.F. King; "Space Medicine-The Human Body into Atmospheres of Venus and Mars," D.G. Simons; "Satellites and Travel in the Future," I.M. Levitt.

1,739

Franklin Institute 1959 SPACE MEDICINE ELECTRONICS. (A Symposium, Franklin Inst., Philadelphia, Pa., 18 May 1959)

CONTENTS INCLUDE:

Fisher, C.F. and F.T. Nicholson, ACCELERATION SIMULATIONS ON THE HUMAN CENTRIFUGE.

Brown, J. L., SIMULATOR STUDIES OF THE EFFECTS OF FLIGHT ACCELERATION ON PILOT PERFORMANCE.

1,740

Franks, W.R. 1939 FURTHER EXPERIMENTS IN CONNECTION WITH AVIATION MEDICAL RESEARCH. (National Research Council, Canada) Report #C-2827 September 1939

ABSTRACT: Experiments are suggested on combating the effects of maneuvering in space at high speeds. Problems arising from rapid ascent, problems arising from anoxia, and provisional expenses for the program of research are outlined.

1,741

Franks, W.R. 1940 PROGRESS REPORT ON WORK TO PROTECT PERSONNEL AGAINST THE PRESSURE EFFECTS OF ACCELERATION. (National Research Council, Canada) Report #C-2828, March 1940

ABSTRACT: The physical principles of accelerative forces are reviewed, the design of a hydrostatic suit for the amelioration of the effects of accelerative forces is outlined and progress in construction of such a suit is described and progress in the design of human centrifuge is reviewed.

1,742

Franks, W.R. 1941 REPORT OF ACTIVITIES AT PHYSIOLOGICAL LABORATORY, R.A.E. FARNBOROUGH.
(National Research Council, Canada) Report #C-2836; July 7, 1941

ABSTRACT: Demonstration by flight tests of the effectiveness of methods developed in Canada to raise the G tolerance of personnel, demonstration by flight that this does not interfere with proper handling of aircraft in all fighter maneuvers, demonstration by dog flights that pilots so protected have an increased maneuverability with resultant tactical advantage, and demonstration that gunners so protected have a G tolerance above that of the aircraft despite their unfavourable position are reported. An aircraftsman of the R.A.F. has been instructed in the principles and methods in fabrication of the appliance used. Modification of the appliance to simplify its design, make more practical and allow for combination with life preserver jackets and high altitude pressure suits is in progress.

1,743

Franks, W.R. 1941 MEMORANDUM-CANADIAN AVIATION MEDICAL RESEARCH.
(National Research Council, Canada) Report #C-2841, 15 Oct. 1941.

1,744

Franks, W.R. 1943 RECENT WORK OF THE ACCELERATOR UNIT AT TORONTO.
(National Research Council, Canada) Report #C-2919, October 1943

ABSTRACT: A progress report is made of research work conducted in the human centrifuge with particular reference to unconsciousness due to acceleration, posture and acceleration, effect of acceleration on reaction time, preliminary studies of negative accelerations, modifications of the Franks Flying Suit, protection with the Franks Flying Suit and preparation of film on F.F.S. for flying personnel.

1,745

Franks, W.R. 1943 REPORT ON THE WORK CARRIED OUT DURING [illegible] AT THE ACCELERATION SECTION NO. 1 I.T.S.
(National Research Council, Canada) Rept No. C-2441. Feb. 1943.

1,746

Franks, W.R. & W.R. Martin 1944 LIAISON REPORT ON MEETING OF SUBCOMMITTEE ON ACCELERATION OF THE NATIONAL RESEARCH COUNCIL, WASHINGTON, JUNE 7, 1944.
(National Research Council, Canada) Report #C-2711

ABSTRACT: This liaison report covers discussion on American experience with Anti-G equipment in the Pacific and the European theatres of war. The latest designs of Anti-G suits, accelerations on parachute openings, blood pressure changes produced by a negative G tilt-table and standardization of centrifuge runs.

1,747

Franks, W. R. 1944 ACCELERATION. (Committee on Aviation Medicine, N.R.C., Washington) Bull. Sub. Com., 7 June 1944.

1,748

Franks, W.R. 1944 PROPOSED USE OF FLUID PRESSURE BANDAGING IN THE PROPHYLAXIS AND TREATMENT OF SHOCK.
Proc. Comm. Shock and Blood Subst., (National Research Council of Canada, Toronto). Appendix A. 28 July 1944.

1,749

Franks, W.R. 1944 LIAISON REPORT TO ACAMR, N.R.C., CANADA, ON VISIT COMMANDER W.R. FRANKS TO THE UNITED KINGDOM DECEMBER 1 TO DECEMBER 22, 1944
(National Research Council, Canada) Report #C-2799

ABSTRACT: A brief report is made of operational problems in aviation medicine overseas, with particular respect to the status of the Franks' flying suits, crash harnesses, cooling of ground crew in the tropics, special breathing apparatus, oxygen film, operational problems in the Canadian squadrons, and treatment of shock.

1,750

Franks, W. R., J. A. Carr, W. R. Martin & W. A. Kennedy 1944 USE OF INCREASE IN WEIGHT OF A MASS UNDER G TO PROVIDE SOURCE OF COMPRESSED AIR FOR F.F.S. (AB/BG SYSTEM).
(National Research Council, Canada) Rept. No. C-2722, Sept. 28, 1944.

ABSTRACT: The possibility of providing a suitable air pressure to actuate the F.F.S., under G resualting from the compression of an air bag by the increase in weight of mass under G has been explored and a prototype unit constructed using the standard aircraft battery as the mass. The system has been designated the AB/BG system. By superimposing the air pressure so obtained on the water pressure in the fluid lining of Mark III F.F.S., increased average protection against G was obtained. Mark III F.F.S. alone gave 1.8 G protection, combined with AB/BG 2.5 G was obtained. With the present unit equal protection was obtained when the Mark III F.F.S. was left empty of water about the trunk and the air pressure superimposed. The present unit was too small to fully explore the limits of protection obtained by such a system using air alone as the fluid in the Mark III F.F.S.

1,751

Franks, W. R., W. K. Kerr, & B. Rose 1945 SOME NEUROLOGICAL SIGNS AND SYMPTOMS PRODUCED BY CENTRIFUGAL FORCE IN MAN. (R.C.A.F., Toronto)

ABSTRACT: The neurological effects of centrifugal force in man were studied in 542 subjects during 5544 test runs at 2-10 G in the centrifuge. As a measure of performance during exposure to centrifugal force, the reaction time for manual responses to visual and auditory stimuli was recorded for 7853 stimuli during 626 tests at 2-8 G on 35 subjects, but it was not significantly increased, except for visual stimuli immediately before black-out.
As a result of exposure to increased G, however, convulsions frequently occurred, usually after loss of consciousness. (52% of 230 subjects had convlusions in 40% of 591 tests producing unconsciousness.) They were usually slight, clonic seizure involving all or some of the extremities, face and trunk. Less commonly, severe generalized convulsions were observed. These varied greatly, and sometimes included a brief tonic phase with neck and trunk in extension, occasionally with arms extended in pronation and legs drawn up in flexion. Conjugate movements of head and eyes to one side were sometimes observed. Usually violent jerks of the extremities and trunk terminated the seizure in 2-5 sec. Finally, a small number of slight convulsions were noted in fully conscious subjects. Dreams were frequently experienced, usually in association with convulsions. Paresthesias, confused states, amnesia and more rarely, gustatory sensations were noted with black-out and loss of consciousness, either with or without convulsions. Incontinence was never observed.
(The susceptibility to convulsions varied greatly and could not be correlated with any of the measured characteristics of resting electroencephalograms, which were normal for 51 subjects. Records of facial blanching and flushing, ear opacity and electrocardiograms showed that convulsions started during the recovery phase of the circulatory changes.)

Electroencephalograms taken from bipolar leads over the motor area of the cortex, during increased G, showed that alpha waves were replaced by high frequency, low-amplitude waves, in fully conscious subjects. With deep black-out and onset of unconsciousness, progressively slower waves (8-2 per sec.) of higher amplitude (50-200 V.) usually appeared and remained until shortly before consciousness was regained. This pattern was not altered by convulsions.
Considering the small difference in specific gravities of cerebrospinal fluid and brain tissue and their anatomical dispositions, it is unlikely that the neurological effects described in this paper are due to any mechanical action of increased positive G on the brain other than diminished cerebral circulation. (J. of Physiology 104:10P-11P, 10 Feb. 1945)

1,752

Franks, W. R., W. K. Kerr, & B. Rose 1945 SOME EFFECTS OF CENTRIFUGAL FORCE ON THE CARDIO-VASCULAR SYSTEM IN MAN. (R.C.A.F., Toronto)

ABSTRACT: By means of the centrifuge, the effects of increased positive G on the cardiovascular system were studied on seventy-two subjects during 690 tests at 2-10 G. Kodachrome motion pictures showed, as increased G was applied, blanching of the face and distension of the superficial leg veins which persisted until a few seconds after the G began to diminish. The leg veins then reverted to normal, but the facial blanching was followed by flushing which lasted 10-20 sec.
The ear opacity (a qualitative measure of the blood content of the ear) began to decrease with the onset of increased G, reaching a minimum 4-6 sec. after G became constant. 0·5-3 sec. after the G began to decrease, the ear opacity rapidly increased. The increase continued above the initial level, coincident with the facial flushing. The decrease in ear opacity was directly but not quantitatively related to the amount of G applied.
The heart rate increased rapidly with the onset of increased G, attaining a maximum of 120-190 beats/min., depending upon the amount of G and its duration. When the maximum G was maintained more than 10-20 sec., the maximum heart rate was relatively constant until the G was reduced. With the reduction of G in short runs there was a delay of 2-5 sec. before the heart rate suddenly fell to below its initial resting level. This bradycardia coincided with the flushing and increased ear opacity, and was frequently followed by a secondary rise in rate.
Electrocardiograms from chest electrodes over base and apex of the heart showed the following changes during increased G. The P. R. Interval was shortened. The overall amplitude of the Q. R. S. complex decreased, usually with the main deflexion downward. The T wave flattened and sometimes disappeared. As the G was reduced, the P. R. interval and Q. R. S. complex reverted to their original form, but the T wave became greatly increased in amplitude and sometimes biphasic for 2-5 min. During this period sinus arrhythmia and, more rarely, ventricular extrasystoles appeared.
Anterior-posterior X-ray films of the chest (1sec. exposure) taken during increased G showed a marked reduction in cardiac shadow as compared to that of control films.
The circulatory changes described in this paper could not be related to the level of G at which a subject would black-out or lose consciousness. However, the pooling of the blood in the lower extremities, reduction in cardiac shadow, facial blanching, decrease in ear opacity and associated changes in heart rate appear to be dependent variables and throw some light on the action of increased positive G on man. (J. of Physiology 104:9P-10P, 10 Feb. 1945)

1,753

Franks, W.R. 1945 ACCELERATION STUDIES.
Proc. Assoc. Comm. Aviation Med. Research,
(National Research Council of Canada) Appendix C. 4 April 1945.

1,754

Franks, W.R. 1945 REPORT ON GRANT A.M. 5 ACCELERATION STUDIES.
(National Research Council, Canada) Report #C-2796, 5 April 1945

ABSTRACT: A brief review is made of progress in research work on accaleration during the previous year.

1,755

Franks, W. R., W. K. Kerr, & B. Rose 1945 DESCRIPTION OF A CENTRIFUGE AND ITS USE FOR STUDYING THE EFFECTS OF CENTRIFUGAL FORCE ON MAN. (R.C.A.F., Toronto)

ABSTRACT: In order to investigate the effects of centrifugal force on man, a centrifuge was constructed for the R.C.A.F. It is built into a circular concrete pit 12 ft. in depth and 31·5 ft. in diameter. To the central shaft which is supported above and below, a single, highly stressed horizontal arm, 8·5 ft. in length, is attached. The car which carries the subject and up to 200 lb. of apparatus has an inside diameter of 6 ft. 2 in. and is suspended from the distal end of the horizontal rotating arm. The centrifuge is stressed to support 15 times the weight exerted by a fully ladden car at 10 G. (1 G equals the force due to the pull of gravity. Centrifugal force is measured in unit of G.)
The suspension of the car allows it to assume at all times a position which is in the direction of the resultant of the forces acting upon it. The subject sits in a chair equipped with a dummy control stick, and rudder bars which can be adjusted for height and length. Within the car, the chair can be rotated around its transverse axis even when the centrifuge is in motion. Thus the centrifugal force can be exerted from head to foot (positive G), foot to head (negative G), transversely (transverse G) or in any intermediate direction. During a run, with the subject seated in the upright position, the radius is 11·5 ft. from the central rotating shaft to heart level and usually 13·8 ft. to foot level. The G exerted at foot level is therefore 20% greater than the recorded G at heart level.
The centrifuge is driven by an electronically controlled 200 h.p. electric motor and is capable of developing 20 G in 3 sec. The magnitude of G and its duration for a given run is predetermined by an automatic cam mechanism. For a standard run, it takes 4·5 sec. to attain 1·5 G, and 5 sec. to attain any maximum desired G. When this has been maintained for 5 sec., the run is terminated by reversing the above procedure. This pattern can be varied by using appropriate cams. Runs are designated as follows. A '6 G run for 5 sec.' implies that 6 G was exerted at heart level for a duration of 5 sec.

The subject is in constant view of an observer who rides on a seat fixed to the central shaft. Electrocardiograms, electroencephalograms, ear opacity tracings and respiratory tracings are all recorded simultaneously with the visual and auditory signals given to the subject, his responses, signals indicating grey-out, black-out, loss of consciousness, the amount of G and the time in seconds, by ink-writing pens on moving paper. Cine films and X-rays of the subject can be taken during operation.
(J. of Physiology 104:8P-9P, 10 Feb. 1945)

1,756

Franks, W.R. Sept. 1959 SOME RECENT DEFINITIONS OF THE ACCELERATION PROBLEM. (15th Meeting, AGARD NATO Aeromedical Panel, Aachen, Germany, 21-26 September, 1959.) pp. 1-10.

ABSTRACT: The acceleration acting on a body is the resultant, of attraction between itself and other masses in the universe, and of change in direction and of speed of its velocity. With the increase in power available today, all of these three components may be varied over appreciable ranges to create an alteration in environmental acceleration which may pose limits in the operation insofar as man is concerned. This paper is a review of the present and future problems in the field of acceleration.

1,757

Franks, W. R. 1961 HUMAN ORIENTATIONS
Aerospace Medicine 32(3):230, March 1961.

ABSTRACT: Orientation may be defined as knowing how, when and where you are. Pertinent information is supplied by all the senses and normally is integrated to provide a conscious state. Accuracy of this will depend on (a) the validity of the information supplied by the senses; (b) the efficiency of the integration process. Information supplied by special senses can be subject to error due to inherent limitations, principally, (a) Events below a given threshold are not sensed, (b) Qualitative errors can arise due to the operation of Weber's Law. In addition, false integration can normally take place as in coriolis accelerations, altered visual perceptions, etc. Changed physiological states resulting from hypoxia, hyperventilation, positive acceleration, etc., can further alter the normal integration process. Finally, disorientation can itself be disorientating in a feedback system. To educate lay operators to exploit the capacities and limits of this vital system, it is essential that Aviation Medicine assess the physiology involved.

1,758

Franks, W. R. 1961 HUMAN ORIENTATION.
(Paper presented at 32nd annual meeting, Aerospace Medical Association, [illegible])

[illegible]ntation may be defined as knowing how, when and where you are. [illegible] information is supplied by all the senses and normally is integrated [illegible]provide a conscious state. Accuracy of this will depend on (a) the validity of the information supplied by the senses; (b) he efficiency of the integration process. Information supplied by special senses can be subject to error due to inherent limitations, principally, (a) Events below a given threshold are not sensed; (b) Qualitative errors can arise due to the operation of Weber's Law. In addition, false integration can normally take place as in coriolis accelerations, altered visual perception, etc. Changed physiological states resulting from hypoxia, hyperventilation, positive acceleration, etc., can further alter the normal integration process. Finally disorientation can itself be disorientation can itself be disorientating in a feed-back system. To educate lay operators to exploit the capacities and limits of this vital system, it is essential that Aviation Medicine assess the physiology involved. (Aerospace Med., 32(3):230, March 1961.

1,759

Franks, W.R. & H.B. Hoy 1961 CANADIAN EXPERIENCE IN IMPACT ACCELERATIONS
(Paper, Symposium on Impact Acceleration Stress, Brooks AFB, Texas, Nov. 27-29, 1961)

ABSTRACT: Accelerations which may be considered to come within the definition of impact, can arise practically from high speed bail-out, parachute openings, during crashes, and also from ab upt acceleration changes from aerodynamic gust and sound barrier turbulence, ejection seats, rocket take-off, and arresting gear, as well as atomic and other blast effects.

Dissipation of 300 knots s theoretically only equivalent to a 5°F rise in body temperature, thus the amount of kinetic energy which the human body can successfully absorb, when peroperly randomized, is considerable and represents a challenge for exploitation. This can only come from an intelligent and imaginative evaluation of the fundamental problems involved and their application to a solution. Animal experimentation can only be useful to a point, and accurate clinical or pathological measurements of ubiquitous human experiences are requisite and rewarding. From these parameters various Canadian developments in Crash Helmets, Ejection Seats, Crash Harness and other equipment will be discussed briefly, as well as current considerations of methodology and operational experience. Detailed reports by various authors will be tabled.

1,760

Franks, W. R. 1961 ACCELERATION RESEARCH IN CANADA
(Paper, Panel on Acceleration Stress of the Armed Forces-NRC Committee on Bio-Astronautics, 6-11 March 1961, NASA Ames Research Ctr., Moffett Field, Calif.)

1,761

Franks, W. R. 1961 SOME RECENT DEFINITIONS OF THE ACCELERATION PROBLEM. In Bergeret, P., ed., Bio-Assay Techniques for Human Centrifuges and Physiological Effects of Acceleration. (London, New York, Paris: Pergamon Press, 1961) AGARDograph 48. Pp. 14-22.

ABSTRACT: Accumulated experience with accelerations and means of protection against these have served to define more closely some of the limiting factors concerned with this variant of modern man's environment.
The compromises of the present g suit, including protection limited to heart level, lack of adequate pressure gradient and approximations in fit, have probably been fully exploited. Return to original design in which these compromises are minimized still leaves various limitations. Body-surface protection where adequate hydrostatic gradients is accomplished still implies an increased load on the unprotected heart which may be limiting, although gaseous increased intrathoraic pressure can minimize this. Complete fluid protection imposes problems of tactile sensation and orientation which can be troublesome. Discomfort from anatomical distortions within the thoracic cage yet can be limiting especially from transverse accelerations.
Other difference in specific gravity between brain and cerebrospinal fluid, possible centrifugal sludging of blood and reciprocal shifts in body fluids generally. Reflex endocrine and vasomotor responses to these shifts may prove embarrassing when an increased g subsides.
Individuals vary in respect to these various factors, and there is still room for selection and training for specialized assignments. (EDITORS SUMMARY)

1,762

Franks, W. R. 1963 A SECOND LOOK AT THE "GRAVEYARD SPIRAL" (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 29-May 2, 1963)

ABSTRACT: In the past, the "graveyard spiral" has been explained on physiological grounds of human disorientation. In this pilot while flying without visual references, i.e. at night or in cloud, inadvertently enters a turn which either is not appreciated or is falsely sensed. This can arise from either subthreshold rates of rotation, "reversal" sensation, or from coreolis disorientation or combination of these. The turn results in an increasing positive acceleration which may be sensed by the idsorientated pilot as a climb, and which if acted upon results in a closing spiral descent. Apparently, however, under similar circumstances an error may arise in the attitude gyro which "if not appreciated by the pilot will cause him to put the aircraft into descending turn." The inherent reliance on such instruments by the unconsciously disorientated pilot may thus play a sinister potentiating role in the etiology of this classical accident.

1,763

Franzen, R., & D. R. Brimhall 1948 A STUDY OF SERIOUS AND FATAL ACCIDENT RECORDS DURING 1939 AND 1940 (Civil Aeronautics Administration, Washington, D. C.) Rept. No. 77; May 1948

SUMMARY: The official records indicating the causes of non-carrier accidents, and related elements of information pertaining to such accidents, represent a valuable source of data for analysis as a basis for suggesting steps to be taken in initiating an accident prevention program. However, the value of this source of information is greatly reduced by inadequacies in present non-air-carrier accident recording procedures.
The major purpose of this investigation has been the evaluation of accident record files covering 1163 accidents occurring during 1939 and 1940. The requisite elements of information which are available in the present files, which are available to a limited degree only, and which are not available, are indicated Suggestions are made for improving accident record procedures in order that a complete description of the background of the accident may be obtained.
The major need is for development of procedures which will result in the collection of comparable information on all accidents, particularly in terms of the nature of maneuvers immediately preceding the accident (lead maneuvers), and in terms of other pertinent conditions surrounding the accident (environments). The inadequacy of procedures in which the specific elements of accident data to be collected are left to the discretion of the investigator is noted. This inadequacy often results in restriction of information to those elements which are most immediately available, and, moreover, may lead to uncertainty as to whether certain important background elements did not apply to the accident in question or were merely overlooked by the investigator.
In the course of the analysis, the high incidence of stalls, particularly from turns, immediately preceding the crash, became evident. In the records analyzed, approximately 65 per cent of the private plane accidents resulting in fatalities involved a stall; and more than half of such stalls followed improper execution of a turn at low altitude The implication of this fact with respect to revisions of the pilot training curriculum is discussed. As another by-product of the principal study, comparisons were made between the sample of pilots in the CAA accident records and a sample of pilots obtained during other research in California. Differences among pilots h[illegible] discussed, in terms of elements of information pertaining to pilot history, such as experience and age. (CAA)

1,764

Fraser, A.M. 1943 A PRELIMINARY STUDY OF THE EFFECT OF MILD ANOXIA UPON THE INCIDENCE OF SWING SICKNESS. (National Research Council, Canada) Report # C-2644, October 10, 1943

ABSTRACT: Twenty-five of those breathing the low concentration of oxygen developed severe nausea and/or vomiting, while only sixteen of the other group developed these symptoms. This difference is not statistically significant Nine men in each group had mild symptoms.

1,765

Fraser, A.M. and G.M. Manning 1943 THE EFFECT OF VARIATION IN THE RADIUS (FREQUENCY OF MAXIMAL CHANGE IN G) AND THE ARC (QUANTITY OF MAXIMAL CHANGE IN G) OF THE SWING ON THE INCIDENCE OF SWING SICKNESS. (National Research Council, Canada) Report #C-2622, 9 October 1943

ABSTRACT: A reduction from 58% in the incidence of swing sickness occurred when the frequency (G change constant) was increased from 15 to 22 swings per minute. A reduction from 50% to 22% in the incidence of swing sickness occurred when the change in vertical acceleration (frequency constant) was reduced by decreasing the total angle of swinging from 90° swing is similar to that of a spring elevator used in previous work on which little or no sickness occurred It would appear that some effective stimulus not present on the spring elevator is operating on the swing.

1,766

Fraser, A.M. and G.W. Manning 1944 EFFECT OF VARIATION IN THE RADIUS (FREQUENCY OF MAXIMAL CHANGE IN G) AND THE ARC (QUANTITY OF MAXIMAL CHANGE IN G) OF THE SWING ON THE INCIDENCE OF SWING SICKNESS. Proc. Assoc. Comm. Aviation Med. Research, Appendix E, 25 Feb. 1944

1,767

Fraser, A.M. & G.W. Manning 1950 EFFECT OF VARIATION IN SWING RADIUS AND ARC ON INCIDENCE OF SWING SICKNESS. J. Appl. Physiol. 2(11):580-584. Apr. 1950.

ABSTRACT: Human subjects were swung on a two-pole swing through angles of 50, 90 and 130 degrees, using radii of 6, 10 or 16 feet, to determine the importance of frequency and of quantity of g change in the occurrence of swing sickness.

The incidence of swing sickness was increased from 4 to 58 per cent when the frequency was decreased from 22 per minute on the 6-foot swing to 15 per minute on the 16-foot swing. Although theoretically the quantity of the forces acting remains constant when the angle remains constant, air resistance results in requiring a greater thrust to operate manually the longer swings; this would result in a greater tangential component of force, and the latter may be responsible for the increase in incidence as stated above. The low incidence of sickness on a vertical elevator, where there is no tangential component, supports this conclusion. The incidence of swing sickness was reduced from 50 to 22 per cent by reducing the oscillation angle from 90 to 50 degrees (or g change from 0.9 to 0.25). Increasing the angle from 90 to 130 degrees did not increase incidence of sickness. The frequency and quantity of g change on the 16-foot, 90-degree swing are similar to those of an elevator used in other work (2) in which sickness was almost absent. This suggests that the tangential component of force on the swing is necessary for production of sickness.

1,768

Fraser, F.T. 1963 ASPECTS OF THE HUMAN RESPONSE TO HIGH SPEED LOW LEVEL FLIGHT (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 28 - May 2, 1963)

ABSTRACT: As a preliminary investigation of the human response to high speed low level flight, a T-33 aircraft was flown at not more than 100-feet AGL and approximately 400 K on a selected course for a duration of about 40 minutes per run. Three pilots of differing anthropomorphic form each made several flights in varying conditions of turbulence. Continuous acceleration tracings were registered on an airborne recorder, from the seat, the "hard hat", and the pilot's hip, along with ECGs and pneumograms. A photographic record of head movement was obtained. Analysis of the tracings showed the dimensions of vertical accelerations and jolts, the predominant frequency response, etc. ECG showed no aberrations, but varied in rate in association with buffeting and flying stress. Pneumograms showed the effects of buffeting on respiratory rate and pattern. A technique was devised for analysing the tracing in terms of jolt function, believed to give a closer representation of the intensity and duration of the buffeting. Subjective reports, borne out by the photographic record, indicated that on some runs the pilot was approaching the limit of his ability to control the aircraft. Pilots varied in their subjective and physiological response.
(Aerospace Medicine 34(3):255, March 1963)

1,769

Frazer, J. W., & E. Reeves 1958 ADAPTATION TO POSITIVE ACCELERATION (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5818, 23 Dec. 1958; ASTIA AD 216 509.

ABSTRACT: One hundred and fifty male Sprague Dawley rats weighing ca 250 grams, were subjected to positive acceleration. Fifty were preconditioned by exposure to 2 g, 50 to 12 g, and 50 to cage stressing 1/2-hour a day for 6 weeks. At the end of the conditioning period all animals were subjected to 20 g and their survival time was measured by means of a transistor EKG. Rats preconditioned to 12 g had significantly longer survival times, rats exposed to 2 g significantly shorter survival times than cage-stressed controls. Statistical correction was made for losses in the group preconditioned at 12 g. Mean survival times at 20 g for cage-stressed controls was 1281 seconds, 2 g preconditioned 969 seconds, 12 g preconditioned 2011 seconds. (Author)

1,770

Fredericks, R.H. 1956 VEHICULAR DECELERATIONS IN CONTROLLED COLLISIONS. (Society of Automotive Engineers, Annual Technical Convention, 1956)

1,771

Fredericks, R.H. 1958 SAFETY IN AUTOMOTIVE TRANSPORTATION. (Ford Motor Comp., Dearborn, Michigan)

1,772

Fredericks, R.H., & R.W. Connor 1960 CRASH STUDIES OF MODERN CARS WITH UNITIZED STRUCTURE. (Ford Motor Comp., Dearborn, Mich.)

1,773

Freeberg, N.E. 1958 ENVIRONMENTAL AND PILOT ASPECTS OF THE VERTIGO ACCIDENT (U.S. Naval Aviation Safety Center, U.S. Naval Air Station, Norfolk, Va.) Aeromedical Dept. Rept. No. AM 1-58, Sept. 1958. ASTIA AD 209 349.

1,774

Freedman, T. & V. Blockley 1959 AN INSTRUMENTATION PACKAGE FOR THE MEASUREMENT OF PHYSIOLOGICAL RESPONSE. (Paper, Meeting Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: Instrumentation has been developed for recording electrocardiograms, skin and deep body temperature, inspiratory mass flow rate, and for telemetering pressure transducer signals. The development of design criteria with consideration for compactness, minimum weight, reliability during physical stress, and comfort of the subject over a prolonged period of application is discussed. Methods for instrumenting the subject are reported as are techniques for lead placement and electrode attachment. Modification of the package for total telemetry, additional parameters and remote readout is proposed. Sample information obtained from instrumented subject is presented. (J. Aviation Med. 30(3):183-184, March 1959.)

1,775

Freeman, H.E. 1962 A RESEARCH PROGRAM TO DEVELOP A 60 "G" PERSONNEL RESTRAINT SYSTEM. In Impact-Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, (National Academy of Sciences, National Research Council, Washington, D.C.) Publication No. 977, Pp. 259-264

ABSTRACT: A 60 G personnel restraint system was develcped. The central components are an individually fitted, fiber glass, torso garment and a similarly fitted seat pan. These rigid components were selected to provide broad support

and preserve the normal body shape under inertial loading. A flexible, low-rebound liner is used for comfort and intimate fit. The torso shell is retained to the seat structure with steel cables to minimize stretching and the resultant rebound. A dacron strap system, positioned by a leather helmet, was chosen to minimize stretching and the resultant rebound. A dacron strap system, positioned by a leather helmet, was chosen to minimize forward head motion. Lateral head supports are mounted on a carriage that adjusts vertically relative to the seat structure for crew-size variation. Low rebound padding in the helmet cushions the ear area. Arm support is provided by contoured armrests and hand-holds with a strap passed over the crook of the arm holding the arm back and down. The dummy's legs are positioned and restrained by the sides of the seat shell, a central divider, a contoured leg backrest, and a leg cover. Antisubmarine protection for the torso is also provided by the leg cover, which supports the forward inertial loads of the thighs and legs and stablizes the pelvis by a direct load path through the femur into the pelvic socket. The contoured lower skirt on the torso backshell and the sides of the seat pan reinforce the pelvic socket by limiting lateral shifting of the thighs. The support structure is a tubular steel frame articulated to provide a torso forward position for boost and torso aft position for less stressful flight elements. Full immobilization and restraint are applied in the forward position.

1,776

Freise, H. n.d. INSTRUMENTS FOR MEASURING ACCELERATION IN AIRCRAFT
(Lilienthal Ges., Report 181, pp. 83-102)
R.A.E. Translation No. 152.

1,777

Freitag, W. 1953 UNTERSUCHUNGEN UBER DIE WIRKING VON FLIEHKRAFTEN IN RICHTUNG FUSS-KOPF AUF DEN MENSCHLICHEN ORGANISMUS.
(Investigations On the Effect of Centrifugal Forces in a Foot-To-Head Direction Upon the Human Organism)
Zeitschrift fur Flugwissenschaft (Braunschweig), 1(2):25-30

ABSTRACT: Experiments were made on 9 subjects flying in a head-downward position (effected by means of a tilting chair) in an airplane diving from altitudes of 2000 or 3000 m. until reaching maximum tolerance acceleration, then spiraling downward in irregular circles. Results show that centrifugal forces acting in the foot-to-head direction increase blood pressure within the vessels of the head and neck region even at accelerations below 2 g, making the blood ooze through the walls of the minor vessels, and causing swelling of the face and pain in the ears and temples. The number of small hemorrhages increased with the rate of acceleration and with exposure time. Under increasing centrifugal force, the heart and blood vessels are no longer able to maintain normal blood circulation. The pressure of the inner organs upon the chest hampers respiration and the pressure in head and neck becomes unbearable. As follows from these experiments, as well as from others made on the centrifuge, man capable of tolerating a centrifugal force up to 2 g for 3 minutes without considerable detriment to his

working capacity. In exposures above 2 g, the time must be rapidly reduced; at 3.5 g it should not exceed 10 seconds to avoid serious troubles. Redding out was not observed in any experiment.

1,778

Free, W. T. & G. M. Jones 1959 A CINE TECHNIQUE FOR MEASUREMENT OF EYE MOVEMENTS IN A DYNAMIC ENVIRONMENT.
(Paper Meeting of the Physiological Society, 11-12 December 1959)

ABSTRACT: The apparatus comprises a standard closely fitting flying helmet, having a forward facing cine camera running at 16, 32 or 64 frames/sec, rifidly mounted on one side, with a 2 in., F/1.9 lens which carries a periscope so arranged that the camera takes a close-up picture of one eye. The motor is connected to the camera by a flex-drive and is mounted on the opposite side for inertial balance. The periscope has front sufraced morrors, carries a 12 W half-silvered bulb for illumination of the eye and contains an annular photo-cell for exposure control, the current from which is amplified approx. 10 times by a transistorized circuit. A hood is avialable for covering the periscope and eye, mainly to reduce corneal reflexions to a single spot of light. The whole system can be fixed relative to the skull with a dental bite. The apparatus is controlled from a small box strapped to the knee, by means of which mains voltage, bulb voltage and amplified current from the photo-cell can be measured, and bulb current can be adjusted through a power transistor control circuit. A self-contained Cd-Ni battery pack supplies 28 and 18 V at 1 amp each for 12 min.

Eye movement in the 'horizontal' and 'vertical' planes can be measured to an accuracy of approx. $\pm 1^{\circ}$ within 25° of a central datum by measuring displacement of the pupil image on the film. Rotational movement about the visual axis can be measured with a similar accuracy by superimposing a projected image of the iris upon a disk, free to rotate about its axis and having characteristic radially disposed marks of the particular iris sketched upon it. The disk is mounted upon a support, graduated in degrees, which is constrained to move in the plane of the image without itself incurring rotation. (J. of Physiol. 150:2-3P, 1960)

1,779

Frenckner, P., & L. Preber 1956 RELATIONSHIP BETWEEN VESTIBULAR REACTIONS AND VEGETATIVE REFLEXES, STUDIED IN MAN BY MEANS OF A REVOLVING CHAIR OF NEW DESIGN. Acta oto-laryngologica (Stockholm) 46(3):207-220, May-June 1956

ABSTRACT: Vegetative reactions were studied in male subjects after rotatory stimulation of the vestibule. A newly designed electrically operated revolving chair with attached apparatus for recording nystagmus, skin resistance, blood pressure and electrocardiogram was used. A distinct and characteristic fall

of the resistance curve was found in neurovegetatively susceptible persons even with the use of weak stimuli (cupulometry). This fall in skin resistance seemed to be caused mainly by vestibular stimulation in the same way as nausea associated with motion sickness. Investigations on approximately 100 persons showed that, on comparison of the changes in skin resistance, the post-rotatory nystagmus, and the aftersensation of cupulometry, the variations in skin resistance were found to be correlated to the intensity and course of the rotatory aftersensation. (AUTHOR)

1,780

Freitag, W. 1958 UBER DIE AERODONTALGIE UND ANDERE AERODONTOPATHIEN.
(About "Aerodontalgie" and Other "Aerodontopathies")
(Deutsche Versuchsanstalt fuer Luftfahrt, Mulheim Ruhr, Germany)
Rept. No. 61, ASTIA AD 204 435

ABSTRACT: According to previous research sound teeth are not injured in any way by environmental changes (such as temperature, atmospheric pressure, radiation, lack of oxygen, acceleration etc.) encountered in flight. However, if the teeth are not sound, some of the above mentioned features can cause pain and further morbid change. Experimental and clinical tests regarding these problems, including some taken from the literature, are reported. (ASTIA)

1,781

Frenkel, O. M. 1940 CHANGES IN EXCITABILITY OF VESTIBULAR APPARATUS FOLLOWING REPEATED STIMULATION.
Bull. Biol. et. Med. Exper. 9:69-72.

1,782

Frenkel, O.M. 1941 CHANGES IN THE EXCITABILITY OF THE VESTIBULAR APPARATUS FOLLOWING REPEATED STIMULATION: SIGNIFICANCE FOR AVIATORS.
Bull. War M. (London) 2:521. Also War Med. (Chicago) 2:536

1,783

Frenzel, H. 1961 A SIMPLE SWIVEL CHAIR MODEL EXPERIMENT ON THE PROBLEM OF CORIOLIS EXCITATION ON THE SEMICIRCULAR CANALS IN HEAD MOVEMENTS DURING ROTATION.
In Arch Ohr Nas Kehlkopfheilk 177:563-578, 1961 (German)

1,784

Freud, S.L. 1962 A STUDY OF PHYSIOLOGICAL MECHANISMS UNDERLYING THE SPIRAL AFTER EFFECT.
(Connecticut University, Doctoral thesis): ASTIA AD 274 366.

ABSTRACT: The physiological mechanisms underlying the spiral after-effect were studied. Some conclusions were: a major central component exists for the SAE; duration of the effect is a simple function of exposure time; duration is longer for non-transfer than for transfer conditions, so it is not possible to rule out retinal contribution; both rods and cones contribute, but cone areas give greater response. The relationship os some of these findings to rod-cone functioning are discussed.

1,785

Friede, R.L. 1958 BIOPHYSICS OF CONCUSSION
(Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC Tech. Rept. 58-193. ASTIA AD 203 385.

ABSTRACT: This investigation was instituted to ascertain the anatomical and/or physiological factors involvolved when experimental "concussion was produced. Methods were developed for effecting a reproducible "concussion". The criterion used to determine when "concussion" was produced consisted of the measurement of abrogation of corneal reflex.

Three principal factors thought to cause "concussion" were studied: namely, (1) rapid deceleration (acceleration concussion as defined by D. Denny-Brown), (2) total force imparted to the skull, and (3) stretch of the cervical region. a test drop rig was developed and instrumentation was used to measure the various force vectors. Varying experimental conditions eliminated one or more of the factors thought to cause "concussion," and the following conclusions were drawn: (1) Total force applied to the skull is not a factor in "concussion" under the test conditions. (2) Acceleration concussion is not a factor under the test conditions. (3) Stretch of the cat's neck or some unknown factor, which can be altered by applying a muscle-tetanizing current, accounts for the "concussion" produced.
Neurohistopathological studies were done on serial sections of the brain and cord to establish the site and degree of neural damage under various experimental conditions. These studies are discussed in Part II of this report.

1,786

Friede, R. 1951 DAMAGE OF THE BRAIN
(Paper, Symposium On Impact Acceleration Stress, Brooks Air Force Base, San Antonio, Texas, November 27-29, 1961)

1,787

Friede, R.L. 1961 MECHANICS OF ACCELERATION CONCUSSION
(Paper, Symposium on Impact Acceleration Stress, Brooks AFB, Texas, Nov. 27-29, 1961)

ABSTRACT: A blow accelerating the head produces an abrupt displacement at the cranio-cervical junction. Such a displacement results in a characteristic fiber lesion at the ventral circumference of the first segment of the cervical spinal cord opposite the odontoid process. Thick fibers are more severely affected than thin fibers. The distal parts of the fibers undergo Wallerian degeneration. Axonal reaction is found in the nuclei which send their descending fibers through the damaged region: the reticular formation of the medulla oblongata, particularly its nucleus giganto-cellularis, the lateral vestibular nucleus, to a smaller extent the red nucleus, and, inconsistently, other nuclei. This pathology is consistently found in cats which received a blow to the head. It shows a definite relationship to the severity of symptoms so that a reasonable estimate of the duration of reflex abrogation can be made without knowledge of the experimental data. The symptomatology and the mechanical forces recorded are identical to those generally accepted for the definition of concussion.

Because of this pathogenic mechanism, both the typical symptomatology and the pathology of acceleration concussion can be reproduced by other means than by applying a blow to the head: for example, cervical stretch. An experimental analysis of the various mechanical factors involved reveals that stretch and flexion of the craniocervical junction are most important for the mechanics of concussion. Dislocation of the odontoid process, rotation, and herniation of the medulla into the foramen occipitale are not of critical significance.

1,788

Friede, R. L. 1961 EXPERIMENTAL CONCUSSION ACCELERATION. PATHOLOGY AND MECHANICS.
In Arch Neurol (Chicago) 4:449-462, April 961.

1,789

Friede, R. L. 1961 THE PATHOLOGY AND MECHANICS OF EXPERIMENTAL CEREBRAL CONCUSSION. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADD TR 61-256; ASTIA AD-266 210

ABSTRACT: A blow to the cat's head produces an abrupt displacement at the cranio-cervical junction. This results in a fiber lesion at the ventral circumference of the spinal cord at C-1, opposite the prominence of the odontoid process. Thick fibers are affected more severely than thin fibers. Axonal reaction is found in the nucleus gigantocellularis of the reticular formation, the nucleus vestibularis lateralis, the red nucleus, and others. All these nuclei send their descending fibers through the damaged region. Changes are consistent. Intensity is related to the severity of concussion so that the duration of concussion can be estimated histologically without knowledge of the experimental data. The mechanical forces used to produce concussion are the same type described by other investigators. An experimental analysis of the mechanical factors involved in the production of damage reveals stretch and flexion to be most important. (AUTHOR)

1,790

Friedman, T. & R.C. Koehler 1958 THE BENEFITS OF SIMULATING PREDICTED ACCELERATION PROFILES THROUGH THE DESIGN OF MANNED FLIGHT SYSTEMS. 3rd European Congress of Aviation Medicine, 1958, Pp. 277-281.

1,791

Frisoli, A. & B. Cassen 1950 A STUDY OF HEMORRHAGIC RIB MARKINGS PRODUCED IN RATS BY AIR BLAST. J. Aviation Med. 21(6):510-512,526.

ABSTRACT: Hemorrhagic rib markings have often been observed during autopsy on the deflated lungs of victims of high explosive blast. Interpretations have been made on one hand by considering that the ribs produce shadows and on the other hand that the ribs produce intensified damage when they are forced against the lungs. To determine definitely between these alternatives, a technique was developed of fixing the lungs of rats in their inflated state after blast injury. These fixed lung preparations clearly demonstrate that the hemorrhagic bands are under the ribs and are most marked under the false ribs. Further, a freely movable disc of metal held loosley to the chest wall will produce intensified damage under it rather than cast a shadow.

1,792

Frommel E., and C. Fleury 1959 PHYSIOPATHOLOGY OF MOTION SICKNESS STUDIED IN THE LIGHT OF ITS THERAPY. Schweiz Med Wschr. 89:590-2, 30 May 1959

1,793

Frucht, A.H. & K. Otto 1959 DRAHTLOSE UBERTRAGUNG DES EKG MIT TRANSISTOR-KLEINSTSENDER VOM MENSCHEN ODER TIER (Wireless Transmission of the EKG of Man or Animal by Means of a Miniature Transistor Transmitter) Pflug. Arch. ges. Physiol. (Berlin) 270(1): 82..

1,794

Fryer, D.I. 1961 THE EFFECTS UPON MAN OF EXPOSURE TO HIGH RAM PRESSURE LOADS. (RAF, Institute of Aviation Medicine, Farnborough) FPRC Kept. No. 1167, July 1961. ASTIA AD 267 789.

ABSTRACT: A study is reported of human tolerance to wind blast, or ram pressure, using a rotating beam channel underwater centrifuge system with specially constructed seat and pylon to simulate the high Q loads of ejection escape

in the air. Descriptions are given of the design and construction of the seat, restraint, communications, breathing gear, and instrumentation used to obtain physiological and mechanical data during the tolerance testing experiments. Results are summarized with regard to tolerance, electrocardiogram, intrathoracic and abdominal pressures, trunk thickness, separation loads on arms and legs, and injuries. (Author)

1,795

Fryer, D. I. 1961
OPERATIONAL EXPERIENCE WITH BRITISH EJECTION SEATS. A SURVEY OF MEDICAL ASPECTS
(Flying Personnel Research Committee, Great Britain)
Rept. no. FPRC-1166 July ASTIA AD 267 788

ABSTRACT: A survey is presented of experience in the emergency use of ejection seats of British design and manufacture. The escapes and attempted escapes included are believed to constitute a complete list of ejections from aircraft flown by the Royal Navy, the Royal Air Force, the ministry of Aviation (formerly Ministry of Supply), and the British aircraft industry up to 1st July, 1960. It does not include test ejections carried out in the development of ejection seats, or the reference to the indications for ejection and the mechanism whereby this is executed is frequently necessary, the primary aim is a medical survey of the difficulties inherent in escape by this means, the nature, causes and contributory causes of injury during and following ejection. (Author)

1,796

Frykholm, A. 1952 REAKTIONSTID OCH REAKTIONSFORMAGA VID FLYGNING MED HOGA HASTIGHETER. (Reaction Time and Reaction Ability in High Speed Flight)
Meddelanden Fran flyg-och navalmedicinaka namnden (Stockholm), 1(2):4-8.
In Swedish.

ABSTRACT: The reaction time of a pilot in relation to the speed of the plane is discussed and represented graphically for the hypothetical case of a plane flying at Mach 3. At this speed the process of motor reaction can be divided into the following successive phases: (1) the latent period (0.1 second) during which the plane would progress 100 m.: (2) the time required for eye adjustment or turning of the head, e.g. toward a suddenly discovered plane (0.1 second), during which the plane would progress an additional 100 m.; (3) time required for mental association of the sensory impression (0.05 second), during which the plane would progress 50 m.; and (4) time required for motor-reaction to take effect (0.2 second), which would correspond to a distance of 200 m. The following recommendations are made: a conscious effort should be made on the part of the pilot to avoid movements of the head or eyes as much as possible, and instrument layout should be designed accordingly; aviation cadets should be taught the above facts, and "quick seeing" should be practiced; only individuals with short reaction and visual adjustment times should qualify to pilot high-speed planes (the fact that reaction time increases with increasing age should be borne in mind); the avoid-

ance of alcohol, of vitamin-deficient food, of overtiredness and of lack of oxygen should be mandatory, because of their retarding effects on visual adjustment.

1,797

Fujiwara, H., & G. Saga 1961 ANATOMICAL AND HISTOLOGICAL STUDIES ON DOGS EXPOSED TO ACCELERATION In Abstracts from the 6th Meeting of the Japanese Aviation Medicine and Psychology Society. Nihon Koku Igaku Shinri Gakkai kiroku (Tokyo) No. 11:2-3, May 27, 1961

ABSTRACT: Ten dogs died after being exposed to centrifugal forces of 8 g for 9 minutes and 10 g for 12.5 minutes. The liver was dark red in color, somewhat enlarged, congested and showed signs of marked hemorrhage under mild pressure. The adrenal glands showed hemorrhage and congestion. The kidneys were also congested. Filaria worms were found in 8 of the dogs. The lungs were reduced, congestion was marked, and petechiae and emphysema were present. Histologically, the liver revealed congestion and occasionally showed thickening of the vascular walls. The kidneys showed swelling of the renal tubules, and both the cortex and medulla were markedly congested. The adrenal glands exhibited mild congestion and hemorrhage. The lungs were congested and small hemorrhages were present in the bronchioli. Hemosiderin was also present. (Dr. H. Saiki)

1,798

Fukuda, T., M. Hinoki, & T. Tokita 1958 STATIC AND KINETIC LABYRINTHINE REFLEX (FUNCTIONAL DEVELOPMENT OF LABYRINTHINE FUNCTION WITH ROTATORY TRAINING). Acta Oto-laryng. 49:467-477

1,799

Fukuda, K., T. Tokida, S. Aoki & T. Takeuchi 1959 JURYOKU NO HENKA GA KINKINCHO NI OYOBOSU EIKYO (The Effects of Variations in Gravity on the Muscle Tone) Nihon Koku Igaku Shinri-Gakkai Kiroku (Tokyo) 7: 3, May 1959

ABSTRACT: The effects of gravitational changes on the tonic labyrinthine reflex in animals were studied. Animals subjected to deceleration, free fall, and motion along a Keplerian trajectory were observed. The effects of an increase in the gravitational forces were studied employing linear and rotational acceleration. The results show that labyrinthine control neck muscle tonus is affected by changes in gravitational forces, and that the rotation and flexion reflex of the neck subsequent to unilateral labyrinthectomy is abolished under conditions of weightlessness (during free fall, Keplerian trajectory) to the point of being difficult to observe.

1,800

Fulton, J. F. 1941 RECENT DEVELOPMENTS IN AVIATION MEDICINE
New England J. of Medicine 225(7):243-268.

ABSTRACT: The war in the air has come to be in a very real sense a physiologic war, since the limitations of air combat at the present time lie more with the pilot than with the plane.

The more important advances of the last two years relate to the following: the physiologic effects of acceleration; the use of oxygen at high altitudes; air embolism and its prevention; and anoxia of the adrenal glands. The topics are considered in this order; problems of pilot selection and training are not touched on.

1,801

Fulton, J.F. 1941 MEDICINE AND AIR SUPREMACY.
J. Maine M.A., 33:201-210

ABSTRACT: The newer combat planes can fly higher than is compatible with health or life. They can perform maneuvers causing centrifugal forces of such intensity, that blood tends to be drawn away from the brain, resulting in transient blindness (blacking out)

To maintain the body at high altitudes, increased secretion of adrenocortical extract is essential. The problem of anoxia and adrenal cortex is discussed.

One of the means of lessening the physiologic effects of high acceleration is the assumption of a crouched posture, bringing the lower extremities nearer the heart and thus diminishing the length of the hydrostatic column of blood subjected to acceleratory force.

1,802

Fulton, J.F. 1941 PNEUMATIC AND WATER SUITS AND OTHER AGENTS DESIGNED TO COUNTERACT ACCELERATION IN AIRCRAFT
(National Research Council, Committee on Aviation Medicine, Washington, D.C.)
CAM Rept. No. 15, 22 July 1941

ABSTRACT: This is a brief review of protective devices which was made preliminary to the commencement of OSRD research. The German methods of combating "g" are summarized. It is recommended that the effects of adrenal cortical hormones on "g" tolerance be studied and that the relative merits of abdominal belts and pressurized leggings be determined. It is also suggested that a water suit be pressurized with air and that standards of service testing for acceleration be drawn up.

1,803

Fulton, J.F. & M.W. Thorner 1941 UNSOLVED NEUROLOGIC PROBLEMS IN MILITARY AVIATION. Trans. Amer. Neurol. Ass. 67:112-115

1,804

Fulton, J.F. 1942 BLAST AND CONCUSSION IN PRESENT WAR. New Eng. J. Med. 226:1-8

1,805

Fulton, J.F. 1943 FISIOLOGIA E VOOS EM GRANDES ALTITUDES: EMBOLIA GASOSA E EFEITOS DA ACELERACAO (Physiology and High Altitude Flying; With Particular Reference to Air Embolism and Effects of Acceleration)
Resenha Clinico-Cientifica (Sao Paulo) 12:107-112; 1 March 1943.
English version: Science 95:207-212; 27 Feb. 1942.

1,806

Fulton, J.F. 1948 AVIATION MEDICINE IN ITS PREVENTIVE ASPECTS: AN HISTORICAL SURVEY. (New York: Oxford University Press, 1948)

CONTENTS:

Altitude sickness and acclimatization: the history of oxygen.
Decompression sickness: the genesis of the tissue bubble.
Pressure cabins and explosive decompression: the spring of the air.
Effects of acceleration: dim-out and black-out; protective measures.
Man and the machine: problems of safety in flight.

These lectures are devoted chiefly to outlining the development of the current knowledge of the physiological effects of altitude and excessive gravitational forces upon human beings. Mechanical devices and other techniques for preventing or ameliorating adverse effects from these causes are described also. Selected results from research carried on during World War II are discussed, and there is a rather full account of the development of the anti-g suit.

1,807

Fulton, J.R. 1942 PHYSIOLOGY AND HIGH ALTITUDE FLYING WITH PARTICULAR REFERENCE TO AIR EMBOLISM AND EFFECTS OF ACCELERATION. Science 95:207-212

1,808

Furey, J. A., & R. N. Kraus 1962 A CLINICAL CLASSIFICATION OF VERTIGO (School of Aerospace Medicine, Brooks AFB, Texas) Review 7-61, Apr. 1962. ASTIA AD-287 069

ABSTRACT: A survey of the literature on the etiology of vertigo was made to discover slight differences in the described syndrome and present a system for the clinical classification of vertigo. This system is needed to ensure a sound medical judgment for removing an aircrew member from flying if he has a disorder which is incapacitating and likely to recur spontaneously without warning. While aviator's vertigo is not likely to occur except under conditions of reduced visibility, medical vertigo can occur under any conditions and gives the patient a sensation of whirling or a sensation that his environment is whirling. The clinical entities fulfilling these conditions include epidemic vertigo, acute toxic labyrinthitis, atypical Meniere's disease, and pseudo-Meniere's syndrome. As a result of this survey a clinical classification system is suggested based on anatomic location instead of etiology. It classifies vertigo as that produced by: (1) peripheral vestibulopathy, involvement of the peripheral anatomic portion of the vestibular system; (2) central vestibulopathy, an involvement of the retrolabyrinthine central anatomic areas of the vestibular system; and (3) idiopathis vestibulopathy, in which vertigo is produced by an unknown cause. R.C.M.

ACCELERATION

G

1,809

Gabb, J. E. 1961 PROTECTION OF THE HEAD.
Rev. Med. Aero (Paris) 2:210-212, Dec. 1961

1,810

Gable, W. D. & F. M. Townsend 1963 AN ANALYSIS OF CARDIOVASCULAR INJURIES RESULTING FROM ACCELERATIVE FORCE.
(Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 29 - May 2, 1963).

ABSTRACT: The autopsy protocols of approximately 3,400 victims of fixed wing aircraft, rotary wing aircraft, and parachuting accidents (accessioned at the Armed Forces Institute of Pathology) were surveyed for cardiovascular injuries. In this series, 442 cases showed significant cardiovascular trauma. These cases were analyzed with emphasis being focused on direction and magnitude of accelerative forces, sites of injury and types of injury. A statistical summary of the frequency of injury in a particular anatomic location was prepared from the data obtained. This material serves as the basis for a discussion of the pathogenesis of specific lesions found in the cardiovascular system following accelerative force application and provides information which may be useful in the design of protective devices. (Aerospace Med. 34(3):255, March 1963)

1,811

Gadd, Charles W. 1962 CRITERIA FOR INJURY POTENTIAL
In: Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, (National Academy of Sciences, National Research Council, Publication No. 977), pp. 141-144

ABSTRACT: Appraisal of injury potential of automotive accessories may be attempted through several methods. One method is the laboratory evaluation which establishes a load-deflection curve for the material under observation. Interpretation of the test results is difficult because of the various determinants, both superficial and real, in a test. Furthermore, new criteria must be developed in order to appraise more deep-seated injury. In studying more complex situations rigorous analysis is not possible and an overall emphirical function may be the best representation available.

1,812

Gagarin, Yu. 1961 MATERIAL ON FIRST COSMONAUT'S FLIGHT. FBIS USSR & East Europe, No. 72, 14 April 1961.

ABSTRACT: The world's first cosmonaut, Maj. Yuriy Gagarin, in an interview with TASS told about himself and his flight into outer space on 21 April 1961. The Soviet cosmonaut said that when weightlessness set in, he felt excellent. It became easier to do everything. "While in the state of weightlessness, I ate and drank and everything occurred just as it does here on Earth. I even worked in that condition--wrote, jotting down my observations," Gagarin says. "I was convinced that weightlessness does not at all affect man's fitness for work. The transition from weightlessness to gravitation, to the appearance of the force of gravity, is smooth." (CARI)

1,813

Gagarin, Y., V.V. Parin, & H. Mielke 1962 GAGARIN, PARIN SPEAK ON GDR TELEVISION. FBIS USSR & East Europe, No. 73, 13 April 1962.

ABSTRACT: Gagarin briefly discusses the problems of cosmic rays, nutrition during flight. He expresses his hope for the cooperation of all scientists in the research on space flights. Professor Parin discusses three main problems of space flights: length of time of space flights is becoming longer and thus requires a very complex closed ecological system; the danger of radiation; and the extended effect of weightlessness on man. (CARI)

1,814

Gagge, A.P. 1945 HUMAN FACTORS IN AIRCRAFT DESIGN. (U.S. AAF-ATSC, Engineering Division, Aero Medical Laboratory) TSEAL-3-3-695-53, 29 May 1945.
See also Air Surgeon's Bulletin, 2(9):298-301, 1945

ABSTRACT: This paper deals with all the problems of human factors except the question of design arising in connection with instruments and controls. Such items as g tolerances; visual acuity, depth perception, night vision, sound tolerance; temperature, altitude tolerance, and space requirements.

1,815

Gagge, A. P. & R. S. Shaw 1950 AVIATION MEDICINE
In Medical Physics (Chicago: The Year Book Publishers, Inc., 1950) Vol 2, pp. 41-65.

1,816

Galambos, R, 1961 PSYCHOLOGICAL TESTING OF SUBJECTS UNDERGOING ACCELERATION STRESS
In: Reports on Human Acceleration (National Academy of Sciences, National Research Council, Washington, D.C.) Publication No. 901, pp. 13-38.
ASTIA AD 266 077

ABSTRACT: The purpose of the tests reported in this paper was to look into the testing of subjects by physiological and psychological methods with a view toward defining objectively the point where a given subject's participation in an experiment must end lest he suffer permanent damage from continued exposure to acceleration. The body system most likely to limit such subject participation was the nervous system. The nervous system is most highly susceptible to the repeated bouts of anoxia and of mechanical trauma experienced by subjects. After completion of the experiments, the author recommended that all centrifuge installations should conduct regular medical examinations of their subjects, with systematic recording of symptoms and careful follow-up of any reported deficiency of vestibular and other functional systems. The peripheral-lights and the auditory emergency signal-response tests should be standardized, and installed and used in all centrifuge installations. Available tests for brain damage, including automated intelligence tests, should be considered for possible inclusion as tests by each centrifuge installation. The Committee conducting and reporting these tests urges immediate research and development looking toward devising a rational practical battery of tests for performance under centrifuge stress. The Committee, or one like it, should continue its work under some appropriate auspices.

1,817

Galambos, Robert 1961 TESTS OF SUBJECTS USED IN ACCELERATION WORK.
(Paper, Panel on Acceleration Stress of the Armed Forces-NRC Committee on Bio-Astronautics, 6-11 March 1961, NASA Ames Research Ctr., Moffett Field, Calif.)

1,818

Galkin, A. 1958 THE ROAD TO THE STARS (Doroga k Zvezdam)
Trans. from Krasnaya Zvezda (USSR) 25 Nov., 1958.
(Office of Technical Services, Washington, D.C.)
March 9, 1959 59-16327

1,819

Galkin, A. 1959 DOROGA K ZVEZRAM (Road to the Stars)
(Trans. from Krasnaya Zvezda (USSR) Nov. 25, 1958, P. 3)
(SLA Translations Center, Chicago. Ill.) 59-16327

1,820

Galkin, A.M., A.R. Kotova, A.V. Petrov, et al. 1958 ISSLEDOVANIIA ZHIZNEDEIATEL'NOSTI ZHIVOTNYKH PRI POLETAKH V GERMETICHESKIKH KABINAKH RAKET DO VYSOTY 212 KM. (STUDIES ON VITAL FUNCTIONS OF ANIMALS DURING FLIGHTS IN HERMETIC CABINS OF ROCKETS UP TO 212 KM)

In: Preliminary Results of Scientific Researches on the First Soviet Artificial Earth Satellites and Rockets, Articles XIth Section of I G Y Program (Rockets and Satellites) No. 1 (Moscow, Academy of Sciences, 1958) Pp. 112-129. JPRS DC-288: 5-28.

ABSTRACT: Medico-biological investigations during rocket flights into the atmosphere have been conducted systematically in the Soviet Union since 1949, for the purpose of studying shifts in certain physiological functions, vehavior of the animals during flights, and any bodily changes as a result of the flights. In 1957, 14 dogs (only 5 dogs are listed, although some were flown 2 or 3 times) were flown in pairs (1 anaethetized, the other normal) in hermetically sealed biopacks on 7 distinct flights to altitudes of 62 to 130 miles. Pre- and post-flight examinations included blood, chest X-ray, EKG, blood pressure, respiration and pulse, urinalysis, temperature, and body weight. Blood pressure, pulse, and respiration were registered during 3-hr. training periods in the cabin and during centrifuge training. A telemetric control system registered the compartment shell temperature, thermoinsulating lining, and barometric pressure inside the cabin. Physiological functions were measured by means of pickoffs, amplifying units, automatic pressure devices, electric clocks, and automatic optical recording devices. Motion pictures were taken at intervals during flight. The state of the physiological functions was not successfully registered during all parts of the flight projectory, inasmuch as abrupt changes in the direction of action G-stresses interfered with instrument operation and caused sharp animal movements which were reflected in the quality of the recordings. Some data are illustrated, although data are cited for determining the extent of experimental successes. Conclusions were as follows: (1) The vitally necessary conditions were guaranteed by the hermetically sealed cabin. (2) Acute disorder in the physiological functions did not occur, and no postflight changes in behavior were observed. (3) The pulse and respiration rates and the blood pressure of the conscious animals increased during the active part of the flights. During the period of dynamic weightlessness the registered physiological parameters were maintained at a high level for the first two to three minutes, with a tendency to decrease. The physiological indices returned to their original level within 4 to 5 mins. after dynamic weightlessness had begun. In the anaesthetized animals, the pulse rate, respiration, and blood pressure did not differ from their original values during the period of weightlessness. (4) The recovery sys m guarantees safe landing although additional work is necessary to insure stabilization and more favorable deceleration conditions during the nose sections' fall from altitudes of 200 km and higher.

1,821

Gelkin, A. M. et al 1958 MEDICO-BIOLOGICAL RESEARCH IN ROCKETS: RESEARCH ON THE LIFE ACTIVITY OF ANIMALS DURING FLIGHT IN HERMETICALLY SEALED CABINS OF ROCKETS UP TO A HEIGHT OF 212 KM: RESEARCH ON THE LIFE-ACTIVITY OF ANIMALS DURING FLIGHTS IN THE HERMETICALLY SEALED CABINS OF ROCKETS UP TO AN ALTITUDE OF 110 KM.
Trans. of mono. Preliminary Results of Research by Means of the First Soviet Artificial Earth Satelites and Rockets, Moscow, 1958. p. 109-149. (Office of Technical Services, Washington, D.C.)
1959 59-22466

ABSTRACT: A detailed account is given of the cabin arrangements and of the instruments devised for recording physiological data, together with the results obtained during the actual flight of dogs.

1,822

Gamble, J. L., and R.S. Shaw 1947 PRELIMINARY OBSERVATIONS ON DOGS SUBJECTED TO NEGATIVE "G" Federation Proc., 6(1):109, March 1947

ABSTRACT: To gain knowledge of pathology resulting from negative g, anesthetized dogs, harnessed on the human centrifuge in the "head out" position, were given consecutive two minute runs at 7 g (negative)

1,823

Gamble, J. L., Jr. & R. S. Shaw 1947 PATHOLOGY IN DOGS EXPOSED TO NEGATIVE ACCELERATION.
(USAF, Aero Med. Lab., Wright Field, Dayton, Ohio) Rept. TSEAA 695-74B. 18 Aug. 1947.

1,824

Gamble, J. L., R. S. Shaw, Otto Gauer, & J. P. Henry July 1948 PHYSIOLOGICAL CHANGES DURING NEGATIVE ACCELERATION. MCREXD-695-74L, 25 July 1948

ABSTRACT: From the experiments conducted in the Aeromedical Laboratory, it was concluded that cerebral symptoms occurring at low levels of negative acceleration lasting only 10 to 15 seconds in the range of 3 to 5 g may be due to changes of reflex origin and not to intracranial hemorrhage.

1,825

Gamble, J.L., R.S. Shaw, O. Gauer & J.P. Henry 1948 STUDIES OF THE PATHOLOGICAL PHYSIOLOGY OF NEGATIVE "G" IN ANIMALS AND MAN
Fed. Proc. 7: 40.

ABSTRACT: Increased pressure in the veins of the head from negative acceleration causes congestion and eventually petechial hemorrhages in the conjunctivae and in the mucous membranes of the accessory sinuses and middle ear. The vessels of the brain, surrounded by incompressible media in the "closed box" of the skull, do not rupture from short exposures. However, two subdural hematomas were observed in ten animals given four two-minute exposures to accelerations of negative 7 g repeated at short intervals. The increasedvenous pressure also causes edema in the cephalad portions of the body with a retrobullar edema which may cause diplopia in humans. If the exposure is prolonged for more than five seconds, evidence of heart and central nervous system disturbance are seen. Electrocardiograms usually show bradycardia in both animals and humans. All degrees of heart block and various types of ectopic rhythms occurred in the dogs and interstitial myocardial hemorrhages were occasionally demonstrated. Blood pressure recordings from animals and humans manifesting these "vagal effects" show a fall in arterial and a rise in venous pressure causing a reduction in the arterio-venous differential pressure.

1,826

Gamble, J. L., Jr., & R. S. Shaw 1948 ANIMAL STUDIES ON IMPACT NEGATIVE ACCELERATION (Air Material Command, Wright-Patterson AFB, Ohio) Rept. No. MCREXD-695-74G; ASTIA ATI-52 685

ABSTRACT: An investigation was made of the effect on dogs of high values of negative accelerations of brief duration such as would be encountered in escape from aircraft by downward seat ejection. Thirteen dogs were exposed to negative acceleration by means of drop tests from a 30 ft. tower, ejection from a horizontal catapult, or up the 100 ft. ejection seat tower. The magnitude of the negative accelerations ranged from 11 g to 50 g, and the durations from 0.04 to 0.3 secs. Minor injuries resulted from these exposures, but no serious irreversible or fatal injuries were observed, and there was no evidence of brain injury. This information cannot be applied to humans until experiments have been performed with animals of anatomical dimensions similar to humans.

1,827

Gamble, J. L., R. S. Shaw, J. P. Henry, & O. H. Gauer 1949 CEREBRAL DYSFUNCTION DURING NEGATIVE ACCELERATION. J. Appl. Physiol. 2:133-140.

ABSTRACT: Six humans were studied in the upright seated posture during exposure to headward centrifugal forces up to 3 g in intensity. Electrocardiograms were taken and arterial and venous blood pressures recorded at

head level. Dogs and rabbits were exposed to accelerations up to 7 g in intensity and 2 minutes in duration. Electrocardiograms and electroencephalograms and arterial and venous pressures were recorded. The electrocardiograms showed vagus block with marked bradycardia and periods of asystole. Electroencephalograms taken immediately after negative acceleration revealed abnormal waves suggestive of brain disturbances.

The arterio-venous pressure differentials in both men and animals pointed to a decreased brain perfurion pressure and it is concluded that cerebral symptoms occurring at levels of headward centrifugal force in the range of 3 to 5 g may be due to changes of reflex origin. These disturbances could result from the marked carotid sinus stimulation that accompanies the increase in blood pressure at head level.

1,828

Gamble, J.L. 1949 CEREBRAL DYSFUNCTION DURING NEGATIVE G.
J. Appl. Physiol. 2:133-140, Sept. 1949.

ABSTRACT: Six humans were studied in the upright seated posture during exposure to headward centrifugal forces up to 3 g. Electrocardiograms were taken and arterial and venous blood pressures recorded at head level. Dogs and rabbits were exposed to accelerations up to 7 g and two minutes in duration. Electrocardiograms and electroencephalograms and arterial and venous pressures were recorded. The electrocardiograms showed vagus block with marked bradycardia and periods of asystole. Electroencephalograms taken immediately after negative acceleration revealed abnormal waves suggestive of brain disturbances.

The arteriovenous pressure differentials in both men and animals pointed to a decreased brain perfusion pressure and it is concluded that cerebral symptoms occurring at levels of headward centrifugal force in the range of 3 to 5 g may be due to changes of reflex origin. These disturbances could result from the marked carotid sinus stimulation that accompanies the increase in blood pressure at head level. (J. Aviation Med. 22:81, 1951)

1,829

Gamow, G. 1962 GRAVITY
(New York: Doubleday & Company, Inc., 1962) (paperback)

SUMMARY: This publication is one of the Science Study Series, intended for the layman or secondary school student, and written by Dr. Gamow, Professor of Physics at the University of Colorado. Ten chapters contain the following topics: How Things Fall, The Apple and the Moon, Calculus, Planetary Orbits, The Earth as a Spinning Top, The Tides, Triumphs of Clestial Mechanics, Escaping Gravity, Einstein's Theory of Gravity, and Unsolved Problems of Gravity (Gravity and Quantum Theory, Antigravity). 157 pp.

1,830

Gandelot, H.K. & P.C. Skeels 1962 CONSIDERATIONS IN CRASH ENERGY ABSORPTION IN M.K. Cragun, ed., The Fifth Stapp Automotive Crash and Field Demonstration Conference, 14-16, Sept. 1961. Pp. 291-224

1,831

Gantz, K. F., ed. 1959 MAN IN SPACE: THE UNITED STATES AIR FORCE PROGRAM FOR DEVELOPING THE SPACECRAFT CREW.
(New York: Duell, Sloan, and Pearce, 1959).

ABSTRACT: Contents include: "The Threshold of Space"; "From Aviation Medicine to Space Medicine"; "Basic Factors in Manned Space Operations"; "Biomedical Aspects of Space Flight"; "Biodynamics of Space Flight"; "The Engineered Environment of the Space Vehicle"; "Human Performance in Space "; "Weightlessness"; "Observation in High-Altitude, Sealed-Cabin Balloon Flight"; "Experimental Studies on the Conditioning of Man for Space Crews"; "Escape and Survival During Space Operations"; "Time Dilation and the Astronaut"; "The Spiral Toward Space"; "Human Factors Support of the X-15 Program"; "The U. S. Air Force Human Factors Program"; "Blueprint for Space"; and "The Military Impact of Manned Space Operations".

1,832

Garbell, M.A. 1960 SOVIET RESEARCH ON GRAVITATION: AN ANALYSIS OF PUBLISHED LITERATURE. (Science and Technology Section, Air Information Division, Library of Congress, Washington, D.C.) Rept. No. AID 60-61, Oct. 1960, ASTIA AD 246 700.

ABSTRACT: A survey is given of Soviet research in the field of gravitation with a comparison of Soviet and Western research. The appendix contains a translation of K.P. Stanyukovich's "The Problem of the Physical Nature of Gravity." A correlation is included of Stanyukovich's public statements on weightlessness with views expressed by other Soviet scientists.

1,833

Garber, T. B. 1958 ON THE ROTATIONAL MOTION OF A BODY RE-ENTERING THE ATMOSPHERE. (Rand Corp., Santa Monica, Calif.) Rept. No. P-1407; 19 June 1958

ABSTRACT: A formulation of the exact equations of motion of a body acted on by aerodynamic and gravitational forces, using inertial axes fixed in a spherical, nonrotating earth. After considering the nature of a typical re-entry path, the equations of motion are linearized. Solutions of the linearized equations are then obtained by the use of a modified WKBJ approximation method.

1,834

Gard, P. W., L. B. Cochran, & M. E. Norsworthy 1955 G x TIME FLIGHT PATTERNS IN THE MANEUVERS AS FLOWN IN ADVANCED TRAINING UNITS 300 AND 301. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.15-0100. 1.3., 21 Feb. 1955

1,835

Garrill, R.A. & F.W. Snyder 1957 PRELIMINARY STUDY OF AIRCREW TOLERANCE TO LOW-FREQUENCY VERTICAL VIBRATION. (Boeing Airplane Company, Wichita 1, Kansas) Document No. D3-1189, Issue No. 36, Contract No. AF 34(601)-2975

ABSTRACT: Five aircrewmen were subjected to vertical harmonic motions of frequencies ranging from 3 to 30 cps with input accelerations ranging to a maximum of over 2.5 g. The subjective judgments of the effect of the vibrations on the aircrewmen were reported by them in terms of a 5-point scale. The results of the subjective judgment tests indicate that aircrewmen are able to tolerate unexpectedly high levels of vibratory acceleration for relatively short periods at the frequencies explored. Transmissability of vibration from supporting structure adjoining the seat to just under the body of the seated airman varied with frequency. Generally, the higher frequencies were transmitted with a greater loss in amplitude of vibration (or g's) than were the lower frequencies.

The same aircrewmen performed a tracking task while being subjected to vibration of various amplitudes and frequencies. The magnitude and duration of error in tracking was electrically integrated to produce a comparable score for each vibration condition. It was tentatively found that there were statistically significant decrements in performance under vibration conditions which were judged to be nearly "intolerable." In addition, there were some notable individual differences in response to the various vibration conditions.

1,836

Garrote Vega, M. 1942 ENFERMEDAD DE LAS ACELERACIONES DE LOS AVIADORES. (ACCELERATION DISEASE OF AVIATORS). Medicina (Madrid) 10:330-337 April 1942.

1,837

Garrow, J.S. 1960 POSITIVE ACCELERATION AND THE RELEASE OF ANTI-DIURETIC HORMONE IN MAN. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 1129, Nov. 1960. ASTIA AD 257 043

ABSTRACT: Three normal experienced centrifuge subjects were maintained with a water load of 250 ml. for three hours. At the middle of this period

they were exposed to 2 g positive for ten minutes. One subject always had an antidiuresis, one never, and one sometimes. The reasons for this are discussed. The retention of water was shown to be an effect of the release of about 100 milliunits of antidiuretic hormone; there was also a transient retention of solids, sodium and potassium, but this is not an antidiuretic hormone effect.

1,838

Garsaux, P. 1935 RESULTS OF THE EXPERIMENTS ON THE 12TH AND 17TH OF JULY 1918 FROM THE ACTION OF CENTRIFUGAL FORCE IN DOGS". (Exper. Serv. Tech. Sect., Milit. Aeronaut., Office of Minist. of War, Paris, 1918). (In Schubert, G., Physiologie des Menschen in Flugzeug) (Berlin: J. Springer, 1935).

1,839

Garsaux, Malassex & Toussaint 1926 SUR LE VERTIGE DE ROTATION (On The Vertigo Of Rotation)
C. r. Acad. Sci. Paris 182:236-238

1,840

Garsaux & Strohe 1932 SES EFFETS SUR L'ORGANISME (Its Effects on the Organism)
Revue aeronautique internationale (Paris) 2(6): 467-475, Dec. 1932.

1,841

Gartmann, H., ed. 1952 RAUMFAHRT-FORSCHUNG (Space Travel Research) (Munich: R. Oldenbourg, 1952)

ABSTRACT: Five contributions by different authors are introduced by a short preface by H. Gartmann. The contributions are (1) Willy Ley, The History of the Idea of Space Travel; (2) Professor Dr. W. Schaub, The Mathematical basis of Space Flight; the Two-body problem and the Solvable Cases of the Three-body Problem; (3) R. Engel, Dr. U. T. Bodewadt, & K. Hanisch, The Satellite Station; (4) Professor H. Oberth, Stations in Space; (5) Professor Dr. H. von Diringshofen, Medical Problems of Space Travel. The book ends with some notes about the astronautical Societies existing in 1952, and the I. A. F., by H. H. Kolle, and a bibliography of space travel from 1919. (CARI)

1,842

Gartmann, H. 1957 MAN UNLIMITED
(New York: Pantheon Books, 1957)

ABSTRACT: Provides information for the layman on some of the psychophysiological stresses man may expect in space flight.

1,843

Gaspa, P. 1953 PROBLEMES PHYSIOLOGIQUES POSES PAR L'ASTRONAUTIQUE (PHYSIOLOGICAL PROBLEMS POSED BY SPACE FLIGHT)
Rev. path. gen. comp. 53: 1485-1503

1,844

Gatland, K.W. 1952 DESIGN FOR ZERO G: A MAN CARRYING ROCKET FOR PHYSIOLOGICAL RESEARCH IN NEAR SPACE.
Flight (London), 61:774-775, 779, 27 June 1952.

ABSTRACT: The plans for a man-carrying rocket presented by R.A.Smith and H.E. Ross of Great Britain in 1946 are discussed. The rocket, which would be propelled by compressed air and alcohol, would have no tail fins. Its initial thrust would be 60,000 lb., its initial acceleration 9.8 ft/sec^2 (after 110 seconds, the effective acceleration would be 2 g). An automatic device would keep the rocket under control in case the pilot would black out. The essential feature of the missile would be its detachable cabin unit, jettisoned by an automatic compressed air device shortly before peak altitude would be reached. The cabin would descend by parachute. While outside the effect of the gravitational pull of the earth, various degrees of "weight" of the pilot may be attained by an axial spin imparted on the cabin by small peroxide-permanganate motors firing tangentially at right angles to its main axis. The range of the rocket has been calculated to be 200 miles, but 180-190 miles is considered the limit of safety. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space Medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903; ASTIA AD-227 817; Feb. 1959)

1,845

Gatland, K. W. & A. M. Kunesch 1953 SPACE TRAVEL
(New York: Philosophical Library, 1953)

1,846

Gatland, K.W. 1954 PROGRESS TOWARDS ASTRONAUTICS
Journal of the British Interplanetary Society 13(3): 142-166, May 1954

ABSTRACT: Review of achievements and opinions recorded in 1949 and progress made by 1954; aerodynamic research techniques developed in United States; specific research aircraft described; design of pressure suits; human centrifuge; research in high atmosphere; and guided missiles.

1,847

Gatland, K. W. 1958 ASTRONAUTICS IN AMSTERDAM
Flight 74:434-435.

ABSTRACT: Brief summaries of some of the papers read at the Ninth IAF Congress, 25-30 Aug. 1958. For another brief report, see Aeroplane, 95:389, Sept. 1958.

1,848

Gatland, K. 1959 MAN INTO SPACE.
Royal Air Force Flying Rev., 14(9):23-25

ABSTRACT: Reviews United States and Russian achievements in space flight in putting animals into space (monkeys and mice in Aerobee rockets in 1952; white mice in Thor-Able rockets; Gordo, the squirrel-monkey, in a Jupiter nose-cone in 1958; and the dog, Laika, in Sputnik II in 1957). Reviews specifications for the payload of the projected Mercury capsule.

1,849

Gatling, F. P. et al 1959 TRENDS IN NAVAL AVIATION INJURY PATTERNS.
(Aero-Medical Dept. U. S. Naval Aviation Safety Center) Rept. No. AM-3-59.

CONCLUSIONS:

1. Neither techniques nor equipment have been able to eliminate the lethal character of Naval aircraft accidents or prevent them from growing proportionately more lethal with the passing years.

2. If the forces involved in Naval aircraft accidents are sufficient to inflict an injury upon the personnel, the chances are about even that the injury inflicted will be a fatal one.

1,850

Gatling, Frank P., E. M. Wurzel, J. H. Britton 1959
TRENDS IN NAVAL AVIATION INJURY PATTERNS
Rept. no. AM-3-59 June ASTIA AD 227 326
(Naval Aviation Safety Center, Norfolk, Va.)

ABSTRACT: Data from the Naval Aviation Safety Center were accumulated from accident reports from the close of World War II (1946) through 1958. The data were examined and tabulated by specific accident type, phase, and damage classifications in current use at the Safety Center. Corresponding tables were constructed for fatal injuries. In addition, the data were developed for bailouts and ejections and their related injury patterns. Taking the data in their entirety, they indicated that there has been a gradual shift over the years in the aircraft accident pattern. For instance, changes in the type of accidents, the phases in which they begin, the methods of escape and so forth, are occurring. Perhaps because of a universal inability to develop a satisfactory classification system, inadequate reporting procedures, or perhaps because it does not exist, practically no shifting is discernible in the patterns of injury, with one exception. This exception has been the steady increase in the proportion of fatal injuries which has grown steadily over the years in Naval Aircraft accidents. (AUTHOR)

1,851

Gaty, Jack 1958 HOW TO SURVIVE A FORCED LANDING
U.S. Army Aviation Digest 4: 39-41.

1,852

Gauer, O. 1938 DIE ATEMMECHANIK UNTER BESCHLEUNIGUNG (Mechanism of Respiration During Acceleration)
Luftfahrtmedizin 2: 291-294
See also: (Dept. of the Air Force) German Avia. Med., World War II, Vol. I

1,853

Gauer, O. 1938 KREISLAUF UND FLIEHKRAFTE (Circulation and Centrifugal Forces)
Luftfahrtmedizinische Abhandlungen (Leipzig) 2: 99-102.

1,854

Gauer, O. 1938 ATMUNG UND BESCHLEUNIGUNG (Breathing and Acceleration)
Luftfahrtmedizinische Abhandlungen (Leipzig) 2: 190-191.

1,855

Gauer, O. 1939 UBER DEN JETZTEN STAND DER BESCHLEUNIGUNGSFORSCHUNG IN DER LUFTFAHRTMEDIZIN (Concerning the Most Recent Developments in Acceleration Research in Aviation Medicine)
Deutsche Militärarzt. (Berlin) 4:497-503.

1,856

Gauer, O. & S. Ruff 1939 DIE ERTRAGLICHKEITSGRENZEN FUR FLIEHKRAFTE IN RICHTUNG RUCKEN-BRUST. (The Limits of Tolerance for Flying Stress in the Transverse Direction) Luftfahrtmedizin 3:225-230

1,857

Gauer, O. & S. Ruff 1939 DIE ERTRAGLICHKEITSGRENZEN FUR FLIEHKRAFTE IN RICHTUNG RUCKEN-BRUST. (The Limits of Tolerance for Flying Stress in the Transverse Direction).
Luftfahrtmedizin 3:225-230

ABSTRACT: Human subjects can tolerate for longer periods (more than 30 seconds) transverse flying stress from back to chest, corresponding to centrifugal acceleration of 8-10 g. The subjective symptoms are so slight that it appears likely that this limit might be considerable exceeded, especially for short periods. Prolonged centrifugal tests above 8 g, petechial hemorrhages appears in the ocular conjunctiva which disappear after two days. The degree of tolerable transverse stress in the back-chest direction depends largely upon the condition of the substrate upon which the body rests and upon the construction of an apparatus giving reliable support to the head at onset of acceleration and preventing injury by knocking against other structures. (J. Aviation Med. 10(3):156).

1,858

Gauer, O. 1939 LEISTUNGSGRENZEN DES ORGANISMUS IM SCHNELLFLUGZEUG (Performance Limits of the Organism in the Highspeed Aircraft)
Klinische Wochenschrift (Berlin) 18:139-140.

1,859

Gauer, O. & Hubertus Strughold 1943 ROENTGENCINEMATOGRAPHY IN THE SERVICE OF PHYSIOLOGICAL ACCELERATION RESEARCH (ROENTGENKINEMATOGRAPHIE IM DIENST DER PHYSIOLOGISCHEN BESCHLEUNIGUNGSFORSCHUNG)
ASTIA ATI 76 123

1,860

Gauer, O.H. & H. Wieckert 1944 DES ELEKTROKARDIOGRAMM DES MENSCHEN BEI FLIEHKRAFTWIRKUNG (The Electrocardiogram of Man During the Effect of Centrifugal Force)
Luftfahrtmedizin 9: 121

1,861

Gauer, O.H. 1944 FLIEHKRAFTERTRAGLICHKEIT BEI SAUERSTOFFMANGEL (Centrifugal Force Endurance During Lack of Oxygen)
Luftfahrtmedizin 9: 104

1,862

Gauer, O.H. 1944 RÖNTGENKINEMATOGRAPHISCHE DARSTELLUNG DER FLIEHKRAFTWIRKUNG (Roentgencinematography Presentation of the Effects of Centrifugal Force)
Luftfahrtmedizin (Berlin) 9: 109
See also: (Dept. of the Air Force), German Aviation Medicine, World War II, Vol. I., "X-ray Photographs During Acceleration"

1,863

MOTION PICTURE

Gauer, O. H. 1948 PRINCIPLES OF PROTECTION AGAINST NEGATIVE G. (U.S.A.F., Wright Field, Ohio) EM-807-4162-AL, March 1948.

1,864

Gauer, O. H. 1950 THE ELECTROCARDIOGRAM DURING EXPOSURES TO CENTRIFUGAL FORCES German Aviation Medicine World War II (Washington: Dept. of the Air Force, 1950), I, 570-576.

1,865

Gauer, O. H. 1950 THE PHYSIOLOGICAL EFFECTS OF PROLONGED ACCELERATION. In German Aviation Medicine, World War II. (Washington: Dept. of the Air Force, 1950), I, 554-583.

1,866

Gauer, O.H. 1950 EVIDENCE IN CIRCULATORY SHOCK OF THE ISOMETRIC PHASE OF VENTRICULAR CONTRACTION FOLLOWING EJECTION
(Paper, The American Physiological Society 59th Annual Meeting, Atlantic City, New Jersey, April 17-21, 1950) Federation Proceedings 9: 47

ABSTRACT: Simultaneous pressure recordings in the outflow region of the left ventricle and the aortic root were taken with 2 miniature manometers mounted on the tips of intracardiac catheters in an anesthetized dog. In the normal animal the summits of the ventricular and aortic pressure curves are congruent and considerable displacement of the ventricular catheter does not affect the pressure contours. If the catheter is kept in this region of the heart and circulatory shock is induced by exsanguination, unusual pressure records may be anticipated when the mean arterial pressure falls below 50 mm. Hg. While the ventricular curve follows an almost sine wave pattern with maximum pressures of 120-200 mm. Hg, the aortic pressure drops abruptly after reaching a peak of 50-60 mm. Hg. This picture is more pronounced in certain stages of adrenalin effect under shock. It can be readily explained by the assumption that the ventricle continues to contract isometrically with considerable force after having expelled its pathologically small blood content. This condition may help to account for the high incidence of subendocardial hemorrhages observed in humans and experimental animals suffering from prolonged circulatory shock.

1,867

Gauer, O., & J. P. Henry 1953 PHYSIOLOGY OF FLIGHT.
Air Force Manual 160-30 (Washington, D. C.: U. S. Government Printing Office, July 1953) pp. 133-134.

1,868

Gauer, O.H. and W.E. Hull 1954 PARADOXIC FALL OF PRESSURES IN THE RIGHT AND LEFT AURICLES AND THE PULMONARY ARTERY WITH A HEAD-DOWN TILT.
Fed. Proc. 13:52

ABSTRACT: Clark, Hooker and Weed (Am. J. Physiol. 109:166, 1934) first described a paradoxic fall of right auricular pressure when an anesthetized dog was tilted head down. This phenomenon was confirmed by Wilkins, Bradley and Friedland to exist also in humans (J. Clin. Investigation 29:940, 1950). By the use of intravascular miniatrue manometers (Science 112:404, 1950) placed at various locations in the left heart, the right heart and pulmonary artery in anesthetized dogs 2 pressures were recorded simultaneously while tilting the animals. It was found that the pressure fall with the head-down tilt is not confined to the right auricle but extends throughout the intrathoracic circulation. Measurements in humans by Asmussen, Christensen and Nielsen (Surgery 8:604, 1940) and the observation in our dogs that the arteriovenous pressure gradient across the lungs is reduced in the head-down posture suggest that the filling of the intrathoracic circulation is probably increased in spite of decreased intravascular pressures. This observation serves to emphasize the relative independence of volume and pressure as hemostatic parameters.

1,869

Gauer, O. H. 1955 VOLUME CHANGES OF THE LEFT VENTRICLE DURING BLOOD POOLING AND EXERCISE IN THE INTACT ANIMAL. THEIR EFFECTS ON LEFT VENTRICULAR PERFORMANCE . Physiol. Rev. 35:143-155.

1,870

Gauer, O.H. & G.D. Zuidema, eds. 1961 GRAVITATIONAL STRESS IN AEROSPACE MEDICINE
(Boston: Little, Brown, & Co., 1961)

ABSTRACT: Contents include: "The Physiology of Acceleration" by O.H. Gauer; "Historical Aspects of Gravitational Stress" by O.H. Gauer; "Definitions: Magnitude, Direction, and Time Course of Accelerative Forces" by O.H. Gauer; "The Hydrostatic Pressure" by O.H. Gauer; "Arterial Blood Pressure Responses to Positive Acceleration in Animals" by R.W. Lawton; "Blood Volume and Gravitational Stress" by O.H. Gauer; "The Circulation in Man Under Gravitational Stress and in the Giraffe" by O.H. Gauer; "Reflex Responses of the Circulation" by O.H. Gauer and E.W. Salzman; "Effect of Acceleration on the Heart" by H.O. Sieker; "Effect of Acceleration on Respiration" by O.H. Gauer and S. Bondurant; "Visual Performance Under Gravitational Stress" by W.J. White; "The Physiology of Acceleration-Performance" by J.L. Brown; "The Physiology of Positive Acceleration" by O.H. Gauer and G.D. Zuidema; "The Physiology of Negative Acceleration" by O.H. Gauer; "The Physiology of Combined Accelerations" by R. Edelberg; "Transverse G: Prolonged Forward, Backward, and Lateral Acceleration" by S. Bondurant; "Escape from High Performance Aircraft" by R.R. Hessberg; "Human Tolerance to Severe, Abrupt Acceleration" by J.P. Stapp; "Sub-Gravity and Weightlessness" by D.C. Simons; "Some Physiological Considerations of Space Flight" by G.D. Zuidema; "Clinical Evaluation of Low G Tolerance" by S.D. Leverett, R.U. Whitney and G.D. Zuidema; "The Hydrostatic Indifference Level" by O.H. Gauer; "The Hydrostatic Pressure in the Arterial Tree" by R.W. Lawton; and "Standardization of Human Centrifuge Techniques" by S.D. Leverett and G.D. Zuidema.

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Gauer, O. H. 1961 BLOOD VOLUME AND GRAVITATIONAL STRESS.
In Gauer, O.H. & G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine. (Boston: Little, Brown, and Co., 1961) Pp. 39-42.

1,872

Gauer, O. H. 1961 DEFINITIONS: MAGNITUDE, DIRECTION, AND TIME COURSE OF ACCELERATIVE FORCES.
In Gauer, O.H. & G.D. Zuidema, eds., Gravitational Stress in Aerospace Medicine. (Boston: Little, Brown, and Co., 1961). Pp. 10-15.

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Gauer, O. H. 1961 HISTORICAL ASPECTS OF GRAVITATIONAL STRESS.
In Gauer, O. H. & G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine. (Boston: Little, Brown, and Co., 1961). Pp. 7-9.

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Gauer, O. H. 1961 THE HYDROSTATIC PRESSURES.
In Gauer, O. H. & G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine. (Boston: Little, Brown, and Co., 1961). Pp. 16-28.

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Gauer, O. H. 1961 THE PHYSIOLOGY OF ACCELERATION.
In Gauer, O. H. & G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine. (Boston: Little, Brown, and Co., 1961). Pp. 3-6.

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Gauer, O. H. 1961 THE PHYSIOLOGY OF ACCELERATION — PERFORMANCE.
In Gauer, O. H. & G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine. (Boston: Little, Brown, and Co., 1961). Pp. 90-114.

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Gauer, O. H. 1961 THE HYDROSTATIC INDIFFERENCE LEVEL.
In Gauer, O. H. & G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine. (Boston: Little, Brown, and Co., 1961). Pp. 257-259.

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Gauer, O. H. 1961 THE PHYSIOLOGY OF NEGATIVE ACCELERATION.
In Gauer, O. H. & G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine. (Boston: Little, Brown, and Co., 1961). Pp. 134-139.

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Gauer, O. H. 1961 THE CIRCULATION IN MAN UNDER GRAVITATIONAL STRESS AND IN THE GIRAFFE.
In Gauer, O. H. & G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine. (Boston: Little, Brown, and Co., 1961) Pp. 43-45.

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Gauer, O. H. & S. Bondurant 1961 EFFECT OF ACCELERATION ON RESPIRATION. In Gauer, O. H. & G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine. (Boston: Little, Brown, and Co., 1961). Pp. 61-69.

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Gauer, O. H. & G. D. Zuidema 1961 THE PHYSIOLOGY OF POSITIVE ACCELERATION. In Gauer, O. H. & G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine. (Boston: Little, Brown, and Co., 1961). Pp. 115-133.

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Gauer, O. H. & E. W. Salzman 1961 REFLEX RESPONSES OF THE CIRCULATION. In Gauer, O. H. & G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine. (Boston: Little, Brown, and Co., 1961). Pp. 46-51.

1,883

Gaulejac, R. De 1939 DES LESIONS ET TROUBLES ORGANIQUES IMPUTABLES AUX DESCENTES EN PARACHUTE (The Organic Injuries and Confusion Attributed to Parachute Descent)
Bull. Med. 53:258-262.

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Gay, L. N. and P.E. Carliner 1949 PREVENTION AND TREATMENT OF MOTION SICKNESS. I. SEA SICKNESS. Science, 109: 359

1,885

Gay, L. N. and P.E. Carliner 1950 A SUBSEQUENT REPORT ON DRAMAMINE: THE PROPHYLACTIC AND THERAPEUTIC CONTROL OF MOTION SICKNESS.
Bull. Johns. Hopkins Hosp., 36:254

1,886

Gazenko, O.G., & V.T. Yazdovsky n.d. SOME RESULTS OF PHYSIOLOGICAL REACTIONS TO SPACE FLIGHT CONDITIONS. (The Academy of Science of the U.S.S.R., Moscow)

ABSTRACT: Of special predominant importance for the biologist and physician are all aspects of investigations referring to the traditional problem of flight safety - protection of man and his potential fellow - travellers, the Earth's living organisms, from the detrimental influence of the external factors of space flight.

1,887

Gazenko. O. G. and V. B. Malkin 1958 BIOLOGY OF COSMIC FLIGHTS (Biologiya Kosmicheskikh Poletov)
Trans. of Nauka i Zhizn' (USSR) 25(11):17-21, 1958. ASTIA AD 257 712.

ABSTRACT: The maintenance of normal living conditions for men during cosmic flights is the main task of cosmic biology. At the present time two groups of experiments are being conducted in the USSR: laboratory experiments and experiments in rockets with telemetric registration of biologic functions. Great difficulties have got to be overcome in solving re-entry at supersonic velocities. The effects of acceleration are being thoroughly studied, whereby it was found that acceleration of 10 G may be endured for several minutes. However, acceleration should be considerably lower than this to maintain operating ability. The authors describe the different operations of re-entry from a cosmic flight: catapulting of pressure cabin from the space ship, slowing down of descent by means of reactive drives and parachute, and finally landing of the cabin with a parachute. (CARI)

1,883

Gazenko, O.G., and R.M. Baevskii 1961 PHYSIOLOGICAL METHODS IN SPACE MEDICINE. (Fiziologicheskie metody v kosmicheskoi meditsine)
Iskusstvennye sputni i zemli (Moskva), 11: 68-77

ABSTRACT: Biotelemetrical methods in space medicine may be grouped along the following lines of application; (1) continous monitoring of physiological functions in man or animals during space flight, (2) research on the effects of cosmic flight factors on the living organism, and (3) indicators of hazards to human life or the design of transducers and amplifiers, conversion or coding of medical information in a form suitable for input into the telemetry channels, programming of measurements, and the volume of information to be transmitted. A brief review is presented of experience with methods employed on the second and third Soviet space flights, i.e., electrocardiography, seismocardiography (modified ballistocardiography), pneumography, electromyography, actography, thermometry, and investigation of conditioned reflexes.

1,889

Gazenko, O. G. 1961 FUNDAMENTAL MEDICOBIOLOGICAL PROBLEMS OF SPACE FLIGHT
Meditsina i kosmicheskiye polety; sbornik 1961(9):13-27

ABSTRACT: Great achievements have recently been made in the field of space biology and space medicine. Rocket tests using animals were made to investigate the problems of noxious effects of cosmic factors on organisms, life preservation during space flight, and effects of acceleration and weightlessness. After the rocket tests, artificial satellites and space ships were launched. The vehicles carried equipment to record the pulse and respiratory rates, electrocardiogram, and motility of the animals on board. An evaluation of the recorded data showed that weightlessness had n o strong effect upon the basic physiological functions. The effect of cosmic radiation after landing was also studied. (CARI)

1,890

Gazenko, O.G. & V.I. Yazdovskiy 1961 SOME RESULTS OF PHYSIOLOGICAL REACTIONS TO SPACE FLIGHT CONDITIONS
Paper: XIIth International Astronautical Congress in Washington, D.C., October 4, 1961

ABSTRACT: In this discussion of the problems of overload and weightlessness, it is noted that a direct dependence of blood oxygenation on the rate of the blood stream testifies to the active participation of hemodynamics of pulmonary circulation in the oxygenation of the blood in the lungs. Thus, active rearrangement of pulmonary circulation can within certain limits insure the preservation of the necessary blood oxygenation level. However, in view of the apparent inequality of the volumes of blood ejected by the right and left ventricles, and taking into account the progressive storage of blood in the lungs, it is difficult to imagine the possibility of enduring increased gravitation for a lengthy period of time. In the study of the mechanisms of the action of overloads on the central nervous system, tests with aminazine as a means of blocking the impulsation at the level of the reticular formation of the middle brain offer promise. The differences in the frequency of pulse and breathing registered by Gagarin and Titov in centrifugal tests and during actual flight are attributed to emotional stress. With regard to weightlessness, the definite instability which has been indicated in the central apparatus which controls vegatative functions probably results from a change in the afferent impulses. Titov noted unpleasant sensations of vestibular character during the entire period of weightlessness. These require a careful analysis. (CARI)

1,891

Gazenko, O. 1962 SPACE BIOLOGY
Joint Publications Research Service, Washington, D.C.) JPRS-16677
Transl. from Nedelya (Moscow), Aug. 5-11, 1962, Pp. 6-7

ABSTRACT: This article discusses the role of biology in the space sciences in terms of the effects of the space environment on living organisms, and of the methods for selecting and training the astronaut. The space environment problems covered are weightlessness, overloading, radiation, and psychological stresses. The importance of considering these psychological factors when selecting astronauts is considered, and methods of training under isolated conditions are described.

1,892

Gazenko, O.G. 1962 SOME PROBLEMS OF SPACE BIOLOGY.
Akademiya nauk SSSR. Vestnik (Moskva) 32(1):30-34, Jan. 1962.
(Office of Technical Services, Washington, D.C.) 62-24338. 22 Mar. 1962.

ABSTRACT: The General Assembly of the Otdeleniye biologicheskikh nauk Akademii nauk SSSR (Department of Biological Sciences of the Academy of Sciences USSR) met in Moscow in 1961 to discuss problems of space biology. Over 30 reports were made and three films shown.. N.M. Sisakyan, V.V. Parin, V.N. Chernigovskiy, and V.I. Yazdovskiy reported on "Problems of Space Biology and Physiology.' In the report 'Some General Results of Medical and Biological Experiments on Cosmic Earth Satellites", O.G. Gazenko, A.M. Genin, and V.I. Yazdovskiy discussed the main results of the biological experiments. The following three main problems exist at present in space biology: (1) clarification of effect of extremum factors of space on living terrestrial organisms: (2) elaboration of the biological fundamentals of safeguarding space flight; and life on other planets; (3) investigation of the conditions and forms of life beyond the earth. The factors of space flight affecting living organism may be divided into three groups: (1) overstrain, vibrations, engine noise, weightlessness; (2) ultraviolet, infrared, and visible ranges of radiation, ionizing radiation, concentration of gas and solid matter, temperature conditions, etc.; (3) insulation, restricted space, peculiarities of the microclimate, rhythm of life, nutrition, etc. The cosmonauts Yu. A. Gagarin and G.S. Titov are mentioned. Under the effect of weightlessness, the two Soviet cosmonauts felt a change of heart beat, diziness, and sickness. The effect of overstrain and protective measures are serious problems. Perfection of biotelemetry is of great importance for the development of space biology. Lately, methods have been elaborated, permitting study of the coordination of arbitrary movements of man and the blood supply to the brain. (CARI)

1,893

Gazenko, O.G., N.N. Zhukov-Vereshhaikov, and V. Ya Kop'yev 1962 TRANSLATIONS FROM NAUKA I ZHIZN' (MOSCOW) (SCIENCE AND LIFE), No. 9. SEPTEMBER 1962.

CONTENTS:

"Five Days Which Shook The World" O.G. Gazenko, p. 1-12
"Biology and Flights to Outer Space" N.N. Zhukov-Vereshnikov and V. Ya. Kop'yev (Acad. Med. Sci. USSR) p. 13-22

1,894

Gazenko, O. et al 1962 PHYSIOLOGICAL INVESTIGATIONS ON "VOSTOK-2" (AMD) AVIATION MEDICINE
Trans. of Aviatsiya i Kosmonavtika (USSR) 44(7):29-34, 90-91, 1962.
(Joint Publications Research Service, San Francisco, Calif.)
Oct. 15, 1962 JPRS: 15706

1,895

Gazley, C., Jr. 1957 DECELERATION AND HEATING OF A BODY ENTERING A PLANETARY ATMOSPHERE FROM SPACE.
(The RAND Corporation, Santa Monica, Calif.) P-955, Feb 18, 1957.
In Alperin, Morton, Stern, and Wooster, Eds. Vistas in Astronautics, (London: Pergamon Press, 1958)

ABSTRACT: An investigation of the conditions for a safe passage through a planetary atmosphere for instrumented or manned space vehicles, in view of the heating and deceleration to be expected. The dynamics and thermodynamics of several types of entry into the atmospheres of Venus, Earth, and Mars are considered. With the proper planetary approach, successful penetration of these atmospheres appears possible.

1,896

Gazley, C., Jr. 1957 DECELERATION AND HEATING OF A BODY ENTERING A PLANETARY ATMOSPHERE FROM SPACE (Rand Corp, Santa Monica, Calif.) Report no. P-955, 18 Feb 1957, ASTIA AD-221 678

ABSTRACT: The dynamics and thermodynamics of several types of entry into the atmospheres of Venus, Earth, and Mars are considered. Deceleration and heating are most severe for direct entry from a parabolic approach orbit. Appreciable reduction is obtained if the vehicle can be maneuvered into a circular satellite

orbit; entry by decay from a circular orbit is more gradual and both deceleration and heating occur higher in the atmosphere. Further reduction is obtained through the use of a body with gasdynamic lift. In all cases surface heating rates can be reduced by increasing the drag-mass ratio of the body, or the lift mass ratio in the case of a lifting body. Based on current estimates of planets atmospheres and hypersonic gasdynamics, successful penetration of the atmosphere of Venus, Earth, and Mars appears feasible providing a proper planetary approach can be made. Heating and deceleration during entry into the atmospheres of Venus and Earth are almost identical. Heating and deceleration are appreciably lower for entry into the Martian atmosphere. (Author)

1,897

Gazley, C., Jr. 1958 THE PENETRATION OF PLANETARY ATMOSPHERES. (Rand Corp., Santa Monica, Calif.) Rept. P-1322, 24 Feb. 1958.

1,898

Gazley, C. 1960 ATMOSPHERIC ENTRY OF MANNED VEHICLES. (Paper, IAS-NASA-RAND Manned Space Stations Symposium, April 1960, Los Angeles, Calif.) (Rand Corp., Santa Monica, Calif.) Research Memo No. RM-2579; 20 Jan. 1960. ASTIA AD 244 947.

ABSTRACT: The establishment of manned space stations requires the development of a reliable system for manned return to the earth. The requirements of such a system are reviewed and compared with the characteristics of various atmospheric-penetration techniques. While human deceleration limitations require the relatively low decelerations of gradual atmospheric entry (i.e., shallow path), the aerodynamic shaping of the vehicle and the method of surface-heat-absorption (or rejection) can conceivably cover a wide range of feasibly possibilities. The problems of orbital departure and the establishment of the initial-entry path, the dynamics of deceleration during entry, the aerodynamic heating of the vehicle surface, and the characteristics of various types of surface-protection systems are discussed. It is concluded that there are two types of feasible vehicles for manned entry: (1) a blunt, dense vehicle with little or no aerodynamic lift and a low-temperature ablation-cooling system, and (2) a radiation-cooled vehicle using a very light drag brake or lifting surface to achieve high-altitude deceleration. (Author)

1,899

Geddes , L. A. H. E. Hoff & W.A. Spencer 1961 SHORT DISTANCE BROADCASTING OF PHYSIOLOGICAL DATA
IRE Trans. on Bio-Medical Electronics, BME-8(3):168-172, July 1961.

ABSTRACT: The need for short distance transmission of physiological measurements being made on a hospital patient for diagnostic study, monitoring

of therapeutic techniques, or for teaching is discussed. The development of facilities to telemeter such data is described. A direct wire system is described and its advantages discussed. (Tufts)

1,900

Geer, R. L., & J. F. Rayfield 1959 DEVELOPMENT AND TEST OF A BALLOON BORNE MANNED VEHICLE (Wright Air Development Division, Wright - Patterson AFB, Ohio) WADD TR 59 - 226; ASTIA AD - 227 244

ABSTRACT: Balloon borne vehicles are well suited for use as a means of lifting parachutusts to a very high altitude for test jumping. The design, fabrication, and testing of a vehicle, developed at the Wright Air Development Center for this purpose, are discussed in this report. Included are presentations of novel designs for a pressure-retaining hatch and an energy-absorbing parachute landing device.

1,901

Geertz, A. 1944 GRENZEN UND SONDERPROBLEME BEI DER ANWENDUNG VON SITZKATAPULTEN (Limits and Special Problems in the Use of Seat Catapults) Doctorate Thesis, 1944. Tech. Hochscule Stuttgart ASTIA ATI 56946.

ABSTRACT: The limits of human tolerance to the forces imposed on the body during seat catapult ejection from aircraft were investigated. Methods of measuring short time accelerations are described, and the ejection velocity and flight path required for the seat to clear the tail of the aircraft are determined. Experimentally observed effects of seat ejection on the human body are described. The limitations of present seat catapults are shown, and an equation is derived of less than 0.5 sec duration is discussed, including the results of tests of the strength of the human vertebrae and other experiments.

1,902

Geertz, A., tr., V. J. Wulff 1945 TESTING OF CATAPULT MECHANISM OF THE TA 154 (Ernst Heinkel Flugzeugwerke G. m. b. H., Seestadt Rostock, Research Div.) Research Rept. 4325, Supplement 4, Pages A-17116-A-17120, July 1944 Translated as Appendix 12 to Lovelace, W. R., E. J. Baldes, & V. J. Wulff, The Ejection Seat for Emergency Escape from High-Speed Aircraft, ATI No. 7245

SUMMARY: The experimental results of the 5 new cartridge types used with a 700 mm. (27.6 in.) stroke, 75 mm. (2.95 in.) greater than the earlier value, indicated higher terminal velocities and lower peak accelerations with types HL 34/4, HO 33/4 and HO 36/4 than with HL 30/4 and a 625 mm. (24.6 in.) stroke (cp. V.B. 4325,

supplement 3). However, since the scatter also was broader, consideration of the lowest values indicates that a satisfactory solution has not yet been achieved. In other words, the application of a power-driven catapult seat mechanism must still be limited to aircraft types which only require a small amount of energy for safe ejection. The performance of the cartridge types HL 32/4 and HL 35/4 were inferior to that of cartridge type HL 30/4 with a 625 mm. (24.6 in.) stroke, so that increasing the stroke does not seem to be justified. The coefficient of fullness seems very favorable throughout - a fact which, considered together with the low weight, suggests that attempts should be made to improve this exercise.

1,903

Gell, C. F. 1951 COMPARATIVE ANALYSIS OF AN AIRBORNE ACCELERATION LABORATORY VERSUS THE HUMAN CENTRIFUGE.
J. Aviation Med. 22(5):375-381, 390.

SUMMARY: The object of this paper is to demonstrate that centrifuges per se will be useful for some time to come and that even the most rudimentary flying stress laboratory is a long way off in comparative consideration of accomplishment, working space, and cost of operation. Since the Johnsville centrifuge will generate 40 G in less than 7 seconds and indefinitely sustain that stress at a simulated altitude of 60,000 feet, it is considered reasonable to think in terms of an actual flying laboratory that would hold 20 G for 1 minute at 60,000 feet. An investigation into the engineering possibilities for an aircraft of this type was conducted and the results indicated that, as an instrument of physiological investigation, its limitations would negate its usefulness for the following basic reasons: (1) cost of airplane and its operation, (2) extremely limited time of maneuvering, and (3) lack of space for subjects and physiological sensing devices. It appears then that the effort and money in engineering and constructing the human centrifuge is small in comparison with what whould be required to even approximate the capabilities in an aircraft.

1,904

Gell, C.F. 1951 MODIFICATION OF F7F, INSTALLATION OF SUPINE SEAT AND RELATED COMPONENTS, INFLIGHT EVALUATION OF THE SEAT
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-L5104; Sept. 12, 1951
ASTIA AD 133 233

ABSTRACT: An F7F aircraft was modified to include a supine seat and related components in order to evaluate and correlate previous experimental findings concerning the effect of supination on pilot tolerances to G forces. A syllabus consisting of seven hourly periods, six of which were to be in the air, was formulated to instruct test pilots in flying the supine seat. Control of the aircraft was maintained through a PIK autopilot and instruments while the pilot was supinated. The reactions of three subjects tested has been very favorable.

1,905

Gell, C. F. & D. Cranmore 1952 A STUDY OF FLUID SHIFTS IN SMALL RODENTS EXPOSED TO ACCELERATIVE STRESS.
(Naval Air Development Center, Johnsville, Pa.) NADC-MA-5201, 7 Apr. 1952.
ASTIA ATI 150 806

ABSTRACT: A study was instituted to investigate fluid shifts and related physiological phenomena in small animals under acceleration stress by a quick-freezing fixation technique. Following preliminary experimentation an apparatus was designed and constructed that made possible the actual fixation of anatomical and physiological changes of the rat under centrifugation stress.

The results of studies on 60 rats (200 to 300 gms.) with this technique indicate:
1) That freezing to a completely solid state by immersion in liquid nitrogen was accomplished in approximately 150 seconds. Static conditions for circulation and respiration were, however, imposed much faster, in the order of 15 seconds or less.
2) That the quick-freezing technique in itself did not cause any apparent fluid shifts in the tissues of the rat. There was no demonstrable exchange of fluid from completely frozen to partially frozen tissues.
3) That anatomical changes such as organ displacement and edema are fixed under actual centrifugation stress in a striking and incontrovertible frozen picture.
4) The implications of this quick freezing technique in the development of new avenues for the investigation of acceleration stress physiology are discussed. (DACO)

1,906

Gell, C.F. 1952 MODIFICATION OF F7F, INSTALLATION OF SUPINE SEAT AND RELATED COMPONENTS, IN-FLIGHT EVALUATION OF THE SEAT
(Naval Air Development Center, Johnsville, Pa.) NADC-MA-L5208, Dec. 10, 1952
ASTIA AD 133 234

ABSTRACT: A supine seat was installed in an F7F fighter plane and tested. Its relatively small size, and points of constriction, as well as the lack of visibility and difficulty of escape it imposed, were found to be undesirable features. In flight, control of the plane was made possible by means of an autopilot (PIK) device allowing the pilot to change position if desired. Additional tests on the human centrifuge are recommended to investigate the physiological implications of the supine seat under acceleration. It is further recommended that the assembly be modified for stick and rubber installation, improved instrument, visibility, and greater physical comfort.

1,907

Gell, C.F. & D. Cranmore 1953 A STUDY OF FLUID SHIFTS IN SMALL RODENTS EXPOSED TO ACCELERATIVE STRESS
Journal of Aviation Medicine 24(1): 48-56, Feb. 1953

ABSTRACT: A study was instituted to investigate fluid shifts and related physiological phenomena in small animals under accelerative stress by a quick-freezing fixation technique. Following preliminary experimentation, an apparatus was designed and constructed that made possible the actual fixation of anatomical and physiological changes of the rat under centrifugation stress. The results of studies on sixty rats (200 to 300 gms.) with this technique indicate: (1) That freezing to a completely solid state by immersion in liquid nitrogen was accomplished in approximately 150 seconds. Static conditions for circulation and respiration were, however, imposed much faster, in the order of 15 seconds or less. (2) That the quick-freezing technique in itself did not cause any apparent fluid shifts in the tissues of the rat. There was no demonstrable exchange of fluid from completely frozen to partially frozen tissues. (3) That anatomical changes such as organ displacement and edema are fixed under actual centrifugation stress in a striking and incontrovertible frozen picture. (4) The implications of this quick-freezing technique in the development of new avenues for the investigation of accelerative stress physiology are discussed.

1,908

Gell, C.F. 1954 EVALUATION OF ANTI-BLACKOUT SUIT WITH PARACHUTE/SAFETY HARNESS AS INTEGRAL PART
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR2, March 9, 1954

ABSTRACT: The subject anti-blackout suit met the requirements of para. 4.2.3 of MIL-S-5085 (Aer) in providing adequate G protection for the subject after being tested and evaluated on the human centrifuge. However, this protection was accompanied by subjective discomfort of excessive pressure from the belly bladder even though the G valve was on the low setting. The same subject had no comparable discomfort when protection of the same magnitude of G was provided by a conventional anti-blackout suit attached to the G valve on the high setting.

1,909

Gell, C.F. & H.N. Hunter 1954 PHYSIOLOGICAL INVESTIGATION OF INCREASING RESISTANCE TO BLACKOUT BY PROGRESSIVE BACKWARD TILTING TO THE SUPINE POSITION
J. Aviat. Med. 25(6): 568-577

ABSTRACT: A healthy male subject can tolerate 15 transverse G while supinated at 85 degrees for five seconds with no indication of impending blackout. At 77 degrees backward tilt, the anti-blackout protection does not exceed that

protection afforded by an inflated anti-G suit with the subject in the upright seated position. To insure full protection against blackout, the subject must be supinated beyond 77 degrees backward tilt. At relatively low G in the 65-77 degrees backward tilt position, a sense of fullness, pressure, or burning sensation often appears in the thorax indicating, again, that the optimum position is beyond 77 degrees backward tilt. The pressure-pain occasionally elicited in the thorax is due to pressure of the rib cage on the thoracic cavity as well as the pressure on the abdomen forcing the abdominal contents against the diaphragm. (Author)

1,910

Gell, C. F. & H. N. Hunter 1954 PHYSIOLOGICAL INVESTIGATION OF INCREASING RESISTANCE TO BLACKOUT BY PROGRESSIVE BACKWARD TILTING TO THE SUPINE POSITION.
(U.S. Naval Air Development Center, Aviation Medical Acceleration Lab., Johnsville, Pennsylvania). NADC-MA-5406, June 30, 1954. ASTIA AD 36856

SUMMARY: Subsequent to the extensive physiological investigations of Stauffer at Pensacola, Florida on the effectiveness of supination in protection against blackout, a supinating pilot's seat was installed in a F7F-2N airplane and flight tested as a prototype.

These test flights indicated the need for further investigation in order to determine the actual positive G protection at varying degrees of supination.

A supine seat, capable of back tilting at 10° increments to 85° backward tilt, was built and installed on one of the swinging platforms of the Aviation Medical Acceleration Laboratory Centrifuge.

In this, as in previous studies, it was demonstrated that when fully supine, exposure to 15 transverse G can be tolerated for 5 seconds with no indication of impending blackout.

It was further demonstrated that at 77° backward tilt the anti-blackout protection did not exceed that protection afforded by an inflated anti-G suit with the subject in the upright seated position.

This study indicates that to receive the full protection against blackout afforded by supination the subject must be back tilted beyond 77°.

A close relationship was observed between the degree of backward tilt of the seat, the vertical angle of the retinal-aortic dimension, and the degree of blackout protection afforded. (DACO)

1,911

Gell, C. F., B. D. polis & O. Bailey 1954 STUDY OF THE EFFECTS OF ACCELERATION STRESS ON FLUID AND ELECTROLYTE DISTRIBUTION IN MAMMALIAN SYSTEMS. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5401, 9 Feb. 1954. ASTIA AD 36 633.

ABSTRACT: An investigation was made of the Na and K content of Wistar rat brains when the animals were subjected to experimental acceleration stress and tie stress The cincentration of brain K increased over the controls by the application of acceleration and tie stress. No significant changes occurred in the brain Na content of the stressed animals as compared to the controls. There was an increase in the H_2O content of the brain when the tie stress was prolonged; this was not the case with acceleration stress. A marked shift in ration of K to Na occurred in the brain of the rats exposed to acceleration stress when compared to tie stress and normal control. An electrolyte imbalance occurred in the brain of Wistar rats under acceleration stress.

1,912

Gell, C. F., B. D. Polis, & O. Bailey 1955 EFFECT OF ACCELERATION STRESS ON THE POTASSIUM AND SODIUM CONCENTRATION OF RAT BRAIN. American J. Physiology 183:23-26, Oct.-Dec. 1955
NOTE: Reel 7, Flash 6, Items 9 and 10

ABSTRACT: An investigation was made of the sodium and potassium content of Wistar rat brains after the animals were subjected to experimental acceleration stress and tie stress. The significant findings of this study was the marked shift in ratio of potassium to sodium that occurred in the brain of the rats exposed to acceleration stress when compared to tie stress and normal control. The results indicate that an apparent electrolyte imbalance occurs in the brain of Wistar rats under acceleration stress. This aberration may be of value for further study of the factors contributing to disturbances in brain metabolism and function under acceleration stress. (AUTHOR)

1,913

Gell, C. F. & D. Cranmore 1956 DISLOCATION OF ORGANS AND TISSUES OF RATS EXPOSED TO ACCELERATION STRESS: POSSIBLE PHYSIOLOGIC SIGNIFICANCE. J. Aviation Med. 27(6):497-504, Dec. 1956.

ABSTRACT: A study was conducted using a quick freeze technique for the anatomic fixation of rats exposed to graduated increments of acceleration stress and time. (1) Visceral displacement reaches a maximum at a relatively low level of acceleration stress in a short period of time in the application of positive, negative or transverse g. (2) Elongation and torsion of the lungs in positive g and compres-

sion of the lungs in negative g supports the postulate of Cranmore that death from acceleration stress is due to anoxic anoxia. (3) Elongation of the heart and great vessels in positive g and compression of these organs in negative g impedes tissue oxygenation by reducing the blood flow. (4) The possibility of tumbling creating pathologic changes due to a piston-like action caused by the alternating displacement of the visceral contents of the cavities above and below the diaphragm appears reasonable, in view of the rapidity of displacement response to applied acceleration stress. (5) The application of transverse g creates little displacement of viscera with no significant physiologic disturbance at much higher g levels than can be applied in positive or negative g. (Author)

1,914

Gell, C. F. 1961 ACCELERATION COMMITTEE --- PANEL OF AEROSPACE MEDICINE --- AGARD --- NATO COUNTRIES.
(Report to Symposium on Acceleration Stress, San Antonio, Texas)

ABSTRACT: The above titled committee has ten members who represent the NATO countries that are actively engaged in acceleration research. The Panel meets once yearly in one of the NATO countries at which time presentations of mutual work are reviewed and plans for joint effort are discussed and implemented. The Committee itself is appointed by the Executive Council of the Aerospace Medical Panel. Approximately ten collaborators who are well known in the field of acceleration are considered members ex Officio and actively assist in the programs.

In this report, the members point out their areas of investigation, mainly in the field of acceleration. They also review their program of re-defining acceleration and of transcribing bits of related data into meaningful graphs.

1,915

Gell, C. F. 1961 TABLE OF EQUIVALENTS FOR ACCELERATION TERMINOLOGY. RECOMMENDED FOR GENERAL INTERNATIONAL USE BY THE ACCELERATION COMMITTEE OF THE AEROSPACE MEDICAL PANEL, AGARD.
Aerospace Medicine 32(12):1109-1111, Dec. 1961.

ABSTRACT: A table of equivalents for the terminologies of acceleration in common usage is presented. The terminologies group themselves into two basic configurations which are set up as Tables A and B. Table A contains the two acceleration terminologies that are commonly used in the field of aeronautics when reference is made to the direction of acceleration of a mass. Table B refers to the inertial reaction of the tissues and fluids of the intact mammalian body in response to the acceleration applied to the whole body. In the first instance the small letter g is used; in the second, the capital letter G is recommended. (Tufts)

1,916

Gelman, R. & J.L. Helfrich 1954 PERFORMANCE OF CATAPULTS IN VARIOUS FORCE FIELDS
(Pitman-Dunn Labs., Frankford Arsenal, Philadelphia, Pa.) Proj. No. TS1-15-C44; Memo. Rept. No. MR-594; Oct. 1954; ASTIA AD 48517

ABSTRACT: The conclusions reached in this report are not to be considered either final or exact, as experimental firings have not been made under the conditions being considered. These results have been obtained by extrapolating the ballistics equations and comparing the results obtained with those of such experimental firings as seemed to be applicable.

The catapults considered were the models M1, M2, M3, M4, T10, and T14 in force fields of one, three, five, and seven g's. Of particular interest was the performance of the M4 catapult in a 3-g field.

The results indicated that all final velocities would be very little affected by a 3-g field. In addition, final velocities of the M1, M3, and T10 would be little affected by a 5-g field. For all catapults, increasing the force field beyond either three or five g's caused noticeable decreases in final velocities. These conclusions are listed in more detail in tabular form.

1,917

Gemmill, C.L. 1943 THE EFFECTS OF ACCELERATION ON MAN
In Physiology In Aviation (Springfield: Baltimore: Charles C Thomas, 1943) pp. 94-99

ABSTRACT: In this chapter, there is a description of the effects of acceleration on man. These effects are mainly in the circulatory system and produce profound changes in the aviator during dive bombing attacks and fast maneuvers.

1,918

Gemmill, C.L. 1943 PHYSIOLOGY IN AVIATION.
(Springfield, Ill.: Charles C. Thomas, 1943)

NOTE: A study of the physiological reactions which are found to take place in men taking part in plane flights. The material covered is essentially that included in the lectures given at the School of Aviation Medicine, Naval Air Station, Pensacola, Florida, where the author is an instructor.

CONTENTS: Physiology applied to aviation. Historical introduction. Air. Gas laws and their application. Mechanics of respiration. Alveolar air. Carriage of oxygen by the blood. Carrying capacity of the blood for carbon

dioxide. Control of respiration. Acute effects of anoxia. Use of oxygen in aviation. Chronic effects of altitude. Aeroembolism. Circulation. Control of the circulation. Effects of acceleration on man. Temperature control of the body. Physiology of muscular exercise. Instrument flight, by Lieutenant Frederick B. Lee, (T), USNR. Index.

1,919

Gemmill, C.L. 1943 PHYSIOLOGY IN AVIATION
(Springfield; Baltimore: Charles C Thomas, 1943)

CONTENTS:

Chapter 1. Physiology Applied to Aviation
2. Historical Introduction
3. The Air
4. The Gas Laws and Their Application
5. Mechanics of Respiration
6. Alveolar Air
7. The Carriage of Oxygen By the Blood
8. The Carrying Capacity of the Blood for Carbon Dioxide
9. The Control of Respiration
10. The Acute Effects of Anoxia
11. The Use of Oxygen in Aviation
12. The Chronic Effects of Altitude
13. Aeroembolism
14. The Circulation
15. The Control of the Circulation
16. The Effects of Acceleration on Man
17. The Temperature Control of the Body
18. The Physiology of Muscular Exercise
19. Instrument Flight

1,920

Gemmill, C.L. 1946 AVIATION PHYSIOLOGY
Ann. Rev. Physiol. 8:499-514

ABSTRACT: Some of the experimental work in four fields of aviation physiology is reviewed. Through intensive efforts of Army, Navy, and vivilian laboratories several important and useful discoveries have been made in aviation physiology during the war years. Satisfactory oxygen regulators and masks have been developed through the cooperation of physiologists and engineers. Pressure breathing equipment has been perfected which enables some men to reach 50,000 feet. Anti-"g" suits have been devised for protection against the forces of acceleration. Another development has been the teaching of practical physiology to thousands of aviators. Lectures, demonstrations of the effects of altitude on man, and runs in the low pressure chambers have been given to nearly every aviator in our Army and Navy. The teaching of night vision is another example of applying physiology to large numbers of individuals. It is in these fields of instruction that physiologists have made their greatest contribution to aviation medicine in this war.

In contrast to these achievements there have been many disappointments. No test has been devised for "bends" which will predict whether an individual is more or less susceptible to aero-embolism than his partner. No practical substitute for oxygen has been discovered which will raise a man's altitude tolerance. We do know after four years of war much more about how man and animals react to altitude. Most of this knowledge has had no immediate practical value. However, the effort has not been wasted for some of this knowledge may be useful in clinical medicine in studying respiratory and circulatory diseases.

1,921

General Electric Company 1960 FLIGHT CONTROL STUDY OF A MANNED RE-ENTRY VEHICLE.
(Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 60-695, Volume II. ASTIA AD 249 400

ABSTRACT: Many of the investigations pertaining to the operation of the energy management concept were performed on an analog computer. The details of the analog simulation and the results obtained are presented in Appendix I. This appendix also contains detailed information concerning the functional capabilities of the energy management system.

Appendix II presentes the error analysis which provides justification for statements in Volume I concerning the usefulness of particular systems.

Appendix III is concerned with the aerothermodynamic considerations of glide vehicles. The major contribution of this appendix to the study program is to show that the heat protection systems required for glide vehicles are reasonable from a weight standpoint.

Information concerning the dispersion of ballistic vehicles is presented in Appendix IV. The various sources of dispersion are discussed and the impact errors resulting from error sources are calculated. It is concluded that the ultimate impact point dispersion is about ten nautical miles.

Appendix V shows how a variable drag device can be used to limit the maximum deceleration. The results presented herein should be helpful in evaluating the utility of variable drag devices in terms of human tolerance to deceleration and the thermodynamic and mechanical feasibilities of specific types of devices.

1,922

Generales, C. D. J., Jr. 1960 SPACE MEDICINE AND THE PHYSICIAN. New York State J. of Medicine 60(11):1741-1761, June 1, 1960

ABSTRACT: Reviews the background of man's desire to travel through interplanetary space from year 1500 A.D. Discusses various aspects of space medicine, including psychological problems of weightlessness, isolation, day-night cycle. Lists human factors in space travel which need further research. The task of space medicine is to adjust man to space environmental conditions which affect him physically and psychologically.

1,923

George, M. B. T. 1959 ATTITUDE CONTROL FOR SPACE VEHICLES. Astronautics 4:34, March 1959.

1,924

George, T.A. 1961 PRINCIPLES OF ATMOSPHERIC REENTRY (Office of the Director of Defense Research and Engineering, Washington, D.C.) Nov. 1961 ASTIA AD-274 999

ABSTRACT: This paper summarizes the entire field of a space vehicle's reentry into the earth's atmosphere. It is assumed that the vehicle, either lifting or nonlifting, is approaching the earth from outer space and must pass through all densities of the atmosphere as it enters at high altitude until it lands at approximately sea level. During the vehicle's descent through the earth's atmosphere, deceleration must not exceed a maximum value, the total heat taken in by the vehicle must not be excessive, and the vehicle's skin or internal temperature must be limited. Methods of attaining these objectives are explained (Author)

1,925

George Washington University 1960 HUMAN RESOURCES RESEARCH OFFICE BIBLIOGRAPHY OF REPORTS July 1, 1959 to June 30, 1960
(The George Washington University, Human Resources Research Office, operating under contract with The Department of the Army) ASTIA AD 241 451

ABSTRACT: This bibliography lists publications of the Human Resources Research Office, its Training Methods Division, and its Human Research Units, from July 1, 1959, to June 30, 1960. It supplements the Bibliography of Reports as of July 30, 1959, issued in July 1959, and replaces the six-month supplement issued in January 1960.

Part I of this annual supplement presents in chronological order an annotated list of reports in the series issued by the Director's Office during FY 1960. Part II organizes reports by Task and by originating Division or Unit; it lists reports issued by the Units and the Training Methods Division, or approved for distribution during the past fiscal year, as well as listing those published by the Director's Office.

1,926

Georgiyev, O. 1959 GETTING READY FOR OUTER SPACE (Sobirayemsya v Kosmos).
Trans. from Sovetskiy Soyuz (USSR) (10):12-14, 1959.
(Office of Technical Services, Washington, D.C.)
Oct. 30, 1959 60-13191

1,927

Gerathewohl, S. J. 1953 DIE PSYCHOPHYSIOLOGIE DER BESCHLEUNIGUNGS-WIRKUNG (Psychophysiology of Acceleration)
Weltraumfahrt 4:15-19.

1,928

Gerathewohl, S.J., H. Strughold, and W.F. Taylor 1956 THE OCULOMOTORIC PATTERN OF CIRCULAR EYE MOVEMENTS DURING INCREASING SPEED OF ROTATION (USAF School of Aviation Medicine, Randolph AFB, Texas) Report 56-33.

1,929

Gerathewohl, S. F., H. Strughold & W. F. Taylor April 1957 THE OCULOMOTORIC PATTERN OF CIRCULAR EYE MOVEMENTS DURING INCREASING SPEED OF ROTATION.
J. Exp. Psychol. 53(4), April 1957.
See also (School of Aviation Medicine, USAF, Randolph AFB, Texas) Rept. No. 56-33, April 1956. ASTIA AD-108 300

ABSTRACT: The basic pattern of guided circular eye movements during increasing rotational target speed was photographed and analyzed with the use of a Master Ophthalmograph. Experiments were made with (1) saccadic eye movements at a constant speed of 15 r.p.m.; (2) during increasing speeds from 20 to 45 r.p.m.; and (3) from 40 to 85 r.p.m. As the rotational speed of the target increases, the movements of the eyes become more frequent, extensive, and irregular. It is concluded that a rotating target can be visually fixated without strain up to a speed of about 30 r.p.m.; that some subjects lose pace in the range between 30 and 60 r.p.m.; and that visual pursuit is extremely difficult at speeds higher than 75 r.p.m. Beyond this limit the oculomotoric pattern disintegrates completely. (AUTHOR)

1,930

Gerathewohl, S.J. & G.R. Steinkamp 1958 HUMAN FACTORS REQUIREMENTS FOR PUTTING A MAN INTO ORBIT
In: Hecht, F., ed., IXth International Astronautical Congress, Proceedings, 1958. (Vienna: Springes - Verlag, 1959)

1,931

Gerathewohl, S.J. 1959 EQUIPMENT FOR MANNED SPACE CAPSULE AND LUNAR BASES. (Army Medical Services, Research and Development Command, Bioastronautics Research Unit) Special Report. 28 Feb. 1959. ASTIA AD 227 226

ABSTRACT: The construction of second and third generation boosters developing several million pounds of thrust to manned space flight. This not only requires the advancement of engineering capabilities and space technology, but also demands an acceleration of bioastronautical research and the projection of information already available into the region of outer space. Equipment variables which are thought to be significant for man's exploration and survival in space are discussed, and sets of research task necessary for the accomplishment of manned space missions are proposed.

1,932

Gerathewohl, S.J. 1959 PSYCHOLOGICAL PROBLEMS OF SELECTION, HOLDING, AND CARE OF SPACE FLIERS. (Army Medical Services, Research and Development Command) Reports control symbol CSCRD-16-4, 13 Nov. 1959.

ABSTRACT: The psychological requirements for the selection, holding, and care of space fliers is investigated. The selection methods are scrutinized as to their validity and applicability to the problem. Examples of related activities are presented. The main purpose of the preparations must be to establish a natural pattern of conditioning and familiarization, to develop skill and abilities parallel to the development of the hardware, and to maintain the interest and motivation of the astronaut. (Author)

1,933

Gerathewohl, S.J. 1959 SURVIVAL IN SPACE.
Space Journal, March-May 1959

1,934

Gerathewohl, S.J., & G.R. Steinkamp 1959 HUMAN FACTORS REQUIREMENTS FOR PUTTING A MAN IN ORBIT. Astro. Acta 5:73-84

ABSTRACT: Man's survival and operational capability in an artificial earth satellite depend primarily on the reliability and accuracy of the launching, guidance and recovery operations on the one hand, and on the perfection of his engineered environment, on the other. Although the human organism is more sensitive and vulnerable than that of man's other creatures, his greater versatility and higher intelligence assure his survival under new and threatening circumstances. If a physiologically habitable environment is created, and if its functions during orbiting are secured, the human passenger can withstand the stresses involved in manned satellite operations of a limited duration.

1,935

Gerathewohl, S.J. 1959 EQUIPMENT FOR MANNED SPACE CAPSULES AND LUNAR BASES. (Army Medical Research Labs., Bioastronautics Research Unit, Ft. Knox, Ky.) Special Rept. 28 Feb. 1959.

ABSTRACT: The construction of second and third generation boosters developing several million pounds of thrust leads by necessity to manned space flight. This not only requires the advancement of engineering capabilities and space technology, but also demands an acceleration of bioastronautical research and the projection of information already available into the region of outer space. Equipment variables which are thought to be significant for man's exploration and survival in space are discussed in this first report, and sets of research task necessary for the accomplishment of manned space missions are proposed.

1,936

Gerathewohl, S.J., S.W. Downs, Jr., et al. 1960 BIO-TELEMETRY IN THE NOSE CONES OF THE U.S. ARMY JUPITER MISSILES. Reprint: IRE Trans. MIL-4:288-302, April- July 1960.

ABSTRACT: The primary objective of the bio-flights was tc demonstrate that animals can survive ballistic flights unharmed, if an adequate life support is provided. The secondary aim was to design, construct and test such a system to develop countdown and launching procedures, and to recover the specimen after flight. Technical and scientific information on the physiologic and behavior status of the animal was to be gained thru telemetry. Although the first animal was lost, valuable data were obtained on the functioning of the bio-package during flight. They served to improve the second experiment, which added substantially to the understanding of the biomedical requirements for space flight. Able and Baker were the first primates recovered unharmed from an operational IRBM nose cone after reentering the earth's atmosphere. (Authors)

1,937

Gerathewohl, S. J. & B. E. Gernandt 1962 PHYSIOLOGICAL AND BEHAVIORAL SCIENCES In: National Aeronautics & Space Administration, Washington, D. C.; Bioastronautics. NASA SP-18, Dec. 1962.

ABSTRACT: The bioastronautical program of the National Aeronautics and Space Administration is based on the classical disciplines of the life sciences as major areas of research. Since man is a terrestrial organism, he has been studied almost entirely under this aspect. However, with his entry into extraterrestrial space, new conditions arise which warrant intensive investigation. Generally, the physiologic research concerns the fundamental bases of human functions, the determination of man's tolerances, and his protection against stressful alterations of his biological homeostasis. The behavioral studies mainly deals with man's performance capabilities and limitations under normal and extreme conditions. In accordance with NASA's mission, the work in these areas is primarily applied and supporting in nature; but there is also a need for basic research. The scope of these investigations reaches from such academic problems as biologic pattern formation and localization at the cellular level to the practical application of cybernetic principles for the monitoring of the organism and the complex systems, communication and information theory, and orientation and navigation processes in animals and man. Also included in this program is the blending of the disciplines of biology and physics in such fields as biotechnology and bionics, which are aimed at the development of improved techniques and instruments as well as of the acquisition of new information. The requirements of man in space necessitate those research efforts, which will result in design criteria for various types of equipment, protective devices, life support systems, communication channels, displays, and controls for space flight and planetary explorations. However, in many ways the life scientist is not yet in a position to inform the engineer which conditions he must produce in order to accommodate the man or what systems must be made available for his protection. This paper will describe some of the NASA's efforts to answer this question. The bioastronautics program of the NASA will cover a much wider range of subjects in which the universities can play a major role. (Author)

1,938

Gerathewohl, S.J. & B.E. Gernandt 1962 PHYSIOLOGICAL AND BEHAVIORAL SCIENCES. In Proceedings of the NASA - University Conference on the Science and Technology of Space Exploration, 1:399-413. (National Aeronautics and Space Administration, Washington, D.C.) Dec. 1962.

ABSTRACT: Various efforts by the National Aeronautics and Space Administration to obtain data in the life sciences are presented. These data are needed so that the engineer will be able to produce conditions to accomodate man in space or to provide systems for his protection. The following areas of investigation are included: (1) studies of acceleration stress, (2) physiology of men under confined conditions. (3) Project Mercury physiological studies, (4) life support, (5) neurophysiology, (6) behavioral studies, (7) pilot control of aerospace craft, and (8) astronaut performance.

1,939

Gerlough, D. L. 1954 INSTRUMENTATION FOR AUTOMOBILE CRASH INJURY RESEARCH. Jour. Instr. Soc. Am. 1(12):29-32.

1,940

Gernandt, B.E. 1949 RESPONSE OF MAMMALIAN VESTIBULAR NEURONS TO HORIZONTAL ROTATION AND CALORIC STIMULATION. J. Neurophysiol. 12:173-184

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Gernandt, B. 1950 EFFECT OF CENTRIFUGAL FORCE UPON NERVE DISCHARGE FROM HORIZONTAL CANAL.
Acta Physiol. Scandinav. 21:61-72.

1,942

Gerogiyev, O. 1959 SOHIRAYEMAYA V KOSMOS (Getting Ready for Outer Space)
(Trans. from Sovetskiy Soyuz (USSR) (10):12-14, 1959)
(SLA Translations Center, Chicago, Ill.) 60-13191

1,943

Gershuni, G. V. 1958 CHARACTERISTICS OF CONDITIONED GALVANIC SKIN RESPONSES AND ALPHA RHYTHM SUPPRESSION REACTIONS IN MAN IN RESPONSE TO SUBTHRESHOLD AND SUPRATHRESHOLD SOUND STIMULATION
Trans. of Zhurnal Vysshey Nervnoy Deyatel'nosti (USSR) 5(5):665-676, 1955
(SLA Translations Center, Chicago, Ill.) 59-11016

1,944

Gibbens, M.E. & W.V. Smith 1957 THE DOCTOR AND THE AUTOMOBILE ACCIDENT
JAMA 163(4):255-259, Jan. 26, 1957.

ABSTRACT: Certain well-tested automobile improvements that would lower the mortality and injury rates could be incorporated into the modern car easily and inexpensively. Better roll-over frames are necessary, and safety seat belts should be standard equipment. Safety door latches, padding of the dashboard, elimination of projecting items inside and outside, shock-absorbing steering wheels, a mechanism for restraining all folding seats, provision for holding luggage securely, and certain improvements in lights, mirrors, and signal systems would often save lives. A physician treating accident victims has an opportunity to encourage their relatives and friends to work in favor of the adoption of automobile safety features. A check-list of safety principles is suggested for consideration as a "Good Driver's Code."

1,945

Gibson, J.J. & O.H. Mowrer 1938 DETERMINANTS OF THE PERCEIVED VERTICAL AND HORIZONTAL
Psychol. Rev. 45: 300-323

ABSTRACT: The proposed hypothesis: both the visual and postural vertical are determined by visual factors and gravitational factors acting jointly, with orientation to gravity, however, as the more decisive factor in cases of real conflict between the two types of sensory data, and the primary factor genetically. In the case of vision, the authors summarize the evidence for the anchorage of the perceived vertical to the (visual) factor. Posture is often unstable when vision is eliminated. The perceived vertical, both visual and postural, is often disturbed and even destroyed when the main visual lines move with respect to gravity. The perceived vertical is partially shifted when the main visual lines are tilted by a constant amount (possibly simultaneous contrast). A shift of the perceived vertical into complete congruence with such main lines has not been verified. Evidence for the dependence of the vertical on gravitational determinants consists of conclusions based on experimentation.

1,946

Gibson, J. J. 1952 THE RELATION BETWEEN VISUAL AND POSTURAL DETERMINANTS OF THE PHENOMENAL VERTICAL. Psychol. Rev. 59:370-375

1,947

Gibson, W.C., G.W. Manning and B. Cohen 1943 THE VALUE OF SIMPLE SWINGS IN ACCLIMATIZING TO AIRSICKNESS. (National Research Council, Canada) Report # C-2638, October 27, 1943

ABSTRACT: Seventy-seven experimental subjects and 75 controls were studied on a total of approximately 4,00 swings and 1250 flights over a period of three months. Swinging for 15 minutes daily on 2-pole, self-propelled simple rope swings (10 foot radius, 90° arc) for 2 weeks prior to and during flying did not reduce the amount of airsickness experienced in Anson aircraft by student navigators.

1,948

Gibson, W.C., G.W. Manning and B. Kirkpatrick 1943 THE EFFECT OF ACTIVE VESTIBULAR TRAINING ON MOTION SICKNESS.
(National Research Council, Canada) Report #C-2512, 8 June 1943

ABSTRACT: The swing reaction of 140 aircrew trainees was determined on 2-pole swings. The men were divided into one group of 92 who were given a special eight week active vestibular physical training programme four times per week,

and another of 48 men (controls) who were given the usual Initial Training School physical training twice a week. Following the eight week period the men were re-swung on the same swing and in the same position. Comparison of the results showed an improvement in both physical fitness and resistance to swing sickness.

1,949

Gil'bert, L. 1960 BEFORE A MANNED FLIGHT
Trans. of Znanie-Sila (USSR) 35(10):6-8, 1960.
(Office of Technical Services, Washington, D.C.)
Aug. 17, 1961 61-28535. ASTIA AD 269 651

ABSTRACT: Some of the equipment is described that is used to simulate the high g forces that will be experienced by astronauts during acceleration and deceleration. The equipment described is mainly U. S. and the document was apparently written shortly after the flight with the two dogs Strelka and Belka.

1,950

Gil'berg, L. 1961 RETURN TO EARTH
Znaniye-sila 34(7):10-13

ABSTRACT: The article reviews the equipment and techniques in standard use for emergency escape from high-speed jet planes, with especial reference to ejection seat design, controlled descent and the physiological effects of ejection and exposure to high altitudes on the pilot. The author explains how high-altitude suits and compensating suits help the pilot to withstand these stresses and survive a bail-out at altitudes as great as 12 km. All the information is based on Western sources. The author mentions prototype capsules which consist in effect of the whole forward portion of the fuselage together with the cabin, the entire unit being detached from the rest of the plane in an emergency to descend by parachute. A development of this method is used for landing astronauts from satellites. Emergency escape cabins for astronauts have also been developed. The pilot's cabin is equipped with a powerful rocket motor which can catapult the cabin to a height from which it can descend by parachute, should any mishap occur during launching. The motor is powerful enough to eject the capsule from the carrier-rocket even when the main rocket engines are functioning during the active

1,951

Gilbert, A.P., H. Boiteau, C. Jacquemin, J. Fabre & A. Adeline 1959 THE PRESENT STATE OF ANIMAL AND HUMAN EXPERIMENTATION IN WEIGHTLESS FLIGHT. Medicine Aeronautique (Paris) 12(2):177-188. In French with English summary.

ABSTRACT: A discussion is presented of current animal and human experiments on weightless flight, and the following conclusions are drawn: Weightlessness in flight does not seem to have any adverse physiological effects, and immediately after return to normal conditions, normal activities are resumed spontaneously. Weightless flights also have demonstrated that behavioral analogies exist between compensatory phenomena following total labyrinthectomy and the effects of conditioning to and training in weightlessness. In both these situations, all clues supplied by the labyrinth, whether abolished or repressed, are compensated by visual ones. However, it is still impossible to predict whether the weightless state, which is well tolerated for one-minute periods, will not, when prolonged, have a deteriorating influence on psychomotor performance.
(J. Aviation Med. 30(2):144, Feb. 1959)

1,952

Gillert, E. 1938 IS FLYING DANGEROUS TO PEOPLE WITH FAULTY CIRCULATION? Klin. Med., 1:423-426

ABSTRACT: The increase in the field of aviation and, particularly, the certainty that many cases of death occuring inflight were caused by failure in circulation, led to researches on the effect of flying on health and faulty circulation. Of especial importance here are two factors: (1) altitude of flight, and (2) speed. The influence of speed is of great importance to the circulation. The main role is played here by the centrifugal acceleration, The latter effects a disproportionate distribution of the blood in the body and a reduction in the circulation is capable of setting against it a great number of compensatory forces, but the faulty circulation is seriously endangered thereby. The amounts of blood engorged in individual portions of the body by the centrifugal acceleration may cause blood vessels to burst, especially so if they are changed by arteriosclerosis. Further-more, atmospheric illness which is identical with sea-sickness, has a bad effect upon the injured circulation. The author concludes that flying entails a considerable burden on the circulation and that, therefore, persons with faulty circulation should abstain from flying.
(Limited ABSTRACT: Journal of Aviation Med. 9(4): 230-231, December 1938)

1,953

Gilles, E. 1961 PHYSIOLOGIE ET AVIATION (REVUE GENERALE) (Physiology and Aviation (General Revue)
Rev. Intern. services saute armees terre mer et l'air (Paris), 34(9):401-404.

ABSTRACT: Reviews the problems of anoxia, rapid ascent and descent, centrifugal forces, acceleration equal to several times gravity, prolonged flight, high altitudes with low temperatures and low oxygen pressures, and sharp changes in barometric pressure. The physiologist indicates means of avoiding most accidents resulting from them by recommending the use of oxygen masks, cabin pressurization and temperature control systems, protective clothing, and the inhalation of helium or oxygen and exercise to prevent gas embolism during flight.

1,954

Gillings, W.H. 1950 THE EFFECTS OF INTERPLANETARY FLIGHT
Brit. Interplan. Soc. J. 9: 105-107, May 1950

ABSTRACT: A general discussion of various aspects of space flight.

1,955

Gilruth, R. R. & L. N. McMillion 1962 MAN'S ROLE IN APOLLO
(Paper, IAS Man-machine Competition Meeting, Seattle, Washington, Aug. 10-11, 1962.) Paper No. 62-187

ABSTRACT: Manned landing on the moon and return to earth within this decade is a major national objective. Accomplishment of this objective is the purpose of Project Apollo. The Apollo spacecraft is being designed to utilize the capabilities of the crew and various automatic systems. The discussion of selected mission phases illustrates the close interaction between the crew and the spacecraft systems. Man's role in Apollo is, therefore, the efficient use of his own talents and those of the systems at his disposal.

1,956

Gilruth, R.R. & H.K. Strass 1960 MANNED SPACE FLIGHT- PRESENT AND FUTURE STEPS
Aero/Space Engineering 19(5):16-17, 90, May 1960

1,957

Gilson, J. C., W. K. Stewart & Z. Pekarek 1943 PREVENTION OF INJURY IN AIRCRAFT CRASHES.
(R.A.F. Institute of Aviation Medicine, Farnborough) FPRC 556

1,958

Gilson, J. C. & R. L. B. Beare 1945 GERMAN RESEARCHES ON DECELERATION AND EJECTOR SEATS IN AIRCRAFT: INTERROGATION OF DR. S. RUFF, FLUGKAPITAN, HEAD OF THE MEDICAL INSTITUTE OF THE D.V.L. BERLIN, 14.8.45.
(R.A.F. Institute of Aviation Medicine, Farnborough) FPRC Rept. #646, October 1945

1,959

Gilson, J. C. et al 1946 REPORT ON THE HAZARDS OF ESCAPING FROM AIRCRAFT IN COMBAT.
(R.A.F. Institute of Aviation Medicine, Farnborough) FPRC Rept. #658, March 1946

1,960

Gimalouski, E. A. 1952 INVESTIGATION OF IMPACT LOAD ABSORPTION THROUGH SUSPENSION LINE ELONGATION.
(Wright Air Development Center, Wright-Patterson AFB, Ohio) Dec. 1952.

ABSTRACT: The purpose of this investigation was the study of parachute suspension lines under actual operating conditions, having varying degrees of elongation, energy absorption and elasticity. A secondary purpose of the investigation was the study of fabric porosity, shape and type of canopy, and method of parachute deployment.

1,961

Girard, P. F. 1959 MEDICAL AND HUMAN ENGINEERING ASPECTS OF FLIGHT IN RYAN VTOL AND STOL AIRCRAFT
(Paper Fourteenth Meeting of the Flight Test Techniques and Instrumentation Panel, 11-15 May 1959, Athens, Greece)
(Advisory Group for Aeronautical Research and Development, Paris, France)
Rept. no. 239 May 1959 ASTIA AD 237 625

ABSTRACT: A short historical outline including brief descriptions of the VTOL aircraft constructed by the Ryan Aeronautical Company is given. The major aspects of the principal medical and human factors in hovering and transitional flight are discussed, principal attention being given to the human engineering aspect. It is concluded that the medical and human factors must be given serious consideration in the early design stages of a VTOL aircraft if satisfactory handling qualities are to be obtained. (Author)

1,961

Girden, E., J. E. Barmack & J. D. Coakley 1948 A BIBLIOGRAPHIC EVALUATION OF THE EFFECTS OF ACCELERATION ON THE CONTROL AND SAFETY OF HIGH SPEED AIRCRAFT. (USN Special Devices Center, Port Washington, L.I., N.Y.) Rept. SDC 151-1-9, Feb. 1948. ASTIA AD 45 884.

ABSTRACT: Literature pertinent to the effects of acceleration on pilots and aircraft is evaluated to derive implications for the safe operation of supersonic aircraft. Available data indicate that human g tolerance varies with the individual, the direction in which the force is applied, and the criteria employed to measure its effect. Using visual symptoms and continuation of consciousness as criteria, higher values of g may be tolerated if directed transversely than if directed from head to seat (+g) or from seat to head (-g). Methods are now available for increasing -g tolerance such that, although consciousness can be retained in the presence of large g forces, the manipulation of controls is impaired by muscular inadequacy. Various aids for minimizing the effects of g and the effect of the duration of exposure to g forces are discussed.

1,962

Githens, T. S., et al. 1919 PHENOMENA FOLLOWING INDIRECT CONCUSSION OF THE SKULL.
Paper, Thirty-First Annual Meeting of the American Physiological Society, Johns Hopkins University, Baltimore, April 24, 25, and 26.

ABSTRACT: Concussion was produced in completely etherized dogs by a weight falling on a board 4 cm. thick laid on the head in front of the occiput. Complete unconsciousness continued till the end of the experiment. The lid and corneal reflexes were never lost. The eyes showed nystagmus for an hour or so after the concussion and afterward were moved in an apparently normal manner. Stimulation of exposed sensory nerves (e.g., supra-orbital) caused no sign of pain and no influence on respiration or other reflex effect even after four hours. A new nose-licking reflex was noted. The medullary centers were surprisingly little affected. The blood pressure was usually very high soon after the concussion, and the respiration was noisy and irregular, soon becoming normal. For the first hour or so there was complete paralysis with loss of all reflexes and responses. Later, circulatory, respiratory and spinal reflexes returned and often became exaggerated. Only gross study of hemorrhage was made. The only characteristic lesion was a hemorrhage into the upper part of the cord extending from the calamus to the second or third cervical nerves. This was associated with laceration of the gray matter extending from the central canal into the dorsal horns. There was almost no hemorrhage within the skull. (American J. Physiol. 49: 120.

1,963

Giurdzhian, A.A., N.N. Demin, N.V. Kor[illegible]va, R.S. L'vova, L.T. Tumanishina, M.S. Uspenskaia, and T.A. Fedorova. SOME ASPECTS OF THE METABOLISM OF ANIMALS AFTER A SPACE FLIGHT. (Nekotorye storony metabolizma u zhivotnykh sovershivshikh polet v kosmos)
Iskusstvennye sputniki zemli (Moskva) 11: 78-86

ABSTRACT: Shifts in biochemical indices (protein fractions and the total protein content of blood serum, serum mucoid content, non-specific cholinesterase activity, free and bound 21-hydroxy-20-ketosteroids in the urine, presence of deoxycytidine in the urine) were investigated in a number of dogs, rats, and mice after single or repeated exposures to vibration, accelerations of 6-9 g, and a prolonged stay in a sealed cabin. For some of the animals data from space and rocket flights were available. Single exposures to different stresses resulted in shifts indicative of compensatory reactions, while repeated exposures were followed by a dystrophic state. The dogs Belka and Strelka exhibited a reversible stress reaction after space flight which differed considerably from the picture observed after radiation injury. The extent of biochemical changes seems to be more dependent upon the dose of stress rather than its nature.

1,'64

Glaister, D. H. 1961 DIAPHRAGM MOVEMENT UNDER POSITIVE ACCELERATION.
(Paper, 32nd Annual Meeting of the Aerospace Medical Association, 24-27 Apr., 1961, Chicago, Ill.)

ABSTRACT: Movement of the diaphragm has been studied in man on the human centrifuge. A technique has been developed which allows direct recording of diaphragm movement at the oesophageal hiatus. Descent of the diaphragm has been demonstrated under positive acceleration and correlated with the degree of acceleration applied, and with simultaneous changes in lung volume and intra-abdominal pressure The inflation of an anti-g suit raises the diaphragm; the net result of inflating the suit under positive acceleration is a reduced fall in diaphragm level. It is concluded that movement of the diaphragm at the oesophageal hiatus is similar to that at the dome, but that the excursion is about half that at the dome.
(Aerospace Medicine 32(3):231, March 1961)

1,965

Glaister, D. H. 1961 THE EFFECT OF POSITIVE ACCELERATION ON DIAPHRAGM MOVEMENT AS DEMONSTRATED BY A DIRECT RECORDING TECHNIQUE.
Rev. Med. Aero (Paris) 2:28-29, Dec. 1961 (Fr)

Glaister, D.H. 1961 BREATHING. Nature (London) 192(4798):106-108, 14 October 1961

ABSTRACT: Reviews two papers presented at a symposium on "Breathing." The first paper studies the problems of air temperature and pressure at 40,000 feet, and includes effects of explosive decompression from 8,000 to 38,000 feet. Describes design for oxygen masks which allows proper breathing under decompression. The second paper discusses the effects of posture on breathing under positive acceleration. The mechanical effects on the lungs, viscera and diaphragm under accelerations of 3 g are described, and it is shown that the total efficiency of the respiratory process decreases during positive acceleration.

1,967

Glaister, D.H. 1963 PULMONARY GAS EXCHANGE DURING POSITIVE ACCELERATION
(Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler Hilton Hotel, Los Angeles, Calif., April 29- May 2, 1963)

ABSTRACT: Quantitative measurements of pulmonary gas exchange, and qualitative measurements of pulmonary gas distribution have been made during positive acceleration on the human centrifuge.

Use has been made of expired air collection, as well as breath to breath analysis of expired air with a rapid response carbon dioxide meter. Findings demonstrate changes in metabolism and gas distribution in man at low levels of positive acceleration.

1,968

Glantz, William M. and Vernie A. Stembridge 1959
CORONARY ARTERY ATHEROSCLEROSIS AS A FACTOR IN AIRCRAFT ACCIDENT FATALITIES
(Armed Forces Inst. Of Pathology, Army Medical Center, Washington, D.C.)
Journal of Aviation Medicine, 30:75-89, Feb., 1959
ASTIA AD 219 780

ABSTRACT: Recent reports have shown that significant degrees of coronary sclerosis occur in young age groups. To evaluate this finding, a microscopic study was undertaken, utilizing autopsy material from 222 aircraft accident fatalities. Seventy percent of 222 cases, ranging in age from 19 to 43 years, showed some degree of coronary sclerosis. Twenty-one percent showed varying degrees of definite restriction of the coronary lumen. A marked increase in the incidence of restrictive coronary sclerosis is demonstrated in the age group of 30 to 40. A definite occurrence of myocardial infarction in flight was found in 3 cases, and in 1 case myocardial infarction caused the accident. The electrocardiogram still seems to be the best tool to detect coronary sclerosis. (AUTHOR)

1,969

Glanvill, A.D., et al. 1937 THE MAXIMUM AMPLITUDE AND VELOCITY OF JOINT MOVEMENTS IN NORMAL MALE HUMAN ADULTS
(Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TN 55-159
See also: Human Biology 9: 197-211

1,970

Glascock, H.W., Jr. 1961 JOINT US- CANADIAN CONFERENCE ON ENVIRONMENTAL PHYSIOLOGY HELD ON 9-10 NOVEMBER 1960. (Army Medical Research Lab., Ft. Knox, Ky.) Report no. 474, ASTIA AD-264 971.

1,971

Glaser, E. M. and G. R. Hervey 1952 FURTHER EXPERIMENTS ON THE PREVENTION OF MOTION SICKNESS
Lancet (London) 1:490-492, March 1952

1,972

Glaser, E.M. 1959 PREVENTION AND TREATMENT OF MOTION SICKNESS Proc Roy Soc Med 52:965-72, Nov. 1959

1,973

Glenn, J.H., Jr. 1962 PILOT'S FLIGHT REPORT
In: Results of the First U.S. Manned Orbital Space Flight, February 20, 1962.
(NASA Manned Spacecraft Ctr.) Pp. 119-135

1,974

Godby, R. O., S. B. Browning, D. S. Belski & E. R. Taylor 1963 ANTHROPOMETRIC MEASUREMENTS OF HUMAN SLED SUBJECTS.
(6571st Aeromedical Research Laboratory, Aerospace Medical Division, Holloman AFB, New Mexico) ARL-TDR-63-13, April 1963. ASTIA AD 407 668

ABSTRACT: Fifty-seven human volunteers are used at present in the study of abrupt acceleration at the Biodynamics Branch of the 6571st Aeromedical Research Laboratory, Holloman Air Force Base, New Mexico. Various standard anthropometric measurements have been made on these subjects. These data and their analyses are presented. Somatotyping of the subjects, performed elsewhere, is presented. (ASTIA)

1,97

Goddard, James L. 1962 FEDERAL AVIATION AGENCY IMPACT RESEARCH
In: Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, (National Academy of Sciences, National Research Council) Publication No. 977, pp. 21-23

ABSTRACT: The research activities of the Federal Aviation Agency in the field of impact acceleration stress are discussed. These research activities can be listed in three major categories: (1) the further determination of human tolerance to impact forces; (2) the further determination of forces transmitted to the occupants of current civil aircraft during crash impacts; and (3) the further development of crash safety designs which can contain the crash forces transmitted to aircraft occupants at levels below the maximum tolerance level.

1,976

Godshall, W.D. 1962 THE FPL LINEAR DEADWEIGHT ACCELEROMETER CALIBRATOR. (Forest products Laboratory, Madison, Wisconsin)
ASTIA AD-280 236

ABSTRACT: An accelerometer calibrator that provides a convenient and satisfactory method of checking the response characteristics of accelerometers on an operational basis was constructed at the Forest Products Laboratory. The calibration can be made under normal operating conditions of the accelerometer.

1,977

Goethe, H. 1956 GEDANKEN ZUR EXPERIMENTELLEN UND PRAKTISCHEN PRUFUNG VON SEE-KRANKHEITSMITTELN (CONSIDERATIONS ON THE EXPERIMENTAL AND FIELD TESTING OF SEA-SICKNESS MEDICAMENTS) Ärztliche Praxis (München-Gräfelfing) 8(3):8-Jan. 21, 1956

ABSTRACT: Several types of apparatus and methods in use for testing of motion sickness remedies are described. The Canadian-built motion sickness simulator was recommended as producing accelerations and decelerations most analogous to natural conditions on the ship. Other testing methods include combination of below-threshold doses of apomorphine (central nervous system stimulant) and Barany rotating-chair stimulation. This method has certain drawbacks since there are individual differences in the reaction to the drug. The above methods are suitable primarily for exploration of the therapeutic properties of the drug. Field tests are invaluable for determining the therapeutic properties since long-term simulation of sea conditions is almost impossible. Certain suggestions are offered for better control of field-test conditions.

1,978

Goethert, B.H., ed., W.C. Nelson 1961 TRANSONIC WIND TUNNEL TESTING. AGARDograph no. 49, (New York: Pergamon Press) ASTIA AD-271 130

ABSTRACT: This AGARDograph presents a review of the extensive efforts made during the last 15 years to develop practical transonic wind tunnels and discusses their performance and limitations. Emphasis is placed on the design and operational characteristics of both types of modern transonic wind tunnels, that is, on wind tunnels with either longitudinally slotted or perforated test sections. Each chapter of the AGARDograph has been made as complete as possible, with its own series of figures and a separate list of references and bibliographical material. (Author)

1,979

Gold, A.J., H.E. Hance, M. Kornhauser & R.W. Lawton 1961 TOLERANCE OF MICE TO IMPACT FOLLOWING FREE FALL. (Biosciences Operation, General Electric Missile and Space Vehicle Dept., Philadelphia, Pa.) Reprinted from Federation Proceedings, 20(1):208, March 1961.

ABSTRACT. A study was made to establish impact tolerance of mice as a function of impact velocity and average acceleration. Restrained mice were placed in a carriage dropped freely from controlled heights and were subjected to controlled inertial loads of relatively short duration. Occurrence of death was selected as the index of irreversible damage, or failure. With only several exceptions, all of approximately 300 mice responded to impact forces in an all-or none manner, either dying within 30 seconds or surviving indefinitely without permanent injury. By plotting impact velocities against average accelerations for mouse groups having mortality rates of 5% or 95%, two hyperbola-shaped curves were obtained. Assuming that the 5% mortality curve represented minimum damage below which no permanent injury occurred, limits of tolerance were found to approximate 20 fps (velocity) and 650 g (acceleration). For the 95% curve, limits were 35 fps and 1950 g, respectively. Post mortem examinations indicated that death resulted directly from sudden displacement of the c.n.s., particularly of the brain, on impact and that frequently-observed pulmonary hemorrhage was of secondary importance.

1,980

Gold, A.J., H.E. Hance, M. Kornhauser & R.W. Lawton 1962 IMPACT TOLERANCE OF RESTRAINED MICE AS A FUNCTION OF VELOCITY CHANGE AND AVERAGE DECELERATION. Aerospace Med., 33(2):204-208, Feb. 1962.

ABSTRACT: A study was made to establish impact tolerance limits for restrained mice as a function of velocity change and average deceleration. Mice placed in a carriage dropped freely from measured heights were subjected to controlled inertial loads of short duration. Mice were observed to respond in all-or none

manner, either dying within 30-40 seconds or surviving indefinitely without permanent injury. Ability to survive impact was therefore selected as the index [illegible] curves, constructed from plots of groups having [illegible] (above 99-100 percent) and (b) a low incidence of survival [illegible], were asymptotic at approximately 27 fps and 650 G and 45 fps and [illegible] G, respectively. Limits of high and low probability of survival zones were thus defined. Therefore, this experimental approach to establishing design criteria for protective equipment was found feasible. Evidence indicated that death resulted primarily from sudden displacement of the central nervous system that frequently observed pulmonary hemorrhage was of secondary importance. (Authors)

1,981

Goldberg, A. and S. Merjan 1955 USE OF THE HAN-S-44 SHOCK TEST MACHINE AS A MEANS OF TRANSIENT CALIBRATION FOR BARIUM-TITANATE ACCELEROMETERS FOR AN ACCELERATION RANGE UP TO 1000 G's.
(Pitman-Dunn Labs., Frankford Arsenal, Philadelphia, Pa.) Rept. no. S-4336, March 16, 1955. ASTIA AD 68 711.

ABSTRACT: Comparisons were made between transient accelerometer calibrations, steady-state and transient calibrations, and accelerometer sensitivities as determined by the Frankford Arsenal with those indicated by the manufacturer. Two independent and parallel approaches to the transient calibration of accelerometers were studied by using the JAN-S-44 shock-test machine: the theoretical C and the integrated-output methods. Studies indicated that the test machine could be used for accurate transient calibration of $BaTiO_3$ accelerometers. The theoretical -G method permitted accelerometer calibration at shock-pulse frequencies as low as 60 c and as high as 700 c, and for a 35- to 1000-g shock-acceleration range. The integrated-output method of calibration produced satisfactory results when (1) the integrator time constant was 6 or more times larger than the period of the shock pulse being integrated and (2) the integrator constant was of sufficient magnitude to facilitate accurate measurement of output voltages.

1,982

Goldberg, M.N., R.A. Mills and W.V. Blockley 1960 INSTRUMENTATION PACKAGE FOR INFLIGHT PHYSIOLOGICAL STUDIES. (North American Aviation, Inc. Los Angeles, Calif.) WADD TR 60-83, ASTIA AD-236 039

ABSTRACT: An instrumentation package was developed for the monitoring of pilot physiological status during flights in the X-15. Data recorded include electrocardiograph signals, respiratory flow rates, skin and deep body temperatures, and helmet-suit and suit-cockpit pressure differentials. Environmental and flight tests were performed to determine the characteristics of the package and to survey subject response during stress. The package is capable of driving a pulse duration modulation (PDM) system for telemetering pressure data. Descriptions of the components and methods of use are included.

1,983

Goldbloom, A. A., M. L. Kramer, & A. Lieberson 1940 CLINICAL STUDIES IN CIRCULATORY ADJUSTMENTS. VI. PHYSIOLOGIC RELATION BETWEEN POSTURE AND CARDIAC OUTPUT. Arch. Intern. Med. 65:178-184

1,984

Goldman, D.E. 1946 MECHANICAL FORCES ACTING ON AVIATION PERSONNEL
J. Aviation Med., 17(5): 426-430, October 1946
See also: WADC TR 58-107, Feb. 1946

ABSTRACT: A description of ambient pressure, acceleration, wind blast and vibration and how these mechanical forces affect Aviation Personnel.

1,985

Goldmann, Jack B. 1962 HUMAN CAPABILITIES IN THE PRONE AND SUPINE POSITIONS: AN ANNOTATED BIBLIOGRAPHY
(Lockheed Aircraft Corporation, Sunnyvale, Calif.) SP-62-14, May 1962
ASTIA AD 282 780

ABSTRACT: This literature search covers the decade. 1951-1961. It is concerned with the ability of man to perform basic operations in aircraft while relegated to a prone or supine position, and the possible application of man's performance in spacecraft under similar conditions. References to the design requirements for man are included.

1,986

Goldstein, A.G. 1959 LINEAR ACCELERATION AND APPARENT DISTANCE.
Percept. Mot. Skills, 9(3):267-269, September 1959

ABSTRACT: This is a preliminary study of the effects of linear saggital acceleration upon distance perception. Thirty-three subjects were accelerated from zero to 60 mph in 10 to 11 seconds in a fluid drive transmission automobile while observing an illuminated ring. Subjects reported changes in appearance of the ring - size, distance, etc., during forward and backward acceleration and deceleration. McNemars test of the significance of changes was used to compare the effects of direction of acceleration.

1,987

Golikov, A. and I. Smirnov 1961 OVER THE ROUTES OF THE COSMOS
Trans. of Ogonek (USSR) 39(14):2-3, 1961
(Office of Technical Services, Washington, D.C.)
March 29, 1962 62-24268

ABSTRACT: Information is given on the flights of the dogs Zvezdochka (fifth space ship), and Belka and Strelka.

1,988

Golikov, A. & I. Kas'yan 1962 BEFORE THE LEAP TO THE STARS
(Translation Services Branch, Foreign Technology Div., Wright-Patterson AFB, Ohio)
FTD-TT-62-1767/1 21 December 1962 ASTIA AD 295 768

ABSTRACT: This article describes the weightlessness training on Russian astronauts A. Nikolayev and P. Popovich. The action of a galvanic current on the vestibular apparatus during a weightless condition was studied. These experiments, in particular, indicated that in the state of weightlessness the illusion of anti-rotation becomes briefer. The excitability of the vestibular apparatus towards angular accelerations is reduced. It is established also, that weightlessness does not lead to the functional turning-off of the otolitic apparatus, and is only an extreme irritant for it.

1,989

Gollub, Fred 1960 AN ANALYSIS OF THE MAGNAFLUX INSPECTION RECORD OF WELDED JOINTS ON THE 50-FT CENTRIFUGE. (U.S. Naval Air Dev. Center, Johnsville, Pa.) NADC-MA-6027. ASTIA AD 248 216.

ABSTRACT: The 50-foot radius arm of the human centrifuge at the Aviation Med. Acc. Lab. was inspected on 7 occasions. The data from these inspections has been analyzed by the Eng. Div. in order to try to determine the cause of damage to the arm. All cracks found in the welded joints were bound to the parent metal, preheated by torch, welded, stress-relieved by torch and finally, magnafluxed.

1,990

Gomez Gomez, L. A. 1945 ACCELERATION AND DECELERATION: INFLUENCE ON HUMAN ORGANISM.
Med y cir., Bogota, 10:1-19.

1,991

Goldstone, N.J. 1961 LANDING SHOCK ABSORPTION
In: 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D.C. (Mt. Prospect, Ill.: Institute of Environmental Sciences, P.O. Box 191) Pp. 215-224

ABSTRACT: This paper provides design data obtained in a development test program for an aluminum honeycomb shock-absorption system for planetary soft landings. Test procedures are described. Data are presented from static and dynamic crushing tests of selected aluminum honeycomb specimens, and from drop tests ot a full-scale model of a lunar landing raft.

A method using laterally unrestrained honeycomb blocks is unsatisfactory because of inability to react shear forces incurred during impacts on an inclined plane. Supporting the honeycomb within a piston system is a feasible method. The magnitude and duration of impact decelerations, while higher than calculated on the basis of Reference 1, approximate the levels of design capability of mechanical and electrical systems for planetary vehicles.

Impact decelerations measured during the most critical drop, 29.3 feet per second onto a 15 degrees inclined plane, were as follows:

41.5 G extending for 0.003 second
38.2 G extending for 0.007 second
20 G minimum for 0.036 second

The predictability of test vehicle rebound behavior was demonstrated for all four of the drops. Stable behavior occurred for drops 1, 2, and 3, and a low-level unbalanced overturning moment was observed in Drop 4, as predicted in the dynamic analysis of Reference 2.

1,992

Golikov, A., I. Smirnov and A. Nikolayev 1960 SOVIET SPACE FLIGHTS: SPACE TRAVELERS (AND) FROM THE EARTH TO AN ORBIT OF MARS.
Trans. of Ogonek (USSR) 38(35):2, 4-5, 1960.
Dec. 19, 1960 JPRS: 6402

ABSTRACT: The first paper discusses the manner in which the dogs (Strelka and Belka) were selected, trained, instrumented, clothed, and fed during their space flight. The second paper discusses, in a popular (nontechnical) way, the well known physiological problems connected with space flight (effect of weightlessness, how to breath, effect of cosmic rays, etc).

1,993

Golikov, A. & N. Smirnov 1960 FOUR-LEGGED ASTRONAUTS
(Air Information Division, Wright-Patterson AFB, Ohio) AID Rept. No. 61-72
ASTIA AD 260 501
See also: Ogonek 49: 2

1,994

Goncharskii, L.A. 1952 ELECTRONIC ACCELERATION INDICATORS
Elektrichestvo (Russian) n. 12, pp. 54-57

ABSTRACT: The design principles of electronic acceleration indicators with moving anode are pointed out with reference to a simple theory of these instruments. Points discussed in more detail are: the relations between voltage and sensitivity; advantages of the use of a collector for the anode current in a diode unit; a determination of the sensitivity of a triode indicator with a moving anode. Formulae are given for determining the current and voltage sensitivity of an indicator with directly heated filament displaced in a homogenous field. (B.F. Kraus)

1,995

Goodall, McC., and J.P. Meehan 1956 CORRELATION OF "G" TOLERANCE TO URINARY ADRENALINE AND NORADRENALINE.
(Paper, American Physiological Society Fall Meeting, Sept. 4-7, 1956)

ABSTRACT: Subjects with either a high, low or intermediate "g" tolerance was centrifuged. Urine samples were collected in accordance with a 3 hr. pre-run, 1 hr. run, 1 hr. post-run and a 3 hr post-post-run schedule and bioassayed for adrenaline and noradrenaline by the von Euler method (acta physiol. scandinav. 22:161, 1951). All subjects showed a marked elevation in the urinary output of both adrenaline and noradrenaline. The adrenaline output was increased predominantly during the pre-run and the run [illegible] It appeared related to the anxiety of anticipating the [illegible] ride and the anxiety associated with the ride rather than the physiological changes produced by the ride itself. The noradrenaline output was increased during the run period and to a somewhat lesser degree during the post-run period. High 'g' tolerance subjects in general showed a higher noradrenaline output [illegible] centrifugation and a higher pre-run (control) noradrenaline output than those subjects with a low 'g' tolerance.

High 'g' tolerance subjects, when exposed [illegible] showed variation in the noradrenaline output commensurate with the 'g' exposure; the greater the 'g' exposure, the greater the noradrenaline output. No significant changes in the adrenaline output were noted in these subjects.
(Amer. J. Physiol. 187:601. 1956)

1,996

Goodall, M. 1962 SYMPATHOADRENAL RESPONSE TO GRAVITATIONAL STRESS.
In J. Clin. Invest. 41: 197-202, Feb. 1962.

1,997

Goodall, M., & M. L. Berman 1960 URINARY OUTPUT OF ADRENALINE NORADRENALINE, AND 3-METHOXY-4-HYDROXYMANDELIC ACID FOLLOWING CENTRIFUGATION AND ANTICIPATION OF CENTRIFUGATION. J. Clin. Invest. 39(10)1533-1538, Oct. 1960

ABSTRACT: Nine normal males were centrifuged at a rate of 1 g per 5 seconds to 12 g, or were given a mock centrifuge ride at 2 r.p.m. (equivalent to 0.02 g forward acceleration) for 3 minutes, respectively. Each subject was unaware as to whether he would receive a real ride or a mock ride, and it was therefore possible to measure the sympatho-adrenal response to both centrifugation and anticipation of centrifugation. Under high gravitational stress, increased urinary adrenaline release seems to be largely related to the emotions, while noradrenaline release seems more closely related to the physical changes (hemodynamics) produced by centrifugation. Following the increase release of either or both adrenaline and noradrenaline, there is a commensurate rise in the urinary output of their common metabolic product, 3-methoxy-4-hydroxymandelic acid. (AUTHOR)

1,998

Gooddy, W. & M. Reinhold 1952 SOME ASPECTS OF HUMAN ORIENTATION IN SPACE. I. SENSATION AND MOVEMENT. J. Neurology (London) 75:472-509.

1,999

Gooddy, W. & M. Reinhold 1953 SOME ASPECTS OF HUMAN ORIENTATION IN SPACE. (ii) THE DYNAMIC NATURE OF NERVOUS ACTIVITY (a) "MOTION SENSE," (b) SENSE OF DIRECTION. Brain 76(3):337-363, Sept. 1953.

SUMMARY: In this paper we have attempted to present a dynamic concept of the nervous system. We have suggested that afferent stimuli are streams of successive motion complexes (occurring perpetually in the living man) which become highly integrated and organized both on their way to the cortex, and as a result of cortical activity. The cortex functions in terms of quantity and rate. The final motion patterns are the basis for perception. Perception itself involves the active appreciation of change, here called motion sense.

Sensations are actively endowed with spatial properties by the man who perceives them. They are also perceived as possessing temporal properties on account of their serial nature. Because they are endowed with spatial qualities and because they are in motion, stimuli are perceived as possessing attributes of direction. The sense of direction is necessary for spatial orientation, and for such performances as reading, writing, calculation, and drawing. Certain patients demonstrating varieties of spatial disorientation are described.

2,000

Goodman, B.D. 1961 THE PSYCHOLOGICAL AND SOCIAL PROBLEMS OF MAN IN SPACE: A LITERATURE SURVEY
(System Development Corporation, 2500 Colorado Ave., Santa Monica, Calif.)
Field Note 5220, March 2, 1961. ASTIA AD 252 434

ABSTRACT: What type of man will be able to endure the silence and loneliness of space, with no human voice to speak to him, no human ear to listen? What type of man can remain alert and maintain his performance, removed from ordinary sensory stimuli, enclosed in the cramped quarters of a space capsule as it leaves the earth and all that is familiar?

A review of space literature shows that the primary emphasis in research has been on engineering -- designing the space vehicle to get man into space, and providing the proper closed ecological system, the necessary controls, displays, and equipment to make it possible for him to survive there. This phase of research has involved studying man and his physiological needs, and analyzing human tolerances to environmental variances. An accompanying, but less emphasized phase has been concerned with the study of the psychological and social problems of man in space.

It is the purpose of this bibliography to bring together the reports, books, and periodical articles published through January 1961 in the specific area of behavioral science related to space flight, or as it is sometimes called "space psychology." This area includes social and sensory isolation, psychological assessment and training, fatigue, confinement, performance under stress, work schedules, motivation, weightlessness, idsorientation, emotional stability, and the day-night cycle.

Citations listed are unclassified unless otherwise noted. All titles are unclassified. To facilitate ordering items listed in the Technical lAbstract Bulletin (TAB) and the Armed Services Technical Information Agency, ASTIA documents (AD) numbers have been given when available.

2,001

Goodman, B. D. 1961 PSYCHOLOGICAL AND SOCIAL PROBLEMS OF MAN IN SPACE - A LITERATURE SURVEY. American Rocket Society Journal 31(7):863-872, July 1961

ABSTRACT: What type of man will be able to endure for months or even years the vast silence and loneliness of space, far removed from the sounds and sights of his natural environments? What type of man can remain alert and maintain his performance, deprived of ordinary sensory stimuli, enclosed in the cramped quarters of a space capsule as it leaves Earth and all that is familiar?
It is the purpose of this bibliography to bring together the reports, books, and periodical articles published thru the early part of 1961 dealing with the specific area of behavioral science related to space flight, or as it is sometimes called "space psychology." This area includes problems of confinement, isolation, sensory deprivation, weightlessness, psychological assessment and training, motivation and morale, emotional stability, boredom and fatigue, performance under stress, and work load. (AUTHOR)

2,002

Goodrich, J. W. 1956 ESCAPE FROM HIGH PERFORMANCE AIRCRAFT. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TN 56-7; ASTIA AD-81 562

ABSTRACT: The information presented by this study may be summarized as follows for the conventional ejection seat system. The maximum linear deceleration is essentially constant for a given calibrated airspeed regardless of altitude. At constant calibrated airspeed the rate of tumbling increases with altitude and approaches a value proportional to the inverse of the square root of the density ratio. At constant calibrated airspeed the duration of g forces is approximately proportional to the inverse of the square root of the density ratio. The maximum linear deceleration forces increase as the 2.47 power of the velocity. The maximum linear deceleration rapidly approaches the limit of human tolerance as the speed of the aircraft at time of ejection is increased above 550 knots calibrated airspeed. The aerodynamic and physical characteristics defined by the parameter (C_DA/W) are such as to limit the usefulness of the conventional ejection seat system to the lower part of the speed range of the 'Century Series' fighter. Only by optimization of these parameters, such as may be obtained by the use of a low drag capsule, can successful escape be expected in the extreme speed range capability of the 'Century Series' aircraft and beyond." (WADC)

2,003

Goodson, J. E. & J. W. Miller 1959 DYNAMIC VISUAL ACUITY IN AN APPLIED SETTING.
Aerospace Med. 30(10):755-763.

SUMMARY: 1. Visual acuity deteriorates in the air with increased target speeds in much the same manner as it does in the laboratory when similar tagets are used.

2. The rate of deterioration in acuity, when using two targets, seems to take a linear form over the range of speeds used as opposed to the curvilinear form taken when one target is used.

3. Deceleration of target speeds has a marked effect on performance of a visual tracking task because of both the change in speeds and the resulting change in configuration of the target. The effect appears to be benificial.

4. Physiological factors peculiar to the flight conditions either did not effect performance, or else acted in a consistent manner.

5. Anxiety toward flight, as measured by proneness to become air sick, did not have an effect on performance of the task.

6. All three methods used for testing dynamic acuity discriminated between subject significantly at all speeds.

7. While there was considerable learning in the one-target method, no learning took place when the more complex target was used.

2,004

Gorbov, F. 1962 PSYCHOLOGY OF COSMIC FLIGHT.
Trans. of Aviatsiya i Kosmonavtika (USSR) 44(5):22-27, 1962.
(Joint Publications Research Service, New York, N.Y.)
Oct. 31, 1962 JPRS: 15979

2,005

Gord, Biermann 1931 WELTRAUMSCHIFFAHRT? EINE KURZE STUDIE DES PROBLEMS. (Space Travel? A Brief Study of the Problems) (Bremen: F. Leuwer, 1931)

ABSTRACT: Early history of the physical and technical problems of rocketry with a discussion of space travel.

2,006

Gordon, J., K.E. Jensen, W. Sipple, and R.D. Squires 1959 NADC BIOLOGICAL INSTRUMENTATION SYMPOSIUM OF 10 DEC 1958; FOURTH LETTER REPORT CONCERNING (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR99, Dec. 28, 1959, ASTIA AD 230 971

ABSTRACT: The electroencephalograph was investigated to determine its usefulness as a means of monitoring certain aspects of cerebral function in air and space craft pilots while in flight. Recording electrodes which include a miniature transistorized amplifier, capable of recording a useful EEG without bulky electrical shielding, were constructed to fit comfortably inside a pilot's head gear. The system is sufficiently insensitive to head movement, G forces and vibration. The following information can be obtained from electroencephalographic tracings: (1) state of hypoxia, (2) eyes open and eyes closed, and (3) state of wakefulness. An EEG, recorded via telemetry, employing a miniature transistorized amplifier and transmitter built into an aviator's head gear was transmitted for a distance of approximately 50 feet through the laboratory walls.

2,007

Gordon, J., R.E. Jensen, W. Sipple, & R.D. Squires 1960 NADC BIOLOGICAL INSTRUMENTATION SYMPOSIUM OF 10 DEC 1958; FIFTH LETTER REPORT CONCERNING (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-L6012, May 3, 1960. ASTIA AD 237 819

ABSTRACT: This report deals with the problems of fabrication, testing, and selection of biomedical electrodes suitable for use on human subjects during flight or simulated flight conditions. Small light electrodes have been fabricated which minimize source resistance when the subject's body is in motion or he is being subjected to high accelerations. After testing numerous systems on and off the centrifuge, the most satisfactory electrode restraint system has been fastening cork rubber discs with center hole of electrode and jelly to the skin, followed by a cork rubber cover. Electrode paste is used to secure the electrodes to the scalp for EEG recordings.

2,008

Goria, A. and J. Mallen 1951 IL RADDRIZZAMENTO PASSIVO DEL CORPO A VARIE VELOCITÀ ANGOLARI ED EFFETTI SULLA FUNZIONE RESPIRATORIA E CIRCOLATORIA NELL-UNOMO. (Passive Raising To Upright Position At Various Angular Velocities And Its Effect On Respiratory and Circulatory Function In Man)
Rivista di Medicina Aeronautica, (Rome) 14:386-390, July-Sept. 1951

2,009

Gorokhoff, Boris I. 1962 PROVIDING U.S. SCIENTISTS WITH SOVIET SCIENTIFIC INFORMATION. REVISED EDITION
(Massachusetts Institute of Technology Libraries) Distributed by National Science Foundation, Washington, D.C. April 1962

ABSTRACT: The present report seeks to provide detail of a reference nature on the form and extent of Soviet scientific information in the original language and on what is being done to make such data available to American scientists and engineers who are not familiar with Russian.

2,010

Goshen, C.E. 1961 MAN IN SPACE AND PSYCHOLOGICAL RESEARCH.
Astronautics, 6(3):38-39, March 1961

ABSTRACT: Reviews physiological problems of space flight. Clarifies distinctions between physiological and psychological research as an aid to proper utilization and interpretation of precious data from early manned spaceflight.

2,011

Goswami, S. L., C. p. Trivedi and R. K. Gupta 1961 A PRELIMINARY STUDY OF MOTION INDUCED STRESS IN RATS.
In Arch. Int. Pharmacodyn 134:1-9, Nov. 1, 1961

2,012

Gottlieb, S. 1948 STATIC AND DYNAMIC TESTS OF A TYPICAL FIGHTER PILOT'S SEAT INSTALLATION FOR A 40 G CRASH CONDITION
(Naval Air Material Ctr., Aero Struc. Lab.) NAM 24102, Part I Jan 12, 1948. ASTIA ATI 37398

ABSTRACT: Tests were conducted on a standard R4D pilot seat and reinforcements made after each failure until seat demonstrated its ability to withstand a 40 g

deceleration load at the c.g. of a 200 lb. dummy in head-on-crash condition. Dynamic tests were made in the NAES drop test machine and static tests were made by applying loads to a steel plate behind the dummy acting through its d.g. Several reinforcements consisted of replacing dural parts with 4130 steel of same gage were required to enable seat to withstand 40 g when shoulder harness passed over fuselage bar. Reinforcements added 3-1/2 lbs. to original seat installation weight. Harness was found to transmit all applied load to seat in a 1:2 ratio of shoulder harness to lap harness load. Reinforced seat withstood 20 g when shoulder harness was passed over seat back to floor attachment. Recommended static loads for transport type seat under 40 g loadings are 3000 lbs. shoulder harness load and 6000 lbs. total lap harness load at 40° upward.

2,012

Gottlieb, S. 1948 STATIC AND DYNAMIC TEST OF A TYPICAL PILOT'S SEAT INSTALLATION FOR A 40 G CRASH CONDITION
(Naval Air Material Ctr) NAM 24102, Part 2, 2 Sept. 1948. ASTIA AD 51 489

ABSTRACT: The A N Standard 7505 seat used in F6F single-engine fighters was tested to determine what ultimate static carry through structural strength is required to withstand the loads resultimg from a 40 g deceleration of about 0.1 sec. duration at the cg of a 200 lb dummy in a head-on crash condition. The harness loads were measured and the Bureau of Standards ring dynamometer used to measure the harness loads was evaluated. It is concluded that the F6F seat with reinforcements is structurally capable of supporting 40 g dynamic loads of 7300 lbs. The general distribution of load between shoulder harness and lap harness at 40° upward is a 1 to 2 ratio. The loads determined with the BuSTds rings are consistently low. These results indicate that dynamic calibration may materially improve the accuracy of the dynamometer.

2,013

Gotzlinger, J. & E. Helsing 1955 A "HUMAN CENTRIFUGE" FOR RESEARCH INTO PHYSIOLOGICAL FLIGHT STRESSES. ASEA Journal 28(5-6):75-83 May-June 1955

ABSTRACT: A description of the centrifuge installed at the medical research institute, Karolinska Institute, Stockholm, Sweden, for use in physiological investigations involving man as well as animals. The mechanical design, the driving machinery and regulation and setting devices are also discussed.

2nd ABSTRACT: Centrifuge installed at medical research institute, Karolinska Institute, Stockholm, for use in physiological investigations with human being and also for tests on animals, mechanical design, driving machinery, and regulation and setting devices.

2,014

Gougerot, L. 1940 EFFETS PHYSIOLOGIQUES DES FORCES D'INERTIE, ETUDE DES EFFECTS CIRCULATORIES, RESPIRATORIES ET VESTIBULAIRES CHEZ L'AVIATEUR. (The Physiological Effects of Inertia Forces. Study of the Circulatory, Respiratory and Vestibular Effects in the Aviator) (Paris: Maloine, 1940)

2,015

Gougerot, L. 1947 PERSPECTIVES PHYSIOLOGIQUES SOULEVEES PAR LE PROBLEME ASTRONAUTIQUE (PHYSIOLOGICAL PROBLEMS OF SPACE FLIGHT) Med. aeronaut. 2:63-74

2,016

Gougerot, L. 1953 LA LOI DE WEBER-FECHNER ET VARIATONS DE LA PESANTEUR APPARENTE (The Law of Weber-Fechner and Variations of the Apparent Gravity)
Medicine Aeronautique (Paris) 8: 119-125.

2,017

Gough, M. N. & A. P. Beard 1936 LIMITATIONS OF THE PILOT IN APPLYING FORCES TO AIRPLANE CONTROLS.
(National Advisory Committee for Aeronautics, Washington, D. C.) NACA TN 550, Jan. 1936.

2,018

Gowdey, C. D. & J. W. Pearce 1955 A SELECTED BIBLIOGRAPHY OF THE OPEN LITERATURE ON AVIATION MEDICINE 1945-1955.
(Defence Research Board, Department of National Defence, Ottawa, Canada) Rept. DR-9, July 1955. ASTIA AD 87 331

2,019

Gozulov, S. A. 1956 K VOPROSU O KUMULYATIVNOM VLIYANII USKORENIY. (THE PROBLEM OF CUMULATIVE EFFECT OF ACCELERATION). Voyenno-meditsinskiy Zhurnal (Military Medical Journal) 10:55-59, 1956. (Translation in USAF Air Intelligence Information Report "Two Problems in Acceleration: Cumulative Effect and X-Ray Examinations". IR-1600-57. 23 July 1957)

2,020

Gozulov, S. A. 1959 O PERENOSIMOSTI VOZDUSHNOGO POTOKA DEYSTVUYUSHCHEGO NA LETCHIKA PRI KATAPULTIROVANII (Ability to Withstand Air Current Acting Upon a Pilot During the Process of Ejection) (Trans. of Voyenno-Meditsinskiy Zhurnal (USSR) (12):40-44, 1958) (SLA Translations Center, Chicago, Ill.) 59-19708

2,021

Graham, E.W. & A.M. Rodriguez 1952 RESPONSE OF SOME LINEAR SYSTEMS TO RANDOM FORCES WITH REFERENCE TO AIRCRAFT BUFFETING. (Douglas Aircraft Co., Inc., Santa Monica, Calif.) Rept. No. SM-14517, Sept. 1952. ASTIA AD 240 250.

ABSTRACT: In connection with aircraft buffeting, some studies are made of mechanical systems subjected to random forces. No attempt is made to consider an actual aircraft structure. Instead, highly simplified systems are chosen in order to clarify some of the fundamentals of the problem. Some results are reviewed for free particles and simple oscillators subjected to random forces, considering the transient response in addition to the steady state. An oscillator plus a lever is studied, the fulcrum of the lever corresponding to a nodal point for one mode of an oscillating beam. Two oscillators which are coupled through damping is present. Finally, the equations for response of a uniform slender beam are given. The forcing functions considered are concentrated at a point in space and include a single forcing frequency, a white spectrum and a truncated white spectrum. (The response to the white spectrum is the Brownian motion of the system). The damping is external and applied at a point. (Author)

2,022

Graham, R.A., G.E. Ingram, & W.D. Ingram 1961 PERFORMANCE OF HIGH-VELOCITY PROPELLANT GUN FOR CONTROLLED IMPACTS. (Sandia Corporation, Albuquerque, New Mexico) SC-4652. Nov. 1961.

ABSTRACT: The performance of an extensively modified U.S. Army 40 mm gun for producing controlled impacts is described. Various projectile velocities in the range of 200 fps to 3200 fps are achieved by varying the amount of a fast-burning propellant.

2,023

Grandpierre, R. 1939 LES EFFETS PHYSIOLOGIQUES DU VOL EN AVION AUX HAUTES ALTITUDES (The Physiological Effects of Flight in Aircraft at High Altitudes)
Revue de physiothérapie (Paris) 15: 49-73

2,024

Grandpierre, R., et al. (Eds.). 1948 ELEMENTS DE MEDICINE AERONAUTIQUE. (Paris: L'Expansion Scientifique Francaise, 1948.) 502 pp.

2,025

Grandpierre, R., & P. Bouverot 1958 INCIDENCES PHYSIOPATHOLOGIQUES DE L'EMPLOI DES FUSEES COMME MOYEN DE TRANSPORT (PHYSIOPATHOLOGICAL FACTORS IN THE USE OF ROCKETS AS A MEANS OF TRANSPORTATION) Concours med. 80:265-267, 269-270

2,026

Grandpierre, R, F. Violette, F. Flandrois and J. B. Tosan 1959 SIGNIFICANCE AND LIMITATIONS OF RESEARCH ON ANIMALS AND MAN BY MEANS OF CENTRIFUGES (INTERET ET LIMITES DES RECHERCHES EFFECTUEES SUR L'ANIMAL ET SUR L'HOMME AU MOYEN DES CENTRIFUGEUSES). Medecine Aeronaut. (Paris) 14(4):325-327, August 1961

ABSTRACT: Outlines the development of the centrifuge from the time of Darwin. Observes that, because of inherent limitations in the centrifuge, such as the mechanical limitation on rate of acceleration and the difficulty of analyzing data derived from experiments with animals of a different physical configuration and acceleration susceptibility from those of man, the centrifuge will be most useful as an instrument of applied rather than basic research.

2,027

Grandpierre, R., F. Violette, R. Loubiere & G. Chatelier 1960 PHYSIOLOGIE DU VOL SPATIAL (Physiology of Space Flight) Forces aeriennes francaises (Paris), 14(159):789-823, May 1960 and 14(160):969-986, June 1960.

ABSTRACT: A review discussion is presented of the pertinent physiologic factors involved in space flight. Consideration is given to (1) cosmic flight acceleration and deceleration tolerances; (2) biologic effects of weightlessness; (3) the kinds, distribution, and variations in intensities of radiations which may be encountered in space flight, the attendant biologic effects (acute, secondary, delayed and chronic, genetic), tolerable dosage, and means of protection; and (4) problems attendant to prolonged life in a closed cabin system. Included in the latter are discussions on (a) fundamental respiratory requirements and regeneration of the cabin atmosphere, (b) sources of oxygen and methods of eliminating carbon dioxide, (c) the utilization of urine and collection of water vapor, and (d) the nutritional requirements of astronauts. (Aerospace Medicine 31(10): 873. Oct. 1960).

2,028

Grandpierre, R., F. Violette, R. Loubiere and G. Chatelier PHYSIOLOGIE DU VOL SPATIAL (Physiology of Space Flight) Forces aeriennes francaises, 14(159):789-823, May 1960 and 14(160):969-986, June 1960

ABSTRACT: The following subjects are reviewed: Acceleration and deceleration tolerances, weightlessness, radiation, prolonged life in a space cabin, oxygen regeneration, utilization of urine and collection of water vapor, and the nutritional requirements of astronauts. (Aerospace Med. 31(10):873, Oct. 1960).

2,029

Grandpierre, R., F. Violette, F. Flandrois, and J.B. Tosan 1961 INTERET ET LIMITES DES RECHERCHES EFFECTUEES SUR L'ANIMAL ET SUR L'HOMME AU MOYEN DES CENTRIFUGEUSES (Interpretations and Limitations of Research Done Upon Animals and Man by Means of Centrifuges). In Bergeret, P., ed., Bio-Assay Techniques for Human Centrifuges and Physiological Effects of Acceleration. (London, New York, Paris: Pergamon Press, 1961) AGARDograph 48. Pp. 140-146.

ABSTRACT: Following a brief history of the centrifuge since Darwin (1794) the authors discuss the use of centrifuges for studying long duration g, and their technical limitations, especially when extremely rapid accelerations are involved. They then emphasize the limitations of the evaluation of data obtained. The difference between the 2-feet vertical attitude of man and the 4-feet horizontal attitude of the animal is not only of an anatomic nature, and orthostatism physiologically results in important vascular regulations, which implies much caution in the evaluation of data obtained. Summing up, fundamental physiological research is likely soon to be completed, and the use of centrifuges will be restricted to applied research, namely new technique and material testing.

2,030

Grandpierre, R., F. Violette, J. Fabre and Y. Houdas 1961 PHYSIOLOGICAL PROBLEMS PRESENTED BY SUPERSONIC EJECTIONS. I. (PROBLEMES PHYSIOLOGIQUES POSES PAR LES EJECTIONS SUPERSONIQUES. I) Forces aeriennes francaises no. 175, pp. 667-678, November 1961

ABSTRACT: At speeds near 1100 k.m./hour many present-day types of ejection seats do not properly protect the pilot; consequently, the ejection mortality rate at these speeds is high. This report analyzes the disturbances produced by the different physical parameters of high-speed ejections, and the relationships between seat spin, seat mass, altitude, and deceleration. It discusses the problem of rotation during free-fall after seat separation and control of rotation by parachutists. A concluding section outlines the mechanical and physiological effects of ejection and rotation upon both the human body and equipment.

2,031

Grandpierre, R. R. Angiboust, G. Chatelier, and L. Leitner 1962 MODIFICATIONS OF CORTICAL ELECTRICAL ACTIVITY IN ANIMALS SUBJECTED TO DIFFERENT ACCELERATIONS.
In J. Physiol. (Paris) 54:347-348, March-April 1962 (France)

2,032

Grandpierre, Angiboust, and Chatelier 1962 OUTLINE OF THE FIRST PHYSIOLOGICAL RESULTS FROM THE FRENCH BIOLOGICAL ROCKET EXPERIMENT. Revue de medecine aeronautique (Paris), 1 (4) : 69. July-Aug. 1962

ABSTRACT: A rat exposed to complex accelerations in the head of a Veronique rocket launched into space revealed an intense cortical activity which persisted throughout the flight. In contrast to this cortical activity, the reticular rhythm remained stable until the hundredth second of the ballistic period when the reticular tracing flattened out, decreased progressively, and exhibited slow waves. Cardiac and respiratory rhythms also decreased.

2,033

Grant, C. A., tr. O. Perey 1957 FRACTURE OF THE VERTEBRAL END-PLATE IN THE LUMBAR SPINE. An Experimental Biomechanical Investigation. Acta Orthopaedica Scandinavica, Supplementum No. 25.
(See Perey)

2,034

Grant, D. N. W. 1941 PROBLEMS IN AVIATION MEDICINE AFFECTING MILITARY AVIATION J. Aviation Med. 12:274-279.

2,035

Grant, D. N. W. 1942 THE GENERAL MISSION OF MILITARY AVIATION MEDICINE J. Lab. & Clinical Med. Vol. 28, Part I, pp. 577-585.

ABSTRACT: The development of aviation has presented new medical problems. It has brought with it problems of oxygen want, acceleration, unprecedented demands on the special senses, the nervous system, the heart, and other organs. The general mission of aviation medicine, that of the selection and care of flying personnel is and always has been intimately associated with National Defense. The author of this paper discusses the general mission of military aviation medicine. 30,000 new pilots each year must be chosen not only for their ability to learn to fly, but also from the standpoint of their ability to withstand the stress of operational flying over a long period of time.

2,036

Grant, F. C. 1959 IMPORTANCE OF THE VARIATION OF DRAC WITH LIFT IN MINIMIZATION OF SATELLITE ENTRY ACCELERATION.
(National Aeronautics and Space Administration, Langley Research Center, Langley Field, Va.) Tech. Note D-120, Oct. 1959. ASTIA AD 227 118

ABSTRACT: The present investigation shows that the use of realistic drag polars leads to lower peak accelerations than those obtained on the assumption of constant drac coefficient, which, in effect, limits the aerodynamic coefficients to the low-drag side of the maximum lift-drag ratio. An acceleration parameter is derived which defines the minimum peak acceleration in terms of a simple integral of the aero-dynamic coefficients of the vehicle.

Numerical calculations are presented for an entry vehicle with a simplified but realistic complete drag polar. The assumed vehicle had a maximum lift-drag ratio of 2.8. For an entry angle of 6°, the peak acceleration is reduced to 1.1 g units as compared with 2.5 g units on the assumption of constant drag coefficient. Corresponding values for 12° were 4.1 g units and 8.3 g units. Entry conditions were 25,900 ft/sec at 350,000 feet. The numberical calculations confirm a simple physical argument which indicates that for entry with minimum peak acceleration, the initial portion of the trajectory should be flown near maximum lift coefficient. The calculated minimum values of acceleration are roughly proportional to the square of the entry angle. The results obtained by use of the derived acceleration parameter are in good agreement with the numerical calculations.

2,037

Grant, F. C. 1960 ANALYSIS OF LOW-ACCELERATION LIFTING ENTRY FROM ESCAPE SPEED. (National Aeronautics and Space Administration, Washington, D. C.) NASA Technical Note D-249; ASTIA AD-237 476

ABSTRACT: An earlier analysis of lifting satellite entry for circular orbit velocities is extended to the case of parabolic orbit velocities. Simple formulas are derived which yield approximations to the minimum loadings for steep entries. The general advantage of operation on the high-drag side of maximum lift-drag ratio is demonstrated analytically. The optimum character of modulation from maximum lift coefficient is shown. A principal parameter is shown to be the ratio of maximum lift coefficient to minimum drag coefficient. The analytical results are compared with those of detailed numerical integrations for an entry vehicle with a simplified but realistic lift polar. (AUTHOR)

2,038

Grant, F. C. 1960 MODULATED ENTRY
(National Aeronautics and Space Admisistration, Langley Station, Va.)
NASA Tech. Note D-452, Aug. 1960, NASA N62-71026. ASTIA AD 241 616

ABSTRACT: The technique of modulation, or variable coefficients, is discussed and the analytical formulation is reviewed. Representative numerical results

of the use of modulation are shown for the lifting and nonlifting cases. These results include the effects of modulation on peak acceleration, entry corridor, and head absorption. Results are given for entry at satellite speed and escape speed.

2,039

Grant, R.T. and E.B. Reeve 1951 OBSERVATIONS ON THE GENERAL EFFECTS OF INJURY IN MAN, WITH SPECIAL REFERENCE TO WOUND SHOCK.
(London: H.M. Stationery Off., 1951)

2,040

Graveline, D. E. et al 1961 PSYCHOBIOLOGIC EFFECTS OF HYPODYNAMICS INDUCED BY WATER IMMERSION.
(Paper, 32nd Annual Meeting, Aerospace Medical Association, 24-27 April 1961, Chicago, Ill.)

ABSTRACT: Utilizing a technique involving whole body immersion in water, a hypodynamic environment was produced in which the normal weight sensations were removed and movement was effortless. This experiment was conducted with one subject for a 7-day period during which time extensive biologic data were collected. There are definite indications that pronounced functional impairment results from prolonged exposure to hypodynamic conditions. Following the period of immersion marked changes of cardiovascular reflexes and diminished muscular tone were apparent. Hematologic investigations and extensive biochemical studies on blood and urine show significant changes, and there is a gross disruption of psychomotor effectiveness. In general, this study suggests that during prolonged space flight under true weightless conditions the organism may attain a critical state of deconditioning which will seriously attenuate his tolerance for re-entry stresses and the normal gravitational environment. (Aerospace Med. 32(3): 232, March 1961).

2,041

Graveline, D. E. et al 1961 PSYCHOBIOLOGIC EFFECTS OF WATER-IMMERSION-INDUCED HYPODYNAMICS
Aerospace Medicine 32(5):387-400, May 1961.

SUMMARY: Utilizing a technique involving whole-body immersion in water, a hypodynamic environment was produced in which the normal weight sensations were removed and movement was effortless. This experiment was conducted with one subject for a seven-day period during which time extensive biologic data were collected.

There are definite indications that pronounced functional impairment results from prolonged exposure to hypodynamic conditions. There is a marked decrease in the need for sleep, and sleep characteristics observed in this quasi-weightless environment permit us to hypothesize a specific biological function for sleep, suggesting that it provides a period of recovery from the neuromuscualr "debt" accumulated by man in counteracting the effects of gravity. Following the period of immersion, marked changes of cardiovascular reflexes and diminished muscular tone were apparent. Hematologic investigations and extensive biochemical studies on blood and urine show some interesting changes, and there is a gross disruption of psychomotor effectiveness. In general, this study suggests that during prolonged space flight under true weightless conditions the organism may attain a critical state of deconditioning which will seriously attenuate his tolerance for re-entry stresses and the normal gravitational environment. Investigation into this area must continue in an effort to further assess these effects, and then to develop appropriate protective devices or techniques.

2,042

Graveline, D. E. and G. W. Barnard 1961 PHYSIOLOGIC EFFECTS OF A HYPODYNAMIC ENVIRONMENT: SHORT-TERM STUDIES
Aerospace Medicine 32(8):726-736, Aug. 1961.

ABSTRACT: To study the metabolics and functional responses of the body to a state of relative muscular inactivity, four Ss were studied after 6, 12, and 24 hours of water immersion. Supported by water and a form-fitting couch, normal weight sensation was altered and movement became relatively effortless. Functional studies obtained on the Ss included tilt table and heat chamber tests as well as the responses to headward acceleration. Pertinent psychomotor tests and evaluations of muscle strength were also done. The findings were discussed with reference to protective measures needed for orbital flight to enable man to adapt to the new set of environmental demands. (Tufts)

2,043

Gray, G.W. 1943 THE PHYSIOLOGY OF ACCELERATION.
Gray, G.W., Science at War. (New York: Harper & Bros., 1943). pp. 240-243.

2,044

Gray, P. D., N. A. Williams et al. 1961 ROCKETS IN ENVIRONMENT. PHASE I. PARAMETER STUDY. (Aerojet-General Corp., Azuza, Calif.) Rept. no. 2112; Contract AF 04(611)7441, Proj. 3058-03, Oct. 1961, ASTIA AD-275 189

ABSTRACT: Design criteria for space propulsion systems is being studied by defining the space environment, determining the behavior of rocket engine materials and componenents in this environment, developing design criteria based on the results of these material behavior tests, and designing a piggyback space experiment to verify the conclusions and design criteria established previously. Environmental factors to be considered include: radiation (nuclear, infrared, and ultraviolet), micrometeroids, temperature, vacuum, and zero gravity. Environmental factors constituting the space environment between 300 and 22,000 n.mi. altitude were defined. The propulsion system materials and components most likely to be exposed to this environment were established, and available data regarding the behavior of these materials in the space environment were surveyed. Deficiencies in these data were determined, and appropriate tests were planned for obtaining data now lacking (AUTHOR)

2,045

Gray, R. F. 1953 RELATIONSHIPS BETWEEN OCULOGYRAL ILLUSIONS AND NYSTAGMUS (U.S. Naval Air Development Center, Johnsville, Pa.) AMAL Proj. NM 001-111-302.

2,046

Gray, R.F. 1954 RESPONSES OF BLINDFOLDED SUBJECT TO TILT FROM HORIZONTAL POSITION. (U.S. Naval Air Development Center, Aviation Med. Acceleration Laboratory, Johnsville, Pa.) Rept. No. NADC-MA-5407, 23 July 1954. ASTIA AD-41658.

ABSTRACT: Blindfolded subjects were moved and positioned manually while lying supine on a tilt-table which could be rotated around any one of 3 major axis. The effects of gravity and of the force turning the table served to partially simulate the effects of the thrust of the engines. As the velocity of tilt or turn was increased, the reaction times of the subjects were reduced until, at the higher angular velocities, the choice reaction times leveled off at approximately .200 or .50 seconds, depending on the type of response switch.

Measurements of pointing vertically while tilted indicated that in the head-foot plane of rotation, there would most probably be a continuously more exaggerated sense of tilt as the total amount of tilt increased. It is thought that the unusually rapid responses, in the main, are due to kinesthetic sensation. Also, insofar as can be determined by discontinuous non-tracking studies, a combination of the pressure, vestibular, tactile, and kinesthetic senses would be better than vision for controlling rapid oscillations in aircraft

2,047

Gray, R.F. 1955 TIME REQUIRED TO RAISE THE ARM IN RESPONSE TO TONIC ELECTRICAL STIMULATION. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 111 303, 31 Dec. 1955.

ABSTRACT: Since preliminary experiments had indicated the possibility, it is hoped that a stimulus will be found which would be of assistance in speeding the response of aviators. An adequate stimulator was purchased. It was observed that when both stimulating electrodes are placed on the same muscle, there is an optimum position for each electrode. Under the conditions of this study, then, there will be two motor points for each muscle rather than only one as in the customary arrangement of electrodes. A pulse of direct current which contracts muscle has been found to cause less skin irritation if maintained for a short period of time. The voltage must, of course, be higher when the time of application is reduced. Two hundred and fifty volts maintained for .0001 second has been chosen as the most practical stimulus to be used. Muscle has been regularly contracted in response to a stimulus of only .00001 second duration at 250 volts.

2,048

Gray, R. F., & J. L. Brown 1955 VARIATION OF HUMAN RESPONSES WITH VARIATION OF ACCELERATION PATTERNS. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 111 302; 31 Dec. 1955

ABSTRACT: The first study in this series was for the purpose of relating response to rotation on a human centrifuge to the pattern of motion of the centrifuge at one radius. The duration of apparent motion of the visual field during acceleration was found to increase with increase in the duration of angular acceleration and with reduction in the magnitude of acceleration. The study suggested, also, that dizziness due to head motion on the centrifuge was due to coriolis acceleration and that this acceleration acted on the organs of the ear which respond primarily to linear accelerations, rather than, as is usually assumed, on those organs which respond primarily to rotation. Two other conclusions are suggested by the data; (a) that the spining of the visual field in response to rotation is not due to eye movement, and (b) that the false perception of the vertical in aircraft, called "the leans" is, as hypothesized by Armstrong, due to a perception of the vertical. Furthermore, the data suggest that persons subject to "the leans" can be distinguished on human centrifuges from persons not subject to "the leans".

2,049

Gray, R. F. 1955 THE EFFECTS OF TONIC ELECTRICAL STIMULATION AS A MEANS OF COMBATING ADVERSE CIRCULATORY DISTURBANCES CAUSED BY ACCELERATION. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5501; ASTIA AD-55 215

ABSTRACT: Electrical stimulation which caused strong painful contractions of the muscles of the abdominal wall did not significantly increase the G-level at which

the subject lost sight of peripheral lights. Nor was there a significant increase in the G-level at which peripheral light loss occurred when the muscles of the thighs were contracted by the electrical current. Because of the low protection afforded and the high degree of subject discomfort, this method of protection against G-force is considered to be impractical. (AMAL)

2,050

Gray, R. F., et al. 1955 MISCELLANEOUS TESTS AND MINOR INVESTIGATIONS. PHASE V. THE EFFECTS OF TONIC ELECTRICAL STIMULATION AS A MEANS OF COMBATING ADVERSE CIRCULATORY DISTURBANCES CAUSED BY ACCELERATION FORCES. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 103 300; TED ADC AE-1402 31 December 1955

ABSTRACT: G-tolerance was recorded when the abdominal muscles were strongly contracted by electrical current, when the muscles of both thighs were contracted by electrical current, and when there was no electrical stimulus. The increase in G-tolerance which occurred during the exposures to electrical contraction of these muscles was found not to be significantly different from the increase in G-tolerance which occurred following a similar number of exposures to acceleration only. It was concluded that tonic electrical stimulation of muscle was not a useful means of protection against the adverse effects of acceleration.

2,051

Gray, R.F. 1956 RELATIONSHIPS BETWEEN OCULOGYRAL ILLUSIONS AND NYSTAGMUS. (U.S. Naval Air Development Center, Johnsville, Penn.) NADC-MA-5609, August 1956, ASTIA AD-107 773.

ABSTRACT: Four human subjects were exposed to various angular accelerations during 228 runs on a human centrifuge. It was observed that nystagmus (oscillatory eye movements of a sawtooth waveform) occurred at times when no oculogyral illusions (visual illusions of rotation) were reported, and oculogyral illusions occurred at times when no nystagmus could be distinguished. It is concluded that not all nystagmus causes oculogyral illusions.

2,052

Gray, R. F. 1957 MECHANICAL SYSTEMS SUGGESTED FOR G PROTECTION. (Naval Air Development Center, Johnsville, Pa.) NADC-MA-5708; 15 July 1957 ASTIA AD 144 106

ABSTRACT: A mechanical system is proposed as a means of increasing tolerance to acceleration. The subject is assumed to be completely underwater in a suit and helmet, both capable of resisting a high pressure atmosphere transmitted through

the water from the subject's chest. Analysis of the system indicates that it could protect against loss of blood from the head and consequent blackout at levels of acceleration considerably higher than 100 G units. However, distortions of organs and blood vessels withing air-containing spaces of the body would tend to establish much lower tolerance levels since blood bessels within the top part of the chest would tend to collapse and cut off circulation. It is possible that circulation through the collapsed blood vessels could be restored by pumps acting to change the volume of the suit. Respiration could be provided by cycling the pressure of the air supplied to the subject. This could be under voluntary control. The suit could serve as a pressure suit for high altitude flying since pressures within the body would be exactly counterbalanced by pressures outside the body. (Author)

2,053

Gray, R.F., & R.J. Crosbie 1958 VARIATION IN DURATION OF OCULOGYRAL ILLUSIONS AS A FUNCTION OF THE RADIUS OF TURN.
(Naval Air Development Ctr., Johnsville, Pa.) NADC MA 5806, May 1959

ABSTRACT: Two subjects were exposed on a human centrifuge at radii of 8, 19, 33, and 50 feet to angular accelerations of 0.03 rad/sec^2 for 7.1 seconds. They were usually kept at the maximum angular velocity of 1.71 rad/sec for a period of 45 seconds and then decelerated according to the normal stopping pattern of the centrifuge in which there was a logarithmic decrement in speed, with a deceleration time constant of 4 seconds. With increase in the radius of turn, there was an average decrease in duration of visual illusions of rotation (oculogyral illusions). Comparing the radius effect with the effect due to repetition, this decrease was seen to be significant for the first oculogyral illusion during rotation and was significant for the first postrotatory oculogyral illusion. At the 50-foot radius additional illusions of rotation, occurring at the same time as the first oculogyral illusion during rotation, but opposite in direction, were occasionally reported by one subject. Such oppositely directed illusions were never reported at smaller radii. Appendices include an analysis of the effects of rotation on a fluid filled ring at various radii and a description of some sensations of rotation and tilt which occur on centrifuges. (Author)

2,054

Gray, R.F. & M.G. Webb 1958 PRELIMINARY STUDY OF G TOLERANCE OF A SUBJECT IN THE G-CAPSULE, PRONE POSITION
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR59, July 8, 1958.

ABSTRACT: The G-Capsule is a device for testing some theories of protection of subjects against acceleration by use of complete immersion of the subject and

by pressurization of his respiratory system through the water against the rigid walls of the capsule to hold his respiratory system at a constant volume. This device was tested at AMAL on the 50-foot centrifuge. The subject was seated in an upright position within the capsule facing away from the center of rotation and was exposed to constantly increasing levels of acceleration from 1 to 9 G. The subject held his breath during each period of centrifuge rotation.

2,055

Gray, R.F. & M.G. Webb 1959 HIGH G PROTECTION
(Paper, Aero Medical Association Meeting, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: The principal distortions of the body of a person exposed to increased acceleration include displacement of blood within the body with undesirable secondary effects such as (1) loss of vision, (2) loss of consciousness, (3) petechia, (4) pain, (5) heart failure. Other distortions in various parts of the body may also lead to pain. Advantages, problems, and limits of older types of G protective systems are discussed. Theories are presented for methods of using liquid or form-fitting external supports for the body along with respiratory pressurization to counteract the distorting forces. Actual devices worked out to apply these theories are shown. These devices include: (1) the "Mayo tank" first used by Wood, Code, and Baldes in 1942 to test G protection by submersion in water. This has been slightly modified to bring about substantial increase in G protection in 1958; (2) the 'G-capsule" and associated equipment which most thoroughly of all devices so far built, is an application of these new theories of body support; and (3) the "N A S A-A M A L moulded couch" built by the National Aeronautics and Space Administration according to some of these ideas and incorporating several other devices or procedures such as partial supination to avoid chest pain as indicated by Wright AFB studies. Through the use of these various devices during the past year, several new records of tolerance to centrifugal acceleration have been established, indications have been gained for improvements on these devices, and it is expected that higher levels of G tolerance will at attained.
(J. Aviation Med. 30(3): 185-186, March 1959)

2,056

Gray, R. F. and C. C. Collins 1959 PILOT PERFORMANCE AND TOLERANCE STUDIES OF ORBITAL RE-ENTRY ACCELERATIONS. (U. S. NADC, AMAL, Johnsville, Pa.) Letter Rept. TED ADC AE-1412, Sept. 1959.

2,057

Gray, R. F. & M. G. Webb 1959 PROTECTION AGAINST ACCELERATION BY WATER IMMERSION.
(U.S. Naval Air Development Center, Johnsville, Pa., June 8, 1959)
(American Rocket Society Preprint, ARS Meeting, San Diego, California.)

ABSTRACT: This is a preliminary report of a crude, unsophisticated device for testing the principles of water immersion as a method of protecting man against the effects of acceleration. The results so far indicate that water immersion offers a method of greatly extending man's physical and functional tolerance to acceleration but, at the present time, we cannot predict the ultimate limit of this protection. The authors believe that a practical water immersion system is feasible from an engineering standpoint and that such systems will be found in future space vehicles.

2,058

Gray, R. F. 1959 RELATIONSHIPS BETWEEN SEMICIRCULAR CANAL FUNCTION AND OTOLITH ORGAN FUNCTION. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5911; ASTIA AD-226 907

ABSTRACT: Data are reviewed indicating human responses which may be the combined result of stimulation of both the otolith organs and the semicircular canals. Some responses attributed to semicircular canals are shown to be similar to those attributed to otolith organ stimulation and vice versa. (AUTHOR)

2,059

Gray, R. F., & D. M. Morway 1959 PRELIMINARY STUDY OF DAMPING OF THE OTOLITH ORGAN SYSTEM BY EPICYCLIC ROTATION. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5919, 28 Dec. 1959, ASTIA AD-231 600

ABSTRACT: An attempt was made to determine the basic validity of the concept that the effects of gravity on the otolith organs can be eliminated by tumbling humans around a horizontal axis through the head. The method of testing this concept was to generate oculogravic illusions in subjects on the centrifuge by letting the direction of the resultant of centrifugal acceleration and gravity change in direction through the man so that his perceived vertical would change Four subjects were tunbled in the plane of rotation of the centrifuge around a true vertical axis. Results indicated that tumbling does reduce the apparent tilt of the oculogravic illusion generated on a centrifuge. The rate of 30 rpm was not sufficiently high to completely eliminate these illusions. The few seconds at 30 rpm noted as being without oculogravic illusions suggested that a higher tumbling frequency may eliminate these illusions.

2,060

Gray, R.F. & M.G. Webb 1960 HIGH G PROTECTION
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-5910; 12 Feb. 1960
ASTIA AD 235 338
See also: Aerospace Med. 32(5) 425-430, May 1961

ABSTRACT: Investigation of mechanical principles important in solving some problems of protection against high acceleration. Also discussed is a study of the effects of acceleration on humans in the positive g($+g_z$) position when submerged to eye level in a tank of water. Subjects are also studied in the prone position ($-g_x$) while completely submerged with respiratory pressurization.

2,061

Gray, R. F. 1960 FUNCTIONAL RELATIONSHIPS BETWEEN SEMICIRCULAR CANALS AND OTOLITH ORGANS.
Aerospace Med. 31(5):413-418, May 1960.

ABSTRACT: The generally accepted theory about how the vestibular organs function to maintain balance is that (1) the static group consisting of the otolith organs, the utricles and saccules, respond to linear accelerations and gravity and not to angular accelerations, and (2) the rotary group consisting of the six semicircular canals respond to angular accelerations and not to linear accelerations or gravity. Although this distinction has existed since 1890 it is inadequate for the explanation of many observations concerning response to vestibular stimulation. This report contains results of vestibular experiments on the human centrifuge at Johnsville, Pa.

2,062

Gray, R.F. 1960 PERFORMANCE SPECIFICATIONS FOR THREE NEW FLIGHT MOTION SIMULATORS
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-6028, June 30, 1960

ABSTRACT: Performance specifications are outlined for three flight motion simulators to measure and improve human tolerance and performance in acceleration environments. These specifications are for devices deemed desirably by the Navy's Aviation Medical Acceleration Laboratory at Johnsville, Pa. They include: (1) a device having five degrees of freedom, three angular and two linear, for the purpose of oscillation of humans; (2) a centrifuge with a 25-foot radius capable of attaining 400 G with a 5000 pound payload; and (3) a 600-foot bounce tower capable of generating accelerations between 10 and 1000 G on payloads weighing up to 10,000 pounds.

2,063

Gray, F. R., R.J. Crosbie, R.A. Hall, J.A. Weaver and C. C. Clark 1961 CORIOLIS ACCELERATION EFFECTS ASSOCIATED WITH MOVEMENT OF HUMANS BY A POWERED GIMBAL SYSTEM ON A HUMAN CENTRIFUGE.
(Paper presented at 32nd annual meeting, Aerospace Medical Assoc., 24-27 April 1961, Chicago, Ill.)

ABSTRACT: Three subjects were exposed to rotation at 1.0 G or 3.0 G at the 50-foot radius of a centrifuge. These gave angular velocities of the centrifuge of .80 and 1.39 radians per second, respectively. Simultaneously each subject was rotated around an axis close to this body by means of a powered gimbal system. These secondary rotations (maneuvers) occured around an axis parallel to the radius of the cnetrifuge (0^{o}), almost parallel to the axis of the centrifuge (272^{o}), or around an axis half way between these (325^{o}). These maneuvers had angular velocities of (a) .3927 rad/sec, (b) .1964 rad/sec, (c) .0982 rad/sec, or (d) .0491 rad/sec. In general the subjects reported or failed to report visual coriolis illusions in accordance with predictions of torque generated in the semicircular canals by coriolis accelerations. Estimates of thresholds were obtained. (Aerospace Med. 32(3):232, March 1961)

2,064

Gray, R. F. and M. G. Webb 1961 HIGH G PROTECTION
Aerospace Medicine 32(5):425-430, May 1961.

SUMMARY: Model studies are discussed concerning mechanical principles thought to be important in solving some problems of protection against high accelerations. Also discussed are (1) a study of the effects of acceleration on humans in the positive G ($+G_z$) position when submerged to eye level in a tank of water. Breath holding permitted water pressure to increase the air pressure in the respiratory system of these subjects, and (2) subjects were studied in the prone position ($-G_x$) while completely submerged with respiratory pressurization.

One subject's tolerance was increased by 13 G in the positive G position and by 15 G in the prone position. Other subjects showed unusually high G-tolerance in these positions. Undesirable effects had to do with translocation of air headward with the subjects in the positive G position and with bleeding and pain in the frontal sinuses and abdominal pain when the subjects were in the prone position.

2,065

Gray, R. F. et al 1961 CORIOLIS ACCELERATION EFFECTS ASSOCIATED WITH MOVEMENT OF HUMANS BY A POWERED GIMBAL SYSTEM ON A HUMAN CENTRIFUGE Aerospace Medicine 32(3):232, March 1961.

ABSTRACT: Three subjects were exposed to rotation at 1.0 G or 3.0 G at the f0-foot radius of a centrifuge. These gave angular velocities of the centrifuge of .80 and 1.39 radians per second, respectively. Simultaneously each subject was rotated around an axis close to his body by means of a powered gimbal system. These secondary rotations (maneuvers) occurred around an axis parallel to the radius of the centrifuge (0^{o}), almost parallel to the axis of the centrifuge (272^{o}), or around an axis half way between these (325^{o}). These maneuvers had angular velocities of (a) .3927 rad/sec, (b) .1964 rad/sec, (c) .0982 rad/sec, or (d) .0491 rad/sec. In general the subjects reported or failed to report visual coriolis illusions in accordance with predictions of torque generated in the semi-circular canals by coriolis accelerations. Estimates of thresholds were obtained.

2,066

Gray, R.F. R.J. Crosbie et al. 1961 THE PRESENCE OR ABSENCE OF VISUAL CORIOLIS ILLUSIONS AT VARIOUS COMBINED ANGULAR VELOCITIES. (Aviation Medical Acceleration Lab., Johnsville, Pa.) NADC-MA-6131, Report no. 1, ASTIA AD-266 893

ABSTRACT: Three subjects were exposed to rotation at 1 G or 3 G at the 50 ft. radius of a centrifuge which gave angular velocities of 0.80 or 1.39 radians per second, respectively. Simultaneously, each subject was rotated around an axis close to his body by means of a powered gimbal system. These secondary rotations (maneuvers) occurred around an axis parallel to the radius of the centrifuge (0 degrees), almost parallel to the axis of the centrifuge (272^{o}), or around an axis half way between these (315 degrees). These maneuvers had nominal angular velocities of 0.3927 rad/sec, 0.1964 rad/sec, 0.0982 rad/sec or 0.0491 rad/sec. In general, the subjects reported visual coriolis illusions in accordance with predictions of such illusions based upon the magnitude of torques being developed by the coriolis acceleration. Therefore, it is likely that coriolis acceleration acts to develop the coriolis illusions. Estimates of thresholds were obtained. (Author)

2,067

Graybiel, A., & R. A. McFarland 1941 THE USE OF THE TILT TABLE TEST IN AVIATION MEDICINE. J. Avia. Med. 12(3):194-211

ABSTRACT:
(a) The tilt table test provides a good method of testing the functions of the peripheral vascular system.

(b) Out of 91 subjects tested, 9 collapsed or fainted, 13 responded poorly, 58 responded fairly well and 11 well.
(c) When the subject's response was correlated with changes in blood pressure and pulse, the most important items in order of significance were (1) fall in systolic blood pressure (2) fall in pulse pressure (3) increase in heart rate.
(d) The wide variation in response is due to individual differences and to a number of factors which render an individual physically unfit.
(e) Response to tilting may be improved by training.
(f) It has been noted that there is correlation between fainting and "blacking out" in pull outs from dives. Consequently a method of testing this susceptibility should be of value in aviation medicine.
(g) Results so far warrant further exploration of the possibilities of the tilt board and standardization of the procedure.

2,068

Graybiel, A. 1942 SOME PROBLEMS IN AVIATION MEDICINE.
J. Lab. & Clinical Med. Vo. 28, Part I, pp. 590-596.

ABSTRACT: A general discussion of pilot selection, oxygen lack, decompression illness, acceleration, and motion sickness.

2,069

Graybiel, A. 1943 SOME PROBLEMS IN AVIATION MEDICINE.
J. Lab Clin Med. 28:590-596, Feb. 1943.

ABSTRACT: Because aviation medical is a specialized field in medicine, it naturally has unique problems. Among those problems is that of pilot selection. Out of a large number of apparently healthy individuals, only a small number are really fitted, both physically and phychologically to pilot an airplane. The hazards facing pilots are lack of oxygen, decompression, illness, acceleration, airplane sickness, and earache.

2,070

Graybiel, A. 1945 DISORIENTATION IN PILOTS Contact (Pensacola) 5:412-425

ABSTRACT: The problem of orientation in pilots, considered in its broadest meaning, embraces most of the aspects of aviation medicine. A partial outline of possible etiological factors is presented under three main headings -- namely the aerial environment, the plane, and the pilot. The physigenesis of aviator's vertigo is reviewed, and man's limited ability to cope with this form of disorientation is emphasized. Two forms of visual illusion, auto-kinesis, and the oculo-gyral illusion are briefly discussed, and their significance in aviation is briefly commented upon.

2,071

Graybiel, A. & D. I. Hupp 1945 THE OCULO-GYRAL ILLUSION: A FORM OF APPARENT MOTION WHICH MAY BE OBSERVED FOLLOWING STIMUALTION OF THE SEMICIRCULAR CANALS.
(Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR00t.13-6001.1.4. 1 Nov. 1945. ASTIA ATI 69 562.
See also J. Aviation Med. 17(1):3-27, Feb. 1946.

ABSTRACT: In experiments conducted by the author, it was found that
(1) Rotatory acceleration may give rise to a visual illusion of movement which is termed the oculo-gyral illusion. It is the result of nystagmus produced reflexly by stimulation of the sensory receptors in the semicircular canals.
(2) In the light, and especially if visual cues are plentiful, relatively strong stimulation is required to produce even weak illusory effects.
(3) If an object is viewed in darkness, relatively weak stimulation will produce strong illusory effects. The threshold for stimulation in the case of the horizontal canals is in the neighborhood of 0.3 degrees per second. When the fixation object consists of a single light the oculo-gyral illusion is complicated by the phenomenon of autokinesis. The latter is largely abolished by using a three-dimensional tartet.
(4) The direction of the apparent movements of induced afterimages both during and following rotation is exactly opposite to that observed when a real target is fixated.
(5) The relationship between head position or change in head position and the direction of apparent movement indicates the relatively simple reflex character of the phenomenon.
(6) Hyoscine hydrobromide in doses as large as 3/200 of a grain had no appreciable effect on the oculo-gyral illusion.
(7) The oculo-gyral illusion offers a simple means of studying the sensitivity of the sensory receptors of the semicircular canals, the reflexly produced nystagmus and related phenomena.
(8) This illusion is of importance in night flying.

2,072

Graybiel, A. 1945 THE OCULO-GYRAL ILLUSION.
Fed. Proc. 4(1):25

ABSTRACT: During the course of some studies on the autokinetic sensation it was found that if a person undergoing slow rotation suddenly stops and fixates a stationary light in an otherwise dark room, the light appears to move rapidly in a direction opposite to that of the previous rotation. This phenomenon, which is the result of stimulation of the labyrinth, is not observed in a well lighted room except after stron stimulation.

A series of tests were carried out in a dark room in which the subject and a lighted target were rotated together. The chief variables were (1) the strength of the stimulus, (2) the nature of the fixation target and (3) the position of the subject's head. It was found that subjects after being rotated one revolution in 60 seconds and suddenly stopped, report apparent movement of the target for 15-20 seconds in the direction opposite to rotation. The target appears to move rapidly at first, then more slowly and finally seems to wander off in a manner characteristic of the autokinetic movement. The oculo-gyral illusion may be observed even after much weaker stimuli, namely, on sudden decelerations following rotations of 30 degrees at a rate of one revolution per minute, or rotations of 100 degrees at a rate of one revolution in 2 minutes. Nystagmus is not observed after rotations at these slow speeds. After-images do not behave in the same manner as the target light. If the head is inclined 90^{o} toward the shoulder, after producing a strong o.g.i. in a horizontal plane, the apparent movement shifts to a vertical plane indicating the reflex characteristic of the phenomenon.

2,073

Graybiel, A., and B. Clark 1945 THE AUTOKINETIC ILLUSION AND ITS SIGNIFICANCE IN NIGHT FLYING. J. Aviat. Med. 16:111-151

ABSTRACT: This investigation was undertaken to determine the reasons for the great number of crashes upon landing - pilots seem confused or disoriented at the time of the crash. The difficulties they experienced seemed to fall into several categories: disturbances in equilibrium, states of confusion, temporarily losing track of events, various types of optical illusions. Autokinesis was one of illusions here investigated. More than 500 subjects were used to study characteristics of the autokinetic illusion and its significance in night flying. In general, autokinetic movement appears after a delay of a second, lasts about 10 seconds in a particular direction, is observed half of the time, is slow, has a small angular displacement, may occur in any direction and is difficult to suppress. The article includes a historical summary and bibliography, and the data of the experiments. In addition of the conclusions mentioned, above is the fact that the illusion is not readily abolished. Insofar as the reduction of autokinesis is concerned, one of the recommendations made is that planes flying at night should have at least three lights in a different vertical and horrizontal plane visible from any angle.

2,074

Graybiel, A., B. Clark, K. MacCorquodale and D. I. Hupp 1946 ROLE OF VESTIBULAR NYSTAGMUS IN THE VISUAL PERCEPTION OF A MOVING TARGET IN THE DARK. Amer. J. Psychol. 59:259-266.
See also (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR 13-6001.1.5., 14 Jan. 1946.

ABSTRACT: Six well-trained subjects were rotated in the dark in a Link trainer at speeds up to 25 rpm. while observing an illuminated model plane which rotated

to the right around the subject's head at 0.95 revolutions per minute. The subject reported on velocity and direction of movement and the amount of displacement of the plane relative to himself. No attempt was made to discriminate between real and apparent movement. It was found that when a subject was at rest, watching the moving target, and then was abruptly accelerated, the target lost motion but was rapidly displaced in the opposite direction. With continuing rotation, the subject's sensation of motion decreased, while the plane rotated rapidly around him. Following cessation of rotation, the target rushed rapidly in the direction opposite to that in which the subject had been rotating. This effect is designated as the oculogyral illusion.

2,075

Graybiel, A., D. I. Hupp, & J. L. Patterson. Jr. 1946 THE LAW OF THE OTOLITH ORGAN.

ABSTRACT: Experiments on a human centrifuge provided means for distinguishing between the effects of angular acceleration on the semi-circular canals and of g on the otolith organs and yielded the following law: If, in the absence of visual orientation, man is subjected to accelerative force, the perception of the vertical will eventually coincide with the direction of the resultant of this force and the force of gravity.
Corollaries:
(a) An object in the field of vision which does not provide a clue for orientation to the earth will eventually be projected in space in accordance with the apparent vertical direction. (b) If objects in the field of vision do provide clues for orientation to the earth a conflict between visual and otolithic stimuli results and the resolution favors visual orientation to the earth. (c) If the body maintains a constant relationship to the direction of the resultant g one will not be aware of any change from the true vertical position. (d) If the body maintains a constant relationship with the true vertical position one will be conscious of a tilt or rotation. The apparent change from the true vertical will be equal, eventually to the angular displacement which the resultant g makes with the true vertical and will be in the same plane, but the signs of the angle will be opposite. Both the direction and degree of apparent displacement will be independent of a particular position of the body. (Federation Proceedings 5(1): 35, 1946)

2,076

Graybiel, A., B. Clark, K.MacCorquodale, & D. I. Hupp 1946 THE ROLE OF VESTIBULAR NYSTAGMUS IN THE VISUAL PERCEPTION OF A MOVING TARGET IN THE DARK. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-6001.1.5., 14 Jan. 1946
See also Amer. J. Psychol. 59:259-266

2,077

Graybiel, A., B. Clark, & K. MacCorquodale 1946 THE ILLUSORY PERCEPTION OF MOVEMENT CAUSED BY ANGULAR ACCELERATION AND BY CENTRIFUGAL FORCE DURING FLIGHT. I. METHODOLOGY AND PRELIMINARY RESULTS. (Naval School of Aviation Medicine, Pensacola, Fla.) Project MR005.13-6001.1.6, 25 March 1946
See also J. Exp. Psychol. 37(2):170-177, Apr. 1947

2,078

Graybiel, A. & D. I. Hupp 1946 THE OCULO-GYRAL ILLUSION: A FORM OF APPARENT MOTION WHICH MAY BE OBSERVED FOLLOWING THE STIMULATION OF THE SEMI-CIRCULAR CANALS.
J. Aviation Med. 17(1):3-27.
See also (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR 005.13-6001.1.4., 1 Nov. 1945.

ABSTRACT: Stimulation of the canals produced by acceleration may influence visual perception. In the daylight, and if visual cues are plentiful relatively stron stimulation is required before effects are produced. If cues are reduced by darkness, relatively weak stimulation of the labyrinth may cause strong illusions of apparent movement which may persist after all other sensations of rotation have disappeared. Because aviators subjected to even small angular accelerations while flying at night are in ideal circumstances to experience these illusions, the phenomenon is of importance in aviation.

The article includes a historical summary of interest in this illusion and discusses also the experimental procedure where the end organs are stimulated by rotation and the recording of the manner and extent to which this influences visual perception. The subjects were rotated in the Barany chair and Link trainer.

2,079

Graybiel, A, B. Clark, & K. Mac Corquodale 1947 SENSORY PERCEPTION OF MOVEMENT
J. Exp. Psychol. 37:170-177

ABSTRACT: A method was evolved to observe and report the effects of angular acceleration and variations in gravity on visual perception during flight. The visual stimulus was a collimated "star" installed in the rear cock-pit of a standard Navy training plane. All observations were made in complete darkness. Both the pilot's and observer's verbal reports were dictated into an airborne wire recorder which also provided a time line. These recordings were transcribed in the laboratory and all analyses were made from these transcriptions. Preliminary experiments were carried out on three subjects using five basic maneuve in addition to control periods of straight and level flight. For the first time it has been shown that angular acceleration and gravity during flight induce illusory perceptions of motion and displacement of an objectively motionless object. The magnitude of the illusory effects may be great, the fixation object appearing to be displaced as much as 60° from its actual position. The significance of this finding for aviation is evident. The method is adaptable to a number of types of studies concerned with the influence of angular acceleration and gravity on visual perception.

2,080

Graybiel, A., W. A. Kerr, D. I. Hupp & H. Bartley 1947 THRESHOLD OF STIMULATION OF THE HORIZONTAL SEMICIRCULAR CANALS IN MAN WITH PARTICULAR REFERENCE TO THE SIGNIFICANCE OF THE FIRST DERIVATIVE OF ANGULAR ACCELERATION AS A STIMULUS.
(Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-6001 - .1.17., 12 March 1947
See also Amer. J. Psychol. 61:21-36, 1948.

ABSTRACT: By use of the human centrifuge, records of responses both to constant angular acceleration and to changes in angular acceleration were obtained.

The indicator was the oculo-gyral illusion, and three types of responses were obtained, "left movement", "no movement", and "right movement".

The responses were made at 20-second intervals and were related to the mean angular acceleration calculated for the preceding 20-second period. In order to obtain the most reliable relations between changes in angular acceleration and response, the mean change between four 20-second periods (80-second) had to be used.

Fairly consistent relationships between the direction and amount of change in acceleration, as expressed in each of the three types of response were obtained.

2,081

Graybiel, A., B. Clark & K. MacCorquodale 1947 THE ILLUSORY PERCEPTION OF MOVEMENT CAUSED BY ANGULAR ACCELERATION AND BY CENTRIFUGAL FORCE DURING FLIGHT. I. Methodology and Preliminary Results.
J. Exp. Psychol. 37:170-177, April 1947.
See also (Naval School of Avia. Med., Pensacola, Fla.) Proj. MR005.13-6001.1.6, 25 March 1946.

2,082

Graybiel, A., & B. Clark 1947 LINEAR ACCELERATION AND DECELERATION AS FACTORS INFLUENCING NON-VISUAL ORIENTATION DURING FLIGHT. (Naval School of Aviatior Medicine, Pensacola, Fla.) Proj. MR005.13-6001.1.18., 25 Sept. 1947
See also J. Avia. Med. 20(2):92-101, April 1949

2,083

Graybiel, A., & B. Clark 1947 APPARENT ROTATION OF A FIXED TARGET ASSOCIATED WITH LINEAR ACCELERATION IN FLIGHT. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-6001.1.19., 27 Sept. 1947
See also Amer. J. Ophthalmol. 32:549-557, 1949

2,084

Graybiel, A. 1948 LINEAR ACCELERATION AND OPTICAL ILLUSION. Rept. 19, Proj X-148. USN Bumed News Ltr., Av. Supp. 9:15.

2,085

Graybiel, A., W.A. Kerr, S.H. Bartley 1948 THRESHOLDS OF THE SEMI-CIRCULAR CANALS Amer. J. Psychol. 61:21-36

2,086

Graybiel, A., J. L. Patterson, & J. M. Packard 1948 SUNBURN AS CAUSE OF TEMPORARY LOWERING OF BLACKOUT THRESHOLD IN FLYERS. J. Avia. Med. 19:270-275
See also (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-7004.5.1., 3/3/48

ABSTRACT:
1) Three cases are described in which sunburn was responsible for a decrease in circulatory adjustment to change in posture or to higher accelerative forces.
2) In the case of a flight instructor there were no symptoms in the course of ordinary living, but ease of blackout was observed during various maneuvers in flight. Failure to associate sunburn with this decreased blackout threshold almost led to mismanagement of the case.
3) Flight surgeons should be aware of this phenomenon.
(DACO)

2,087

Graybiel, A., W. A. Kerr, & S. H. Bartley 1948 STIMULUS THRESHOLDS OF THE SEMICIRCULAR CANALS AS A FUNCTION OF ANGULAR ACCELERATION. American J. Psychology 61(1):21-36, Jan. 1948
NOTE: Reel 7, Flash 6, Item 31

SUMMARY AND CONCLUSIONS: (1) By use of the human centrifuge records of responses both to constant angular acceleration and to changes in angular acceleration were obtained. (2) The indicator was the oculo-gyral illusion, and three types of responses were obtained, 'left movement', 'no movement', and 'right movement'. (3) The responses were to mean conditions over periods of 20 sec., rather than to conditions at the instant. In order to obtain reliable relations between small changes in angular acceleration and response, the mean rate during four 20-sec. periods (80 sec.) had to be used. (4) Fairly consistent relationships between the direction and amount of change in angular acceleration, as expressed in each

of the three types of response were obtained. (5) A threshold for change in both positive and negative angular acceleration was determined. It was of the order of 0.12 degrees/sec. (6) It was also found that the reliability of response to constant acceleration decreased as the length of the period to which response referred increased beyond 20 sec., at near-threshold rates. Beyond the 20-sec. period, accuracy not only diminishes but reversals in response tend to occur. The individual not only becomes unaware of acceleration as indicated by the oculogyral illusion but he also tends to see movement of the target in the opposite direction. (Author)

2,088

Graybiel, A., W. Kerr, D. Hupp & S. Bartley 1948 THRESHOLD OF STIMULATION OF THE HORIZONTAL SEMICIRCULAR CANALS IN MAN WITH PARTICULAR REFERENCE TO THE FIRST DERIVATIVE OF ANGULAR ACCELERATION AS A STIMULUS.
Am J. Psychol. 61(1):21-36, Jan. 1948.
See also (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-6001.1.17., 12 March 1947.

2,089

Graybiel, A., J. L. Patterson & J. M. Packard 1948 SUNBURN AS CAUSE OF TEMPORARY LOWERING OF BLACKOUT THRESHOLD IN FLYERS.
(Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-7004.5 - .1., 3 March 1948.
See also J. Aviation Med. 19:270-275.

ABSTRACT:
1) Three cases are described in which sunburn was responsible for a decrease in circulatory adjustment to change in posture or to higher accelerative forces.
2) In the case of a flight instructor there were no symptoms in the course of ordinary living, but ease of blackout was observed during various maneuvers in flight. Failure to associate sunburn with this decreased blackout threshold almost led to mismanagement of the case.
3) Flight surgeons should be aware of this phenomenon.
(DACO)

2,090

Graybiel, A., & B. Clark 1949 LINEAR ACCELERATION AND DECELERATION AS FACTORS INFLUENCING NON-VISUAL ORIENTATION DURING FLIGHT J. Avia. Med. 20(2):92-101, April 1949
See also (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005. 13-6001.1.18..25 Sept. 1947

2,091

Graybiel, A., & R. H. Brown 1949 THE DELAY IN VISUAL REORIENTATION FOLLOWING EXPOSURE TO A CHANGE IN DIRECTION OF RESULTANT FORCE ON A HUMAN CENTRIFUGE (Naval School of Aviation Medicine, Pensacola, Fla.) Research Rept. NM 001 110 500.3.; Proj. NM 001 037; 5/25/49 ASTIA ATI 122 354
See also J. Gen. Psychol. 45(2):143-150, Oct. 1951

ABSTRACT: Three subjects were exposed on a human centrifuge to a change in direction of resultant G relative to the body axis. Under the conditions of the experiment the illusion was created wherein a horizontal target line appeared to rotate through an angle corresponding to the change in direction of the result ant force. The subject actually rotated the line counter-clockwise in order to maintain the line horizontal for himself. A marked discrepancy was noted between the time required to impress the physical force on the subject and the period during which he found it necessary to make adjustments in keeping the line horizontal. This discrepancy was regarded as a measure of the delay in the subject's visual reorientation to a change in direction of resultant G. It is thought that a possible cause of the delay may lie in the characteristic behavior of the otolith organ. This lag phenomenon is of importance to aviation inasmuch as the full disorientating effects of a change in direction of resultant G relative to the body axis will not become manifest if the exposure time is short.

2,092

Graybiel, A., & B. Clark 1949 APPARENT ROTATION OF A FIXED TARGET ASSOCIATED WITH LINEAR ACCELERATION IN FLIGHT. Amer. J. Ophthalmol. 32:549-557
See also (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-6001.1.19., 27 Sept. 1947

2,093

Graybiel, A. 1950 THE EFFECT OF A CHANGE IN DIRECTION OF RESULTANT FORCE ON SOUND LOCALIZATION: THE AUDIOGRAVIC ILLUSION. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-6001.1.23., 10 March 1950

SUMMARY: An experiment was carried out in which four healthy male subjects estimated the location of a source of sound while being subjected to a change in direction of resultant force with respect to themselves.

A consistent error was made in terms of a non-visual vertical-horizontal frame of reference. The error amounted to about 70 percent of the angle Ø and a linear relationship was found to exist between the two.

This phenomenon has been termed the audiogravic illusion and it can be readily explained on the basis that the egocentric localization of the horizon, under the conditions of our experiment, accords with the change in direction of resultant force.

2,094

Graybiel, A. 1950 SPATIAL DISORIENTATION IN FLIGHT.
(U.S. Naval School of Aviation Medicine, Pensacola, Fla.)
Proj. No. NM 001 059.01.24, 15 November 1950. ASTIA ATI 94 151

ABSTRACT: The pilot, free to maneuver his plane in space, is confronted with unique and sometimes difficult problems in spatial orientation. This may be looked upon as a phenomenon of perception representing the individual's interpretation of stimuli originating in sensory receptors. This total sensory experience is useful in orientation to the plane but only visual perception can safely be used for orientation to the earth and to other objects in space. Thus, the pilot must learn to distinguish between spatial orientation based on visual perception alone and that based on a sensory experience which includes orientation to gravity or to the direction of resultant force. This is an acquired accomplishment which is subject to all the laws of learning and forgetting. Loss of orientation or disorientation may readily result in the absence of any pathological factor and when all of the sense organs are functioning normally. The two most important causes are inadequate visual perception and the misuse of gravitational cues. Inadequate visual perception may be related to the physical stimulus per se, the influence of stimuli from other sense organs or the effect of central factors on visual perception. The perceptual data may be inadequate on the basis of many environmental factors both within and without the plane. Finally the fact that a person perceives things in a manner which accords with his past experience is emphasized. A few suggestions are made regarding the way in which disorientation might be prevented.

2,095

Graybiel, A., & R. H. Brown 1951 THE DELAY IN VISUAL REORIENTATION FOLLOWING EXPOSURE TO A CHANGE IN DIRECTION OF RESULTANT FORCE ON A HUMAN CENTRIFUGE.
J. Gen. Psychol. 45(2):143-150, Oct. 1951
See also (Naval School of Aviation Medicine, Pensacola, Fla.) Research Rept. NM 001 110 500.3.; Proj. NM 001 037; 5/25/49

ABSTRACT: The authors suggest that a possible cause of such delay in visual reorientation may lie in the characteristic behavior of the otolith organ. This delay is of importance in aviation inasmuch as a flyer who is subjected to rapid acceleration or deceleration over a short period may not experience the full effects of his disorientation.

2,096

Graybiel, A. 1951 SPATIAL DISORIENTATION IN FLIGHT.
The Mil. Surg. 108:287-294
See also (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-6001.1.24.; NM 001 059.01.24, 15 Nov. 1950.

2,097

Graybiel, A. 1951 THE OCULOGRAVIC ILLUSION
(Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 059.01.27, MR005.13-6001.1.27, Rept. No. 27, 25 Dec. 1951. ASTIA ATI 139 629.
See also A.M.A. Arch Ophthal. 48(5):605-615

ABSTRACT: Evidence was obtained that neither ocular nystagmus nor rotation of the eye is responsible for producing the oculogravic illusion. The illusion was produced in subjects seated on a rotatable platform in a dark room while they were fixating on a collimated star directly before them. Their stationary positions were changed by centripetal acceleration which provided a resultant force at 45 degrees in about 3 seconds, where the resultant force is the vector sum of the centripetal force from behind and gravitational force from below. After the initial jerk, the subjects felt as though they were being tilted back-along with the supporting structures and as though the star were rising. The estimate of the degree of the star's displacement above the horizon was closely related to the angle between resultant force and direction of gravity. Experiments under modified conditions (providing an after-image, changing body positions by facing toward or away from the center of rotation, or allowing adaptation to the centripetal force) indicated that the illusion originates in a psycho-physiological mechanism and is unrelated either to the tracking of an image over the retina or to the reflex connection at the level of the oculo-motor nuclei which cause eye movement.

2,098

Graybiel, A. 1952 THE EFFECT ON VISION PRODUCED BY STIMULATION OF THE SEMI-CIRCULAR CANALS BY ANGULAR ACCELERATION AND STIMULATION OF THE OTOLITH ORGANS BY LINEAR ACCELERATION. In White, C. S., & O. O. Benson, Jr., eds., Physics and Medicine of the Upper Atmosphere, A Study of the Aeropause (Albuquerque, N. Mex.: Univ. of New Mexico Press, 1952) pp. 494-508

ABSTRACT: The physiological mechanism of oculogyral and oculogravic illusions is briefly discussed. No evidence has been found to the effect that repeated angular acceleration would lead to habituation and decrease oculogyric illusion. Rapid changes from positive to negative acceleration result in decreased oculogyric illusion, but the aftereffect increases with the lengthening of intervals between changing accelerations. Experiments made in actual flight revealed that oculogyric illusions aid the pilot with regard to the orientation of the plane, but cause disorientation with regard to localization of objects outside the plane. Oculogravic illusions can be demonstrated using the human centrifuge. They manifest themselves in the fact that the subject perceives an apparent tilting of his chair and supporting structure while fixing his eyes on a small luminous object. Unlike oculogyric illusion (which is due to nystagmus), oculogravic illusion is independent of the movements of the eyeball.

2,099

Graybiel, A., J. I. Niven & T. E. Walsh 1952 THE DIFFERENTIATION BETWEEN SYMPTOMS REFERABLE TO THE OTOLIGH ORGANS AND SEMI-CIRCULAR CANALS IN PATIENTS WITH NON-SUPPURATIVE LABYRINTHITIS.
(Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.) NM 001 059.01.29; March 10, 1952. ASTIA ATI 155 263.

ABSTRACT: Five patients with symptoms characteristic of non-suppurative labyrinthitis were largely or wholly relieved following unilateral labyrinthectomy. After recovery from the operation they were subjected to both angular and rectilinear accelerations which stimulated respectively the sensory elements in the horizontal pair of semicircular canals and otolith organs. The symptoms induced by a change in direction of resultant force, which included stimulation of the otolith organs, were an apparent tilting of the body and the apparent displacement of objects so that they appeared to assume a new position in space. When their spontaneous symptoms were interpreted in the light of the induced symptoms, it became evident that the disturbances in equilibrium might be mainly referable to either one or both portions of the non-acoustic labyrinth. The spontaneous disturbances were mainly referable to the semicircular canals in two cases, the otolith organs in one, and to both sensory organs in the remaining two. (Author)

2,100

Graybiel, A. & J. I. Niven 1952 THE ABSENCE OF RESIDUAL EFFECTS ATTRIBUTABLE TO THE OTOLITH ORGANS FOLLOWING UNILATERAL LABYRINTHECTOMY IN MAN.
(Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-6001.1 - 33., 22 Oct. 1952. ASTIA TIP U-25734

ABSTRACT: Five control and five unilaterally labyrinthectomized subjects were exposed to centripetal forces on a human centrifuge. Their ability to estimate apparent change in position of a visual object and change in body position during exposure to centripetal force was recorded. No significant differences between the subjects were revealed. Residual effects attributable to the unilateral destruction of the otolith organs were negligible. (TIP abstract)

2,101

Graybiel, A. & B. Clark 1952 DURATION OF OCULOGYRAL ILLUSION AS A FUNCTION OF THE INTERVAL BETWEEN ANGULAR ACCELERATION AND DECELERATION. ITS SIGNIFICANCE IN TERMS OF DYNAMICS OF SEMICIRCULAR CANALS IN MAN.
J. Appl. Physiol. 5: 147-152, Oct. 1952.

ABSTRACT: Subjects were placed in a Link Trainer which was modified to rotate only in the horizontal plane and could be rapidly arrested by a brake mechanism. The trainer was rotated at various rates of acceleration, and peak velocities were kept constant for a varying length of time (0, 10, 20, 30, and 60 seconds) before rapid deceleration was applied. The duration of first and second oculo-

gyral effects (e.g. the apparent movement of a luminous object first in the direction of the turn and then in the opposite direction) reported by the subjects were timed to the nearest second. It was found that the duration of both oculogyral effects was proportional to the rate of acceleration and could be expressed as a function of the length of the constant-velocity interval between acceleration and deceleration: it increased rapidly after an interval of 0 to about 20 seconds, then remained almost constant (about 25 seconds), thus indicating a state of physiological adaptation. The findings are correlated with the physiological mechanism of the semicircular canals. In applying the data to conditions encountered by pilots during night flights it is concluded that similar illusory aftereffects may be expected after rotation of a plane about one of its axes and may impair spatial orientation to a minor degree.

2,102

Graybiel, A. 1952 OCULOGRAVIC ILLUSION.
A.M.A. Arch. Ophthalmol., 48(5):605-615
See also (Naval School of Aviation Medicine, Pensacola, Fla.)
Proj. No. MR 005-13-6001, Rept. No. 27, 29 Dec. 1951. ASTIA ATI 139 629

ABSTRACT: When a person is subjected to a change in direction of resultant force relative to himself, he experiences an illusion wherein objects in the visual field, stationary with respect to the observer, appear to move and to assume a new position more or less in accord with the direction of resultant force. This phenomenon has been termed the oculogravic illusion.

Under the experimental conditions the subject perceived direct and indirect orientation cues. The former had their origin in stimulation of sensory elements by tension and pressures induced by resultant force. The indirect cues were provided by the perception of objects in the visual field which retained their original position with respect to the gravitational vertical. It was in the resolution of these conflicting cues that objects in the visual field appeared to move and to be displaced. The important variables determining the appearance of the illusion were (1) the pattern of centripetal acceleration, (2) the position of the subject, and (3) the visual framework. When the direction of resultant force was shifted with respect to the subject, the illusion consisted of apparent movement and apparent displacement of objects in the visual field. If the relation between resultant force and subject was fixed, apparent displacement was observed, but not apparent movement.

2,103

Graybiel, A. 1954 FLYING STRESS AND HEART DISEASE IN U.S. NAVAL AVIATORS.
(Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-7004.5.10., 12 Oct. 1954

ABSTRACT: A study of flying stress and its relation to heart disease in U.S. Naval Aviators indicates that these aviators are, if anything, less susceptible to hypertensive and coronary heart disease than are non-flying officers. The

existence of flying stress is not denied; however, short periods of stress are followed by long periods during which recovery from strain can take place.

For this report Naval Aviators were regarded as a single occupational group and the inquiry centered around (1) experiences in the Cardiac Clinic at the U.S. Naval School of Aviation Medicine, (2) the results of a 12-year follow-up study of 1056 Naval Aviators, and (3) comparison of the incidence of heart disease in flying and non-flying Naval Officers.

2,104

Graybiel, A. 1954 THE CONCEPT OF AVIATION MEDICINE
(Naval School of Aviation Medicine, Pensacola, Fla.) Research Rept. NM 001 059.25.18., 10 Sept. 1954

ABSTRACT: This report emphasizes the need for a generalized concept of aviation medicine sufficiently broad to include all of the human aspects of aviational activities and in turn the effects of these activities on man. This is done by analyzing aviational activities for the human elements and structuring the concept out of these elements.

2,105

Graybiel, A. & J. L. Patterson 1954 THRESHOLDS OF STIMULATION OF THE OTOLITH ORGANS AS INDICATED BY THE OCULOGRAVIC ILLUSION.
(Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-6001, NM 001 059.01.38; 26 July 1954. ASTIA AD 44 402
See also J. Appl. Physiol. 7:666-670, 1955.

ABSTRACT: The oculogravic illusion was utilized as an indicator mechanism in determining the perceptual thresholds of change in the direction of resultant force; this force, the vectorial sum of the forces of gravity and acceleration in a human centrifuge, is expressed by the angle (Ø) it makes with the gravitational vertical. The mean threshold for 3 subjects in the sitting position was 0.000344 g (Ø = 1.5) for the 75% correct response level. Corresponding values for the subjects lying on their right sides were 8.9, and the curve of threshold responses was bimodal. Curves of the threshold values of subjects in an upside-down position resembled the initial portion of the curve obtained with the subjects lying. The findings supported the hypothesis that the otolith organ functions best with the head upright and fails to function with the head down.

2,106

Graybiel, A 1955 MEDICAL ASPECTS OF FLYING.
(Naval School of Aviation Medicine, Pensacola, Fla.) July 1955.
ASTIA AD 116 428

2,107

Graybiel, A. 1955 FLYING STRESS AND HEART DISEASE IN NAVAL AVIATORS. J. Aviation Med. 26(4):329-336.

SUMMARY: 1. The object of this study was to determine the importance of flying stress in precipitating myocardial infarction or in predisposing the naval aviator to hypertensive and coronary heart disease.

2. The data presented indicate that naval aviators are, if anything, less susceptible to hypertensive and coronary heart disease than are non-flying naval officers.

3. The explanation does not lie in denying the existence of flying stress. The most reasonable explanation lies in the fact that short periods of flying stress are followed by long periods during which recovery from strain can take place.

2,108

Graybiel, A., & J. L. Patterson 1955 THRESHOLDS OF STIMULATION OF THE OTOLITH ORGANS AS INDICATED BY THE OCULOGRAVIC ILLUSION. J. Appl. Physiol. 7:666-670 See also (Naval School of Aviation Medicine, Pensacola, Fla.) Research Rept. NM001 059.01.38; MR005.13-6001.1.38., 7/26/54; ASTIA AD-44 402

ABSTRACT: The oculogravic illusion described by Graybiel (Arch. Ophthalmol. (N. Y.) 48:605-615, 1952) was utilized as an indicator mechanism in determining the perceptual thresholds of change in the direction of resultant force; this force, the vectorial sum of the forces of gravity and acceleration in a human centrifuge is expressed by the angle (ζ) it makes with the gravitational vertical. The mean threshold for 3 subjects in the sitting position was 0.000344 g (ζ=1.5 degrees) for the 75% correct response level. Corresponding values for the subjects lying on their right sides were 8.9 degrees, and the curve of threshold responses was bimodal. Curves of the threshold values of subjects in an upsidedown position resembled the initial portion of the curve obtained with the subjects lying. The findings supported the hypothesis that the otolith organ functions best with the head upright and fails to function with the head down. (ASTIA)

2,109

Graybiel, A., 1955 AVIATION MEDICINE. In Cecil & Loeb, eds., A Textbook of Medicine, 9th Ed. (Philadelphia; London: W.B. Saunders, 1955) pp. 510-516

2,110

Graybiel, A. 1956 PROBLEMS INVOLVING THE PILOT AND HIS TASK: THE CHANGING EMPHASIS IN AVIATION MEDICINE.
(Naval School of Aviation Medicine, Pensacola, Fla.) Proj. no. NM 001 105 106, Rept. no. 1, June 1956. ASTIA AD 105 695.

ABSTRACT: 'The problem: Aviation medicine is a specialty which has undergone radical changes in emphasis during its brief existence. The critical problems involving the professional pilot are no longer medical in the usual meaning of this term but center around his task in the cockpit where the distinction between man the instrument and man the individual becomes artifical. The great complexity of this task places demand on the pilot in chich mental qualifications are most important. Findings: Many agencies with interlocking interests play a part in the solution of the problems encountered. A greater coordination among these agencies would be beneficial. Designers, engineers, research workers, the aviation examiner, and the pilot himself with a firm appreciation of what is truly involved in "success in flying" can make important contributions." (US-NSAM)

2,111

Graybiel, A., J. I. Niven & K. MacCorquodale 1956 THE EFFECT OF LINEAR ACCELERATION ON THE OCULOGYRAL ILLUSION.
(Naval School of Aviat. Med., Pensacola, Fla.) Res. Proj. No. NM 001 110 100, Rept. No. 42; 13 July 1956. ASTIA AD 127 827.

ABSTRACT: The results of this study show that the duration of the oculogyral illusion is an increasing function of increasing angular acceleration. The heading of the observer relative to the axis of rotation of the centrifuge does not affect the duration of the oculogyral illusion. The increased magnitude of the linear acceleration component experienced when the seating radius was increased from 2 feet to 17 feet did not affect the duration up to centrifuge speeds of 8 r.p.m. (maximum angle $\emptyset$ = 20 degrees). The increase in magnitude of the linear acceleration component with increase in centrifuge speed beyond 8 r.p.m. becomes increasingly disruptive of performance, as oculogravic effects become dominant. The sign of the acceleration i.e., positive and negative acceleration, most probably does not influence the duration. (Author)

2,112

Graybiel, A. & J. I. Niven 1956 THE OCULOGRAVIC ILLUSION: A SPECIFIC PERCEPTUAL RESULTANT OF STIMULATION OF THE OTOLITH ORGANS.
(U.S. Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 110 100, Report No. 40.

2,113

Graybiel, A. 1956 THE IMPORTANCE OF THE OTOLITHIC ORGANS IN MAN BASED UPON A SPECIFIC TEST FOR UTRICULAR FUNCTION.
Ann. Otol. Rhin. & Laryng. 65:470-487, June 1956.

2,114

Graybiel, A. & J. I. Niven 1956 PERSISTENCE OF THE AUTOKINETIC ILLUSION IN PERSONS WITH BILATERAL INJURY OR DESTRUCTION OF THE LABYRINTH OF THE INNER EAR.
(Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-6001.1 .41, 12 July 1956.

ABSTRACT: In the absence of angular acceleration, the sensory elements in the cupulae might be stimulated in random fashion by weak currents in the endolymph. Experiments are described in which this possibility was explored through the use of subjects with bilateral labyrinthine injury.

It was found that the sensory organs of the inner ear are not essential for perception of the autokinetic illusion. Responses made by the subjects fell within the normal range, but this is not proof that inner ear organs have no influence on perception of the autokinetic phenomenon.

2,115

Graybiel, A., & R. C. Woellner 1957 THE PERCEPTION OF VERTICAL IN THE PRESENCE OF INCREASED ACCELERATIVE FORCES. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-6001.1.45., 31 Oct. 1957

2,116

Graybiel, A. 1958 ORIENTATION IN SPACE WITH PARTICULAR REFERENCE TO VESTIBULAR FUNCTIONS (Presented at International Symposium on Submarine and Space Medicine New London, Connecticut, 1958)

2,117

Graybiel, A., & R. C. Woellner 1958 A NEW AND OBJECTIVE METHOD FOR MEASURING OCULAR TORSION. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-6001.1.46., 15 May 1958

2,118

Graybiel, A., R.H. Holmes, D.E. Beischer et al. 1959 AN ACCOUNT OF EXPERIMENTS IN WHICH TWO MONKEYS WERE RECOVERED UNHARMED AFTER BALLISTIC SPACE FLIGHT
Aerospace Medicine 30(12): 871-931, Dec. 1959

ABSTRACT: An account has been given of two experiments in which three monkeys were carried in Jupiter missiles 300 miles into space. In the first, a squirrel monkey survived in good condition till a mishap occurred to the vehicle re-entry.

In the second, an American-born rhesus and a squirrel monkey were recovered uninjured. Details have been furnished covering the construction of the biocapsules, the provisions for a closed life support environment, the equipment and arrangements for monitoring the responses of the monkeys, and the experimental findings.

2,119

Graybiel, A., B. Clark, & J. J. Zarriello 1959 OBSERVATIONS ON HUMAN SUBJECTS LIVING IN A "SLOW ROTATION ROOM" FOR PERIODS OF TWO DAYS: CANAL SICKNESS. (Naval School of Aviation Medicine, Pensacola, Fla.) Research Project MR005.13-6001.1.49., 10/15/59; ASTIA AD-232 510
See also Arch. Neurol. 3:55-73, 1960

ABSTRACT: This study was designed to investigate the consequences of prolonged constant rotation of human subjects living in a slow rotation room. Five healthy subjects and one control subject were subjected to rotations varying from 1.71 rpm to 10.0 rpm for periods of two days each. During each run they engaged in a series of tasks designed to serve as stressors and at the same time give some measure of their performance during the period of rotation.
Under the experimental conditions, angular acceleration constituted the dominant stimulus, while the small centrifugal force played an unimportant role. Five normal subjects experienced symptoms which, in their variety and prominence, seemed to be out of proportion of the mild stimulus condition. The cardinal subjective symptoms were headache, dizziness, sleepiness, depression, visual illusions, and nausea. Cardinal signs were pallor, sweating, difficulty in walking, oliguria, and vomiting. In some instances, particularly at the higher rotational velocities, the symptoms were so severe that the subject was unable to carry out any useful task. Adaptation occurred after a period of hrs. to days, and the symptoms either disappeared or were reduced in severity. Inasmuch as the symptoms arose directly or indirectly as a result of stimulation of the semicircular canals, the term calan sickness appears to be a useful designation. A control subject with loss of vestibular function reported no sensations of rotation nor any unpleasant symptoms whatsoever. His only difficulty was in walking due to centrifugal force at the higher velocities.
After-effects following the forty-eight period of rotation were usually much less prominent than during the rotation itself, but in some cases the symptoms were quite as strong as they were during rotation. The most prominent effects were difficulty in walking and fatigue. The control subject showed none of these symptoms. (CARI)

2,120

Graybiel, A., D. E. Beischer, W. C. Hixson, A. J. Moss, & D. E. Stullken 1960 MEDICAL ASPECTS OF THE PROJECT MERCURY RECOVERY PROGRAM. (School of Aviation Medicine, Pensacola, Fla.) SAM P-14

ABSTRACT: This report deals with the care and handling of the astronaut following impact and is presented in two parts. Part I is a methodical treatment of the principal elements in medical planning of the recovery program. Part II is a specific plan for a manned flight of three orbits.

2,121

Graybiel, A., J.C. Meek, D.E. Beischer, & A.J. Riopelle 1960 OBSERVATIONS OF CANAL SICKNESS AND ADAPTATION IN CHIMPANZEES IN A "SLOW ROTATION ROOM." (U.S. Naval School of Aviation Medicine, Pensacola Air Station, Fla.) Proj. MR005.13 6001, Subtask 1, Rept. 55, Oct. 1960. ASTIA AD 260 748.

ABSTRACT: To complement the studies on man of the effects of varying speeds of constant slow rotation, two chimpanzees, one with normal and one with disturbed vestibular function, were subjected to rotations varying from 1.9 to 10.0 rpm in a slow rotation room. The animals were observed for manifestations of "canal sickness" as seen in man. The animals were further studied under conditions of subcritical stimulation for two days to ascertain whether adaptation would occur. The usefulness of the chimpanzee as an experimental animal for studying the phenomenon of canal sickness was discussed. (Tufts)

2,122

Graybiel, A., B. Clark, & J. J. Zarriello 1960 OBSERVATIONS ON HUMAN SUBJECTS LIVING IN A "SLOW ROTATION ROOM" FOR PERIODS OF TWO DAYS: CANAL SICKNESS. Arch. Neurol. 3:55-73, 1960
See also (Naval School of Aviation Medicine, Pensacola, Fla.) Research Project MR005.13-6001.1.49., 10/15/59; ASTIA AD-232 510

ABSTRACT: This study was designed to investigate the consequences of prolonged constant rotation of human subjects living in a slow rotation room. Five healthy subjects and one control subject were subjected to rotations varying from 1.71 rpm to 10.0 rpm for periods of two days each. During each run they engaged in a series of tasks designed to serve as stressors and at the same time give some measure of their performance during the period of rotation.
Under the experimental conditions, angular acceleration constituted the dominant stimulus, while the small centrifugal force played an unimportant role. Five normal subjects experienced symptoms which, in their variety and prominence, seemed to be out of proportion of the mild stimulus condition. The cardinal subjective symptoms were headache, dizziness, sleepiness, depression, visual illusions, and nausea. Cardinal signs were pallor, sweating, difficulty in walking, oliguria, and vomiting. In some instances, particularly at the higher rotational velocities, the symptoms were so severe that the subject was unable

to carry out any useful task. Adaptation occurred after a period of hrs. to days, and the symptoms either disappeared or were reduced in severity. Inasmuch as the symptoms arose directly or indirectly as a result of stimulation of the semicircular canals, the term calan sickness appears to be a useful designation. A control subject with loss of vestibular function reported no sensations of rotation nor any unpleasant symptoms whatsoever. His only difficulty was in walking due to centrifugal force at the higher velocities.
After-effects following the forty-eight hr. period of rotation were usually much less prominent than during the rotational itself, but in some cases the symptoms were quite as strong as they were during rotation. The most prominent effects were difficulty in walking and fatigue. The control subject showed none of these symptoms. (CARI)

2,123

Graybiel, A., E. Guedry, W. Johnson, & E. R. Kennedy 1960 ADAPTATION TO BIZARRE STIMULATION OF THE SEMICIRCULAR CANALS AS INDICATED BY THE OCULOGYRAL ILLUSION. (Naval School of Aviation Medicine, Pensacola, Fla.) Research Project MR005.13-6001, Rept. No. 53; ASTIA AD-244 936
See also Aerospace Medicine 32(4):321-327, Apr. 1961
See also (Army Medical Research Lab., Fort Knox, Ky.) Rept. No. 464; ASTIA AD-253 099

ABSTRACT: Four healthy male subjects 19 to 23 years of age were exposed to tilt in a specially constructed chair mounted in a rotating room which is built around the center of a human centrifuge. Determinations of the course of the adaptation to the oculogyral illusion are reported. Also compared are the effects of their voluntary head movements. Information obtained appears to have application to anticipated problems in manned orbiting satellites and to any rotating installation where personnel will be exposed to angular velocities above 2.0 rpm. (AUTHOR)

2,124

Graybiel, A., E. Guedry, W. Johnson, & E. R. Kennedy 1960 ADAPTATION TO BIZARRE STIMULATION OF THE SEMICIRCULAR CANALS AS INDICATED BY THE OCULOGYRAL ILLUSION. (Army Medical Research Lab., Fort Knox, Ky.) Rept. No. 464; ASTIA AD-253 099L
See also (Naval School of Aviation Medicine, Pensacola, Fla.) Research Proj. MR005.13-6001, Rept. No. 53; ASTIA AD-244 936
See also Aerospace Medicine 32(4):321-327, Apr. 1961

ABSTRACT: Four healthy male subjects 19 to 23 years of age were exposed to tilt in a specially constructed chair mounted in a rotating room which is built around the center of a human centrifuge. Determinations of the course of the adaptation to the oculogyral illusion are reported. Also compared are the effects of their voluntary head movements. Information obtained appears to have application to anticipated problems in manned orbiting satellites and to any rotating installation where personnel will be exposed to angular velocities above 2.0 rpm. (AUTHOR)

2,125

Graybiel, A. & B. Clark 1961 PERCEPTION OF THE HORIZONTAL OR VERTICAL WITH HEAD UPRIGHT, ON THE SIDE, AND INVERTED UNDER STATIC CONDITIONS AND DURING EXPOSURE TO CENTRIPETAL FORCE.
(USN School of Aviation Medicine, Pensacola Air Station, Fla.)
Proj. MR005.13 6001, Subtask 1, Rept. 60, 15 Aug. 1961. ASTIA AD 266 066
See also Aerospace Medicine 33(2):147-155, Feb. 1962.

ABSTRACT: The present experiment attempted to measure the accuracy of visual egocentric localization in widely different body (head) positions and the change in localization induced by a change in direction of the gravitational-inertial force environment. The ability of five healthy subjects to set a luminous line to the horizontal while in the dark was measured with head upright, on the side, and inverted both under static conditions and during exposure to centripetal force. In general, the findings were the same for all subjects and interindividual differences did not affect any of the major findings significantly. Under static conditions egocentric visual localization was quite accurate with head upright, inaccurate with head inverted, and grossly in error with head on the side. When the subjects were exposed to centripetal force with a change in direction of force making an angle of 6 degrees or 12 degrees, the oculogravic illusion was preceived with head erect, not exhibited with head inverted, and not measurable with head on the side. The significance of these finding is discussed with reference to the function of the otolith apparatus and other factors. (Author)

2,126

Graybiel, A., & B. Clark 1961 ESTIMATE OF THE HORIZONTAL OR VERTICAL WITH HEAD UPRIGHT, ON THE SIDE, AND INVERTED UNDER STATIC CONDITIONS AND DURING EXPOSURE TO CENTRIPETAL FORCE. (Paper, 32nd Annual Meeting of the Aerospace Medical Assoc., Palmer House, Chicago, Illinois, April 24-27, 1961)

ABSTRACT: The observations were carried out on five subjects. The task consisted of setting a luminous line in the dark: (1) before rotation, (2) when exposed to centripetal force resulting in a change in direction of force relative to the subject (angle 0 6° or 12°), and (3) after cessation of rotation. Seated upright, the estimations of the horizontal were quite accurate before and after rotation, while, during exposure to centripetal force, a correction was regularly made in accord with the change in angle 0 (oculogravic illusion). Lying on the side or with head inverted, all subjects exhibited gross inaccuracies in setting the line under static conditions, and the oculogravic illusion could not be demonstrated.

2,127

Graybiel, A., E. Guedry, W. Johnson & E. R. Kennedy 1961 ADAPTATION TO BIZARRE STIMULATION OF THE SEMICIRCULAR CANALS AS INDICATED BY THE OCULOGYRAL ILLUSION.
Aerospace Medicine 32(4):321-327, April 1961.
See also (Army Medical Research Lab., Ft. Knox, Ky.) Rept. No. 464; ASTIA AD 253 099
See also (Naval School of Aviation Medicine, Pensacola, Fla.) Research Proj. MR005.13-6001, Rept. No. 53; 27 July 1960. ASTIA AD 244 936.

ABSTRACT: Four healthy male subjects 19 to 23 years of age were exposed to tilt in a specially constructed chair mounted in a rotating room which is built around the center of a human centrifuge. Determinations of the course of the adaptation to the oculogyral illusion are reported. Also compared are the effects of their voluntary head movements. Information obtained appears to have application to anticipated problems in manned orbiting satellites and to any rotating installation where personnel will be exposed to angular velocities above 2.0 rpm. (Author)

2,128

Graybiel, A. 1962 AEROSPACE MEDICINE AND PROJECT MERCURY.
Aerospace Medicine 33(10):1193-1198. Oct. 1962.

ABSTRACT: Broadly considered, the medical aspects of space fall into such well-known categories as Selection of the Astronaut, Indoctrination in Life Support Systems, Medical Care, and Periodic Re-evaluation. However, in Project Mercury there were unusual problems to take into account. These stemmed from the (1) small number of astronauts, (2) small payload (3) characteristics of the flight profile, (4) hostility of the environment aloft, and (5) landing on water. The problems generated by these factors centered around: (1) close interrelationships between medical and professional fitness of the astronauts, (2) need for continuous monitoring of the physiological responses and environmental conditions during flight, (3) medical logistics of "recovery", and (4) maximal exploitation of the flight for scientific purposes.

2,129

Graybiel, A & others 1962 HUMAN PERFORMANCE DURING TWO WEEKS IN A ROOM ROTATING AT THREE RPM (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-6001, Subtask 1, rept. no. 74, 28 Aug. 1962

2,130

Graybiel, A. 1962 ORIENTATION IN SPACE, WITH PARTICULAR REFERENCE TO VESTIBULAR FUNCTIONS. In Schaefer, K.E., ed., Environmental Effects on Consciousness. (New York: The MacMillan Co., 1962), Pp. 64-72

ABSTRACT: In man the sensory organs in the vestibular labyrinth contribute little to orientation in space if comparison is made with the otolith apparatus in fishes and the semicircular canals in birds. Persons who have lost the function of these vestibular sense organs are scarcely handicapped by day and, for all ordinary activities, are little handicapped at night. Indeed, the great importance of these organs rests in the fact that they are potentially capable of causing disorientation. This may result from pathological factors or from circumstances in which persons are exposed to unusual patterns of stimulation. Such patterns may be encountered in flight, and the conclusion is reached that under certain conditions it would be advantageous to the space traveler if these sensory organs, especially the semicircular canals, were non-functioning.

DISCUSSION: It is not unreasonable to postulate that the semicircular canals and otolith apparatus will contribute very little to the orientation of a traveler in space and may prove to be a decided handicap. The chief difficulties will arise from the visual disorientation and canal sickness if persons are subjected to Coriolis accelerations. If it should be found desirable to generate an artificial gravitational field by means of rotation, persons with normal semicircular canals would suffer unless the rate of rotation was very slow. In view of this possibility more studies are needed with regard to screening large populations to determine if otherwise healthy persons are relatively insensitive to stimulation of the canals, to determine the limits of adaptation, and to explore means of reducing or abolishing the function of the canals. The absence of this function would not handicap the person aloft and limit him very little under all ordinary conditions.

The role of the otolith apparatus is less well understood than that of the semicircular canals but, in all likelihood, it is less important for good or bad (Lansberg, 1958). If it were impossible to abolish the function of the canals without also destroying the function of the otolith apparatus, the loss might be appreciable but not great. (Author)

2,131

Graybiel, A., & W. H. Johnson 1962 A COMPARISON OF THE SYMPTOMATOLOGY EXPERIENCED BY HEALTHY PERSONS AND SUBJECTS WITH LOSS OF LABYRINTHINE FUNCTION WHEN EXPOSED TO UNUSUAL PATTERNS OF CENTRIPETAL FORCE IN A COUNTER-ROTATING ROOM. (Naval School of Aviation Medicine, Pensacola, Fla.) BuMed Project MR005.13-6001 Subtask 1, Rept. No. 70, DRML Proj. PCC-D50-93-10-71; NASA Order No. R-47, 22 June 1962

ABSTRACT: Normal subjects and deaf persons with bilateral labyrinthine defects were exposed to unusual patterns of linear acceleration in an attempt to disturb normal functional mechanisms in the brain stem. Through the use of a counter-

rotating room it was possible, at the same time, to avoid angular or Coriolis accelerations. Some of the normal but none of the labyrinthine defective subjects experienced motion sickness. The results are discussed in terms of the etiologic role of the vestibular sensory organs. (AUTHOR)

2,132

Graybiel, A., & B. Clark 1962 PERCEPTION OF THE HORIZONTAL OR VERTICAL WITH HEAD UPRIGHT, ON THE SIDE, AND INVERTED UNDER STATIC CONDITIONS AND DURING EXPOSURE TO CENTRIPETAL FORCE. Aerospace Medicine 33(2):147-155, Feb.1962 See also (Naval School of Aviation Medicine, Pensacola, Fla.) Rept. No. 60; Proj. No. MR005.13-6001; NASA Grant No. R-1; ASTIA AD-266 066

ABSTRACT: The present experiment attempted to measure the accuracy of visual egocentric localization in widely different body (head) positions and the change in localization induced by a change in direction of the gravitational-inertial force environment. The ability of five healthy subjects to set a luminous line to the horizontal while in the dark was measured with head upright, on the side, and inverted both under static conditions and during exposure to centripetal force. In general, the findings were the same for all subjects and interindividual differences did not affect any of the major findings significantly. Under static conditions egocentric visual localization was quite accurate with head upright, inaccurate with head inverted, and grossly in error with head on the side. When the subjects were exposed to centripetal force with a change in direction of force making an angle of 6 degrees or 12 degrees, the oculogravic illusion was perceived with head erect, not exhibited with head inverted, and not measurable with head on the side. The significance of these findings is discussed, with reference to the function of the otolith apparatus and other factors. (AUTHOR)

2,133

Graybiel, A., & B. Clark 1963 MEASUREMENTS OF THE OCULOGRAVIC ILLUSION IN HEALTHY SUBJECTS AND IN PERSONS WITH BILATERAL VESTIBULAR DEFECTS WITH A NOTE ON ITS USEFULNESS AS A SPECIFIC INDICATOR OF OTOLITH FUNCTION. (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 28 - May 2, 1963)

ABSTRACT: Experiments on a human centrifuge were carried out with nine normal subjects and ten bilateral labyrinthine defective deaf persons who, because their otolith function was unknown, were referred to as OFU subjects. Particular care

was taken to ensure that conditions were favorable for perception of the oculogravic illusion which has been defined as an apparent movement and displacement of the visual field when a person is exposed to a change in direction of the gravitational inertial force environment relative to himself. The subject's task was to observe a line of collimated light in the dark, report whether he perceived any apparent motion, and, if the line appeared to be displaced from the horizontal, to restore it to that position. Findings in the normal subjects were remarkably uniform; tables or curves based on mean values of the group were characteristic for all. In the OFU subjects inter- and introindividual variances were so great that it was difficult to combine the results; therefore, the findings had to be summarized on an individual basis. Moreover, there was evidence of learning in the OFU subjects which tended to complicate interpretation of the results. The usefulness and limitations of this test as an indicator of otolith function are pointed out.

2,134

Grayfer, G.R. & A.I. Bykhovskiy 1936 PROPHYLAXIS OF ANKLE INJURIES IN PARACHUTE JUMPERS
Sovetskaya khirurigiya (Moscow) 7: 115-118.

2,135

Great Britain, Ministry of Supply DYNAMIC LOADS IN AIRPLANES UNDER GIVEN IMPULSIVE LOADS WITH PARTICULAR REFERENCE TO LANDINGS AND GUST LOADS ON A LARGE FLYING BOAT. Research memorandum 2221.

2,136

Greaves, F.C., Draeger, Brines, Shaver, & Cary 1943 AN EXPERIMENTAL STUDY OF UNDERWATER CONCUSSION.
U.S. Nav. Med. Bull. 41:339-352, March 1943.

2,137

Greeley, P. O., H. Jorgenson, W. G. Clark, D. R. Drury & J. P. Henry. 1945 EFFECT OF ANOXIA ON G TOLERANCE.
(Natl. Res. Council, Div. Med. Sci., Comm. on Aviat. Med., Washington, D.C.) CAM Rept. No. 480, 22 Oct. 1945.

2,138

Greeley, P. O. et al. 1945 EFFECT OF ANOXIA ON MAN'S TOLERANCE TO POSITIVE ACCELERATION.
(National Research Council, Committee on Aviation Med., Washington, D.C.) CAM Rept. no. 500, 30 December 1945.

ABSTRACT: Ten centrifuge trained subjects were subjected to positive acceleration on a centrifuge which attained maximum acceleration at the rate of 3 g's per second and which maintained maximum acceleration for 15 seconds. A total of 301 runs were made. The inherent g tolerance of each subject was determined before, during, and after anoxia. Each determination was repeated in the same manner on 2 or 3 different occasions. The g tolerarce was determined by recorded responses to visual and auditory signals and by changes in ear opacity (blood content of the ear). The g ranged from amgnitudes which caused no visual symptoms, to those causing blackout. Anoxia was induced by breathing a gas mixture containing 11.5% oxygen and 88.5% nitrogen until a steady state was reached of Millikan oximeter readings (ca. 15 minutes), and maintained during the centrifuge tests. All subjects were at low oxygen tensions for 30-40 minutes. Return to normal was effected by breathing room air again for ca. 15 minutes.

Although oxyhemoglobin saturation was reduced to an average of 64% (range 59-75%), as determined by oximetry and Van Slykes, there was no significant decrease in g tolerance (average 0.1 g; maximum for blackout in any one case, 0.4 g).

The results support and extend those reported by Gauer. (Fed. Proc. 5(1):35)

2,139

Green, C.D., B.E. Welch, W.L. Brown, L.E. Lamb, P.C. Tang, D.B. Gisler, et al. 1961 STUDIES OF ESCAPE FROM BALLISTIC SPACE VEHICLES. I. BIOMEDICAL EVALUATION. II. INSTRUMENTATION. (School of Aerospace Medicine, Brooks AFB, Texas) Rept. 61-29, Apr. 1961. ASTIA AD-254 065.

ABSTRACT: Biomedical information on primates successfully flown through programmed escape profiles was obtained in conjunction with the NASA project "Little Joe." Animal response during acceleration, deceleration, re-entry, and water impact demonstrated survivability. Also recorded and evaluated were: (a) environmental data (i.e., relative humidity, total gas pressure, O_2 partial pressure, and gas temperature); (b) physiologic data (i.e., respiratory rate, pulse rate, and cardiac rhythm from ECG tracings); (c) psychomotor performance data; and (d) oculomotor movement. These experiments substantiate, under actual flight conditions, physical and biologic design criteria for biopacks, physiologic sensor response, and performance criteria during all phases of the ballistic trajectory and recovery operations from an impact area. (Authors)

2,140

Green, D. M. 1943 AIRSICKNESS IN BOMBER CREWS.
J. Aviation Med. 14:366.

2,141

Green, H. D. 1943 AVIATION PHYSIOLOGY. III. ACCELERATION. Clin. Bull. West. Res. Univ. 7:25-27, 1943.

2,142

Green, H. D. 1944 AVIATION PHYSIOLOGY WITH PARTICULAR REFERENCE TO THE CIRCULATION.
In O. Glasser, ed., Medical Physics (Chicago: Year Book Publishers, Inc., 1955) I, 22-26.

2,143

Green, I. D. & B. F. Burgess 1961 SOME OBSERVATIONS OF THE EFFECTS OF 100 PER CENT OXYGEN AND POSITIVE ACCELERATION ON R.A.F. AIRCREWS.
(Paper 32nd Annual Meeting, Aerospace Medical Association, 24-27 April 1961, Chicago, Ill.)

ABSTRACT: A set of symptoms experienced by aircrew following flights during which they have been subjected to high levels of positive acceleration whilst breathing 100 per cent oxygen has been recognized by the Royal Air Force for several years. The incidence of this syndrome amongst pilots is given. Radiographs of the chest taken after flight and the effects of the disorder upon lung volume are described. The significance of these effects is discussed together with the need for further experimentation and the form that this should take. (Aerospace Med. 32(3):232-233, March 1961)

2,144

Green, I. D. 1961 RESPONSE OF THE HUMAN RETINAL VESSELS TO POSITIVE PRESSURE BREATHING. Aerospace Medicine 32(5):407-411, May 1961

ABSTRACT: Photographs of the human retinal vessels have been taken during positive pressure breathing at a pressure of 60 mm. Hg without counterpressure to the eyes, and examined. Evidence is put forward to suggest that under these circumstances there is little likelihood of intra-ocular adequately supported by the accompanying increase in tension of the intra-ocular fluid. (AUTHOR)

2,145

Green, I. D., & B. F. Burgess 1962 AN INVESTIGATION INTO THE MAJOR FACTORS CONTRIBUTING TO POST FLIGHT CHEST PAIN IN FIGHTER PILOTS. (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. No. 1182, Jan. 1962 ASTIA AD-283 051

ABSTRACT: A field trial is described which investigated the part played by each of three factors (level of applied acceleration, breathing of 100% oxygen, wearing an anti-g suit) in the production of a post-flight syndrome (characterized by cough, chest pain, limitation of inspiration) experienced by fighter pilots. Chest x-rays were taken and lung volume measurements made of six pilots before and after flight in Hunter Mark 6 aircraft. The results of the test and symptoms experienced by these pilots led to the conclusion that all three factors under investigation contributed to the syndrome. The possible pathological changes that may have taken place during the flights are discussed together with the likelihood of any ill effects such changes might produce. (AUTHOR)

2,146

Green, W.D. Jr., T.B. Smith, and P. Felsenthal. 1961 PRECISION VELOCITY MEASUREMENT FOR INERTIAL GUIDANCE TESTING. (Allied Research Assoc., Inc., Boston, Mass.) ASTIA AD-266 737

ABSTRACT: Two practical solutions are advanced to the problem of measuring the velocity of the center of gravity of a rocket sled to 1 part in 10 to the 5th power over a speed range of 200 to 5,000 ft/sec. Solutions are based on a combined space-time/accelerometer system. The characteristics of the systems and the manner in which they meet the requirements are discussed and a program is outlined whereby either system may be introduced as the standard velocity measuring system for the sled test facility at the Air Force Missile Development Center. In reaching the conclusion that the combined space-time/accelerometer system is the optimum solution, other methods were investigated. Results of these studies of direct physical methods, as well as methods from which velocity may be inferred, are discussed. None of the methods examined was found to offer a satisfactory solution to the problem at hand. It is pointed out that quality of instrumentation must be paramount in developing any velocity measuring system and no amount of statistical operations with the data can compensate for data of poor quality. (Author)

2,147

Greenberg, S. 1957 UNDERWATER ESCAPE PROGRAM F9F-4 AIRPLANE LOW-LEVEL DROP TESTS, KEY WEST - August 1957
(U. S. Naval Air Development Center, Johnsville, Pa.) NADC-ED-5720. 25 Sept. 1957 ASTIA AD 408 135.

ABSTRACT: An attempt was made to investigate and critically analyze the parameters involved in pilot escape from present day fighter, attack and

trainer type aircraft during a crash at sea incident to aircraft carrier operation. This report covers the basic research data pertinent to pilot underwater egress obtained during August 1957, by crashing 3 navy service F9F-4 aircraft into approximately 22 fathoms of water off the shores of Key West, Florida. A sinking rate of 7.5 feet per second is the maximum attained in this series of tests. The plastic canopy bubble on this particular aircraft would not withstand differential pressures in excess of 16 psi.

2,148

Greenberg, S. H. 1958 UNDERWATER ESCAPE PROGRAM. DESCRIPTION OF F86D-11 AIRPLANE 50-FOOT DROP TEST, KEY WEST, FLORIDA - 25 MARCH 1958. (Naval Air Development Ctr., Johnsville, Pa.) NADC-ED-5816; Interim Rept. No. 3; 25 Aug. 1958. ASTIA AD 231 439.

ABSTRACT: The results of a 50-foot free-fall drop test of an F86D-11 airplane striking the water in a flat attitude from the YD-203 yard derrick at the U. S. Naval Air Station, Key West, Florida, on 25 March 1958, have been compiled and presented in this report. Physiological effects of impact accelerations and underwater canopy implosion on an anthropometric dummy and shock damage to the airframe are discussed. As would be expected, damage caused by the implosion was localized at the pilot and pilot seat. Seat-to-head forces were in excess of the trheshold values for vertebral damage. Additional tests are recommended.

The aircraft exhibited the characteristic return-to-surface-after-impact behavior and verified a basic assumption underlying previous tests (i.e., that sink rate is substantially independent of initial impact velocity).

2,149

Greenburg, Sidney H. 1958
UNDERWATER ESCAPE PROGRAM. DESCRIPTION OF F86D-11 AIRPIANE 50-FOOT DROP TEST KEY WEST, FLORIDA
(Naval Air Development Center, Johnsville, Pa.)
Rept. no. NADC-ED-5816 March ASTIA AD 231 439

ABSTRACT: Tests were performed to determine (1) the effect of high-velocity vertical entry on the sinking time of aircraft in water; (2) the structural damage sustained by the aircraft on impact; and (3) the physiological shock the pilot suffers when subjected to water collisions of this nature. Damage resulting from implosion of the canopy due to dept pressure and the accompanying physiological implications are also discussed. Shock loadings sustained by the anthropometric dummy in the F86D011 aircraft reached a peak acceleration of 62g, with values well above 25g for 30 msec. This shock loading was greater than that sustained by any other part of the airframe when the complete system was subjected to the 50-foot fall. The acceleration was a rate of onset of approximately 6000 g/sec which, at the g loading and duration of sustained shock,

represents values well above the threshold of vertebral damage, signifying a high expectancy for extensive spinal injury. The opening in the canopy resulting from the implosion appeared to be large enough to permit egress of the pilot and his equipment from the cockpit. Only 19 sec were required from entry to submersion. The increase in the rate of submergence in the latter test must have been contributed by the higher entry velocity, accompanied by greater water penetration of aircraft, and by extensive impact damage which destroyed watertightness and buoyancy of the airframe. (See also AD-231 389) (ASTIA)

2,150

Greenewald, R.E., R.J. Taylor and J. Lew 1949 EFFECTS OF AIRPLANE DESIGN ON ACCELERATIONS EXPERIENCED IN SUPERSONIC FLIGHT. (Cornell Aeronautical Laboratory, Inc., Buffalo, New York) Report No. BC-531-S-11, ASTIA ATI-90379

ABSTRACT: Accelerations and decelerations resulting from flight maneuvers, atmospheric disturbances and power failures during supersonic flight are presented as individual problems. General solutions of some problems have been combined with the human tolerance to acceleration and show the limit of conditions resulting from the participation of a pilot or crew in such conditions

2,151

Greenfield, A. D. M. 1945 EFFECT OF ACCELERATION ON CATS, WITH AND WITHOUT WATER IMMERSION.

ABSTRACT: Forty cats, anaesthetized with chloralose, were centrifuged to produce accelerations up to 20 G in the head-tail axis measured at the heart. Continuous records of acceleration and of arterial, right auricular and intrapleural pressures were obtained. Without water immersion, arterial pressure showed an abrupt fall with onset of acceleration, reached zero at the head level at 3-4 G, and remained approximately constant during 1 min. runs. Right auricular pressures fell, but this was partly offset by the fall in intrapleural pressure. Following the run, the auricular pressure returned to its resting value, but the arterial pressure rose for 1-3 min. to a height greatly exceeding the resting value. Immersion in water at body temperature to levels lower than 4 cm. below the cardiac apex made little difference to the response, but with the water level at the cardiac apex it required an acceleration of about 10 G to reduce the arterial pressure to zero at the head. After the first 10 sec. of the run, arterial pressure showed an increase of 60-80 mm. Hg, which was abolished by carotid sinus denervation. When this compensation had occurred, it required 15-20 G to reduce arterial pressure to zero at the head, corresponding to a pressure of about 300

mm. Hg at the heart. The right auricular pressure showed only a slight rise during the run. Following the run the arterial pressure rose above the resting value for 1-3 min. by an amount proportional to the compensation occurring during the run. This rise was also abolished by carotid sinus denervation.
Raising the water level above the cardiac apex gave only slight further improvement of the arterial pressure response, but the right auricular pressure showed a greater rise during the run.
Respiration was slowed and became shallow with occasional gasps in the non-immersed animals, but was well maintained in the water-immersed animals up to 16 G.
Following exposure to 15-20 G with water immersion for several half-minute runs, death frequently occurred, and subendocardial haemorrhages were observed in the left ventricle. (J. of Physiology 104:5P-6P, 10 Feb. 1945)

2,152

Greenhouse, S. C., & B. Reznek 1961 CALIBRATION OF ACCELEROMETER SYSTEMS In 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D. C. (Mt. Prospect, Ill.: Institute of Environmental Sciences, P. O. Box 191) pp. 595-603

CONCLUSIONS: It is our opinion that not enough emphasis has been placed upon system calibrations, as contrasted with calibrations which combine the individual errors of the major units that comprise the system.
In trying to improve his instrumentation, one of course should carefully examine all its elements until he is convinced that the individual units are satisfactory for his real needs. Then it is our contention that his attention should be focused on the use of rather rapid but sufficiently accurate system calibrations, such as have been described in this article. (AUTHOR)

2,153

Greening, C. P. 1961 CORIOLIS EFFECTS ON OPERATOR MOVEMENTS IN ROTATING VEHICLES.

ABSTRACT: Rotation of manned space vehicles has frequently been considered as a means of providing artificially some of the characteristics of a gravity field. The relatively high rates of rotation anticipated in moderate-sized vehicles will bring into prominence a class of phenomena known as Coriolis effects. In this paper, the magnitude and direction of the forces on the human body associated with Coriolis effects are studied analytically as a function of vehicle spin rates, bodily movement rates and the orientation of vehicle work areas. Relationships among the pertinent variables are expressed parametrically, and also discussed qualitatively. Some implications for work station arrangement are discussed. (Aerospace Medicine 32(3):233, March 1961)

2,154

Greening, C.P. 1961 CORIOLIS EFFECTS ON OPERATOR MOVEMENTS IN ROTATING VEHICLE (Paper presented at 32nd annual meeting, Aerospace Medical Association, 24-27 April 1961, Chicago, Ill.)

ABSTRACT: In this paper, the magnitude and direction of the forces on the human body associated with coriolis effects are studied analytically as a function of vehicle spin rates, bodily movement rates and the orientation of vehicle work areas. Relationships among the pertinent variables are expressed parametrically, and also discussed qualitatively. Some implications for work station arrangement are discussed. (Aerospace Med., 33(5):579-582, May 1962)

2,155

Gregg, Lee W., Richard G. Pearson, and Alfred C. Barnes, Jr. 1961 PREDICTION OF DEGREE OF INJURY FROM IMPACT AND DAMAGE VARIABLES IN LIGHTPLANE ACCIDENTS
(Aviation Crash Injury Research, Phoenix, Ariz.)
Rept. no AvCIR 61-1; TREC Tech. rept. no. 61-94 August
ASTIA AD 265 091L

ABSTRACT: Accident severity in lightplane accidents can be described by means of impact variables such as impact velocity and angle of impact, or by ratings of the resultant damage to the aircraft. Both kinds of factors may be useful predictors of degree of injury sustained by the occupant. An analysis of 913 accidents was undertaken to determine the extent to which individual, gross accident variables predict severity of injury as measured by the AvCIR Injury Scale and by the proportion of fatalities. Damage severity ratings, especially AvCIR's composite Accident Severity rating, predicted degree of injury more effectively than did the primary impact variables. A composite impact severity measure derived from the primary impact variables improved prediction but still not to the level of the damgge ratings. The need for an adequate description of the circumstances surrounding an accident event in terms of the physical impact conditions is emphasized by these findings. Both injuries and damage to the aircraft are effects of an accident. What is required is a more accurate specification of their causal determinants. (AUTHOR)

2,156

Gregg, L. W. & R. G. Pearson 1961 FACTORIAL STRUCTURE OF IMPACT AND DAMAGE VARIABLES IN LIGHTPLANE ACCIDENTS.
Hum. Factors 3(4):237-244, Dec. 1961

ABSTRACT: This paper presents "a rational analysis of the relationships among a number of variables associated with lightplane accidents together

with an empirical evaluation of the adequacy of the logical structure for describing such accidents." Some of these variables are: impact conditon--velocity, angle, attitude, terrain; injury to occupant--degree and location; damage to occupant's structural environment; damage to cockpit and cabin; damage to other structures. A factor analysis is performed on the data from 154 accidents. Four factors which describe the conditions at impact are found; the relationship between injury to occupant and proximity of structural damage is demonstrated; the relationship among damage variables is compared to that between damage and impact variables. (Tufts)

2,157

Gregg, Lee W., and Richard G. Pearson 1961
FACTOR ANALYSIS OF LIGHTPLANE ACCIDENT IMPACT AND DAMAGE VARIABLES
(Aviation Crash Injury Research, Phoenix, Ariz.)
Rept no. AvCIR 61-6 TREC TR 61-122 August
ASTIA AD 266 410L

ABSTRACT: A conceptual framework through which accident variables are defined and certain cause-and-effect relationships are established is confirmed through application of the technique of factor analysis to a set of lightplane accident data. Relationships between aircraft structural damage and injury to the occupant were seen to increase as a function of proximity. Individual measures of the consequences of impact were found to intercorrelate higher than the implied cause-effect relations from impact to damage. (AUTHOR)

2,158

Greig, D.D.A. 1940 REPORT ON PRACTICAL FLYING TESTS CARRIED OUT WITH "SPECIAL FLYING SUIT" (DESIGNED BY DR. FRANKS) BETWEEN JUNE 1st AND JUNE 5th, 1940. SPITFIRE L.1090.
(National Research Council, Canada) Rept. No. C-2830, 8 June 1940.

ABSTRACT: Flight tests were carried out with the special flying suits designed by Dr. Franks in a Spitfire. A pilot who normally "blacked-out" between 3 to 5 G's was able to make manoeuvers going up to over 8 G without feeling any effect of the "blackout". It is felt that the principle involving the design of the suit is sound but in its present form it is not a practical proposition. The results obtained were of such a convincing nature however, that further development is strongly recommended.

2,159

Greiner, T. 1956 THE EFFECT OF A VASOCONSTRICTOR, METARAMINOL, ON HUMAN TOLERANCE TO ACCELERATION. (Wright Air Development Center, Air Research and Development Command, Wright-Patterson AFB, Ohio) WADC TR 56-575. Nov. 1956. ASTIA AD 110545.

ABSTRACT: Recent manipulation of various factors in human acceleration uncovered an unexpectedly large improvement in tolerance, the reflex circulatory adjustment that develops when acceleration is gradually induced. If a similar reflex pattern is activated by a drug, some of the improved tolerance might be available to the quickly entered acceleration of combat flying. In the largest practical doses, metaraminol increased g-tolerance an average of 0.7 g-unit, only one-third of the advantage conferred by full mobilization of the reflexes with slow onset acceleration, and far less than that provided by the standard g-suit in rapid onset acceleration.

2,160

Greiner, T. June 1956 THE EFFECT OF A VASOCONSTRICTIVE AGENT, METARAMINOL, ON HUMAN TOLERANCE TO ACCELERATION. J. Pharmacol. Exp. Ther. 117 (2):228-231 See also WADC TR 56-575, Nov. 1956, ASTIA AD 110 545

ABSTRACT: Recent manipulation of various factors in human acceleration uncovered an unexpectedly large improvement in tolerance, the reflex circulatory adjustment that develops when acceleration is gradually induced. If a similar reflex pattern is activated by a drug, some of the improved tolerance might be available to the quickly entered acceleration of combat flying. In the largest practical doses, metaraminol increased g-tolerance an average of 0.7 g unit, only 1/3 of the advantage conferred by full mobilization of the reflexes with slow onset acceleration, and for less than that provided by the standard g-suit in rapid onset acceleration. (DACO)

2,161

Gresser, A. 1959 THE AIRPLANE DISASTER OF 6 FEBRUARY 1958 AT MUNICH-RIEM. SURGICAL REPORT. Muenchen Med Wschr 101:1569-71; contd., 11 Sept. 1959

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Gresser, A. 1959 THE AIRPLANE DISASTER OF 6 FEBRUARY 1958 AT MUNICH-RIEM. SURGICAL REPORT. Muenchen Med Wschr 101:1606-9; concl., 18 Sept 1959

2,163

Gressitt, T.J. 1962 SLOW-ROTATION, A HUMAN ENGINEERING PROBLEM IN THE NIKE-ZEUS GUIDED MISSILE SYSTEM. (Institute of Environmental Sciences, Mt Prospect, Ill.) Reprint 62-385

ABSTRACT: The NIKE-ZEUS Guided Missile system, now in an advanced state of development for the Department of the Army, was designed and developed by Bell Telephone Laboratories under a Western Electric Company prime contract from the Army Ordnance Missile Command.

The design of equipment for enhanced service ability and to promote personnel comfort and safety in rotating environments was aided by the application of principles evolved through the study of human factors. Consultation with other agencies, experimentation in the test chamber, and operational experience at both White Sands and Kwajalein have contributed to mitigation of a difficult environmental problem.

2,164

Grether, W. F. 1947 ACCELERATION (G)
In "Survey of Display Problems in the Design of Aviation Equipment," In P. M. Fitts, ed., Psychological Research on Equipment Design (Air Materiel Command, Wright-Patterson AFB, Ohio) Rept. No. 19; ATI-125 983, p. 31

ABSTRACT: As the accelerative or G forces encountered in maneuvering aircraft are increased, resulting in disturbance of the normal distribution of blood to the brain and other parts of the body, there is known to be first a narrowing of the visual field, then complete loss of vision, then loss of hearing, and finally loss of consciousness. Effects are somewhat different for positive G (head to foot) and for negative G (foot to head). Human tolerance to G can be increased somewhat by the G suit and by voluntary muscular contractions, both of which resist the flow of blood away from the upper part of the body. It is not known what, if any, losses occur in sensory and interpretive processes at G levels below those necessary to produce narrowing of the visual field. Research is needed to show whether or not such losses occur and whether there is a selective effect on different perceptual processes, so that equipment or tactics can be modified if necessary Results also may have important implications for an understanding of cerebral functions. (AUTHOR)

2,165

Grether, W. F. 1963 HUMAN PERFORMANCE CAPABILITIES FOR MILITARY OPERATIONS IN SPACE. (Paper, Lectures in Aerospace Medicine, School of Aviation Medicine, Brooks AFB, Texas, 4-8 February 1963)

,166

Griffin, D. R. 1953 SENSORY PHYSIOLOGY AND THE ORIENTATION OF ANIMALS. Amer. Sci. 41:209-244

2,167

Griffith, C. R. 1920 THE ORGANIC EFFECTS OF REPEATED BODILY ROTATION. J. Exp. Psychol. 3(1):15-47.

ABSTRACT: As truning is repeated from day to day, the duration of the after-nystagmus, the number of ocular movements made, and the duration of the apparent movement rapidly decrease. The major part of this decrease occurs within the first few days. The decrease takes place not only from day to day but also within a period of ten trials on any single day. The amplitude of the ocular movements and the number of movements made per second also decrease as repetitions increase. Furthermore, certain other organic effects, especially those known as past-pointing, decrease in the same manner. The time of nystagmus changes with the speed of rotation and with the number of revolutions and that it is increased when the chair is abruptly halted. As to other conditions under which nystagmus wavies in degree and amount, the following factors must be considered: (a) the time of day during which rotation is carried on; (b) the amount and number of rest-intervals between turnings and between series; and (c) the general organic state of the subject. Finally, nystagmus may be modified indirectly by 'transfer.' In general, investigators found the organic effects of rotation to be highly variable in their appearance and, moreover, so amenable to practice that they may entirely disappear within a relatively short time, provided rotation is repeated from day to day.

2,168

Griffith, C. R. 1924 A NOTE ON THE PERSISTENCE OF THE "PRACTICE EFFECT" IN ROTATION EXPERIMENTS.
J. Comp. Psychol., 4:137-150, April 1924.

ABSTRACT: Previous studies have established the fact that after-nystagmus or post-rotation nystagmus decreases rapidly in duration and in the amount of movement under repeated turnings. From this study the following inferences seem justified:

1. The "practice effect" persists for fairly long periods of time. Although the effect may not be apparent in a single truning after a long interval, nevertheless, the time taken to reduce post-rotation nystagmus in a second series is notably shorter than the time taken in the original practice series.

2. When all the conditions of rotation are kept constant—save for the number of turnings—the practice effect is found to modify the mental and bodily results of rotation in the same relative way regardless of the number of turnings.

3. Curves built upon data from repeated turning bear a striking resemblance to the traditional learning curve. At any rate the "practice effect" does not seem to be a simple matter of fatigue or of adaptation.

2, 5

Griffith, R., W. Kornberg, & A.G. [illegible] 1956 THE ENVIRONMENT OF AN EARTH SATELLITE. (U.S. Army Signal Corps Engineering Labs., Fort Monmouth, N.J.) SC Project 1724, DA Project 3 99 07 023, Tech. Memo. SR M 1747, March 1956. Rev., Nov. 1956.

ABSTRACT: This report is a collection of graphs, tables, and other data relevant to the environment of an earth satellite during both the launching and in-orbit phases. The information was assembled from recent sources and to some extent unpublished. The major topics include mechanical-thermal considerations, composition of the atmosphere, properties of the atmosphere, radiation at high altitudes, cosmic rays, variation of g with height, the earth's magnetic field, temperatures, pressures, densities, and winds, micrometeorites and meteorites.

2,170

Grigor'ev, Iu. G. 1961 ON THE PROBLEM OF THE CHARACTER OF THE DEVELOPMENT OF VEGETATIVE REACTIONS IN SUBJECTS WITH THE USE OF ANGULAR ACCELERATIONS OF VARIOUS RATES.
In Vestn. Otorinolaring 23:76-81, Nov.-Dec. 1961 (Russian)

2,171

Grimm, J.R. 1959 ENVIRONMENTAL TEST FACILITIES AT WRIGHT AIR DEVELOPMENT CENTER (Aeronautical Accessories Lab., Wright Air Development Center, Wright-Patterson Air Force Base, Ohio) WADC TN 59-369, ASTIA AD-232 476.

ABSTRACT: Environmental test facilities operated at the Wright Air Development Center are listed and pertinent information about the facilities, including the specimen load capacity, test conditions, manufacturer, responsible laboratory, location. Facilities are grouped in accordance with test requirements set forth in MIL-E-5272. Test conditions include high temperature, low temperature, high-low temperature, humidity, altitude, temperature-altitude, salt spray, fungus, sunshine, sand and dust, explosive atmosphere, vibration, acceleration, shock, and several miscellaneous environmental conditions. (Author)

2,172

Grinsted, A. D. & R. K. Ambler 1951 A STUDY OF THE DIURNAL DISTRIBUTION OF AIRCRAFT ACCIDENTS IN NAVAL AIR TRAINING
(USN Sch. Av. Med, Pensacola, Fla.)
Res. Rept. No. NM 001 059.20.01, 15 April 1951

2,173

Grinsted, A.H., Jr. 1962 EVALUATION OF ACCELERATION ENVIRONMENT OF B-52/GAM-77 WEAPON SYSTEM IN HIGH-SPEED, LOW-LEVEL CAPTIVE FLIGHT (PROJECT ROUGH RIDE) (U). (Air Force Proving Ground Command, Eglin Afb) Rept. No. APGC TDR 62-18; ASTIA AD 328 857.

2,174

Grishina, M. 1960 OTVAZHNAYA' IN OUTER SPACE AGAIN. Meditsinskiy Rabotnik. (Moscow) p. 3, 17 July 1960. (translation)

ABSTRACT: Animal training is described for a female rabbit named Zvezdochka, and dogs named Malek and Otvazhnaya (the latter of whom has made five previous flights into outer space), and the subsequent space flight results are briefly given. During the training period a high-speed centrifuge was utilized and physiological data was obtained from medical devices attached to the animals. "The centrifuge is set at a definite rate of rotating motion. The effect of G-forces on the animal organism can be observed on the screen of the apparatus. Training was also conducted on the vibration platform, where the animals were subjected to vibration similar to that experienced in a rocket flying through space. "During the actual flight cardiovascular and respiratory observations were made on the dogs with pulse rate, respiration, arterial pressure, and "cardiac biocurrents" being recorded. The telemetry system also provided information concerning changes in muscular tonus during weightless of the rabbit. "They did not suffer any kind of injury; there were no signs of even slight hemorrhages. No serious disturbances in physiological functions were noted in the animals. Otvazhnaya and Malek feasted on beefsteak and Zvezdochka ate radishes with fresh grass".

2,175

Griswold, R. L., & I. Gray 1956 CONDITIONING OF RATS TO TUMBLING TRAUMA BY ELECTROCONVULSIVE SHOCK (Walter Reed Army Institute of Research, Washington, D. C.) WRAIR 182-56; ASTIA AD-125 925.

ABSTRACT: Rats have been made relatively resistant to the lethal effects of tumbling trauma by a previous series of electroconvulsive shocks (ECS). ECS causes an immediate marked rise in the plasma concentrations of adrenaline and noradrenaline, as a result of the electrical stimulation of the sympathetic nervous system. The plasma concentrations of adrenaline and noradrenaline, which are elevated in response to trauma, show a more rapid fall after termination of trauma in the ECS-conditioned animals than in the controls. There is no significant alteration in the sensitivity of ECS-conditioned rats to toxic doses of adrenaline and noradrenaline. (AUTHOR)

2,176

Groat, R. A., H. W. Magoun, F. L. Dey and W. F. Windle 1944 FUNCTIONAL ALTERATIONS IN MOTOR AND SUPRANUCLEAR MECHANISMS IN EXPERIMENTAL CONCUSSION. Am. J. Physiol. 141:117.

2,177

Grodsky, M.A., and G.W. Levy 1963 HUMAN FACTORS IN SPACE FLIGHT. (New Jersey: Prentice-Hall, Inc.) In preparation, Spring, 1963.

2,178

Groen, J. J., & L. B. W. Jongkees 1948 TURNING TEST WITH SMALL REGULABLE STIMULI. IV. THE CUPULOGRAM OBTAINED BY SUBJECTIVE ANGLE ESTIMATION. J. Laryng. and Otol. 62:236-240

2,179

Groen, J. J. 1956 THE SEMICIRCULAR CANAL SYSTEM OF THE ORGANS OF EQUILIBRIUM II.
Phys. in Med. and Biol. 1(2):103-117.

ABSTRACT: The vertebrates, fishes, reptiles, amphibians, birds and mammals have all the same fundamental construction of their organs of equilibrium, although there are as many differences in final shape as there are species. Notwithstanding these differences it can be stated that the common base of the organs is always recognizable. This paper contains a detailed description of the semicircular canal system of the organs of equilibrium. The author describes the function of the otolith, because, being the oldest vestibular sensory element it has some of the fundamental properties found in the semicircular canals. In the case of the semi-circular canals, the threshold of the of the peripheral organ is determined with a rotating chair. The smallest impulse moment, expressed as the just perceptible suddent change of an angular velocity, lies between 1 and 3°/sec., depending on the sensitivity of the test subject. The threshold for an angular acceleration is of the order of 0-2/sec². In the macula neglecta, only change of acceleration will provoke action potentials. It is an organ which is extremely sensitive to vibration. The saccule macula and the utricule macula show a similar behavior. It appears that the border areas of the macula contain these change-receptors, whereas the central region has more acceleration-sensitive receptors.

2,180

Green, J. J. 1957 THE SEMICIRCULAR CANAL SYSTEM OF THE ORGANS OF EQUILIBRIUM. II.
Physics in Med. and Biol. (London) 1(3):225-242.

ABSTRACT: The function of the semicircular canal system is considered on the mechanical basis of the heavily damped torsion pendulum. It appears that this point of view has a first approximation validity. The deviations in the responses of the predicted mechanical behaviour point mainly to an inhibition of central origin. The so-called 'normal test subject' tends to suppress the signals passing the stations between labyrinth and brain in a progressive manner: nystagmus is less distorted than sensation. A comparison between these two responses may yield information on the (dis)function of the vestibular tract. (Author)

2,181

Grollman, A. 1928 THE EFFECT OF VARIATION IN POSTURE ON THE OUTPUT OF THE HUMAN HEART. Amer. J. Physiol. 86:285-301

2,182

Gross, A.G., A.Z. Klain and C.F. Lombard 1949 A NEW CONDUCTIVITY-TYPE PRESSURE TRANSDUCER. (University of Southern Calif., School of Medicine, Los Angeles) Contract N6ori77, Task 1, 31 March 1951

ABSTRACT: In an attempt to find a suitable technique for the measurement of pressures in brain concussion research, the technique reported by Gurdjian and Lissner based on the electrical conductivity of an electrolyte as a function of pressure was investigated.

The path of this investigation is traced showing the technique used and the findings upon which the conclusions are based.

It was found that a pressure transducer operating on the conductivity pressure principle would be too insensitive for practical use. It was deduced that the high sensitivities obtained by Gurdjian and Lissner were of an accidental nature.

A new type pressure transducer based on the compression and expansion of a very small bubble of gas in an electrolyte is presented and an evaluation given.

It was concluded that although this new type transducer might have definite application in certain fields of research it has definite limitations precluding its use for the measurement of impact phenomena.

2,183

Gross, A. G., A. Z. Klein and C. F. Lombard 1949 A NEW CONDUCTIVITY-TYPE PRESSURE TRANSDUCER
(Office of Naval Research, Washington, D. C.)
December 1949 Contract N6ori77

SUMMARY: In an attempt to find a suitable technique for the measurement of pressures in brain concussion research, the technique reported by Gurdjian and Lissner based on the electrical conductivity of an electrolyte as a function of pressure was investigated.

The path of this investigation is traced showing the technique used and the findings upon which the conclusions are based.

It was found that a pressure transducer operating on the conductivity pressure principle would be too insensitive for practical use. It was deduced that the high sensitivities obtained by Gurdjian and Lissner were of an accidental nature.

A new type pressure transducer based on the compression and expansion of a

2,184

Gross, Arthur G. 1958 A NEW THEORY ON THE DYNAMICS OF BRAIN CONCUSSION AND BRAIN INJURY
Journal of Neurosurg. 15(5): 548-561 Sept. 1958

ABSTRACT: The basic purpose of this research effort has been to investigate the dynamics of the head and its contents when subject to impact. The actual experimentation involved was limited to the study of the dynamics of fluid-filled glass flasks simulating the human head. Although the medical literature on brain concussion was carefully reviewed for guidance of this study, the actual research was of an engineering nature, conducted by engineering personnel.

If it can be established that concussion of the brain is produced by, or occurs simultaneously with, cavitation, it then may be possible to obtain considerable information on the threshold of concussion from research on impact on human cadavers.
very small bubble of gas in an electrolyte is presented and an evaluation given.

It was concluded that although this new type transducer might have definite application in certain fields of research it has definite limitations procluding its use for the measurement of impact phenomena.

2,185

Gross, A. G. 1958 IMPACT THRESHOLDS OF BRAIN CONCUSSION
J. of Aviation Medicine, 29(10):725-732, October 1958

ABSTRACT: An analysis was made of the resonance-cavitation theory of brain concussion, evaluating the various physical factors that relate to the impact thresholds of brain concussion. A formula for computing the impact threshold for countrecoup cavibation was developed. Use of this formula requires the obtaining of "K" factors by impact research on human cadavers. Instrumentation techniques were developed for use in obtaining threshold acceleration cavitation data on human cadavers. Impact experiments were conducted on glass simulated skulls to demonstrate the technique of determining "K" factors.

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Grow, M.C. 1935 RESEARCH IN AVIATION MEDICINE.
Army Med. Bull., (32):48-53

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Grow, M.C. & R.G. Armstrong 1941 FIT TO FLY: A MEDICAL HANDBOOK FOR FLYERS.
(New York: D. Appleton Century Co., Inc., 1941)

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Grow, M.C. 1947 FUTURE RESEARCH IN AVIATION MEDICINE
The Military Surgeon 100(3):205-207, Mar. 1947.

ABSTRACT: The basic object in research in aviation medicine is to keep pace with aircraft design and, where possible, to stay out in front. However, there are urgent problems [illegible] iology which must be solved if powerful new aircraft are to be manned. A few specific problems posed by jet and rocket aircraft is acceleration, deceleration and escape for the pilots.

2,189

Grubin, C & P. Lieber 1954 FURTHER CONSIDERATIONS ON THE THEORY OF THE ACCELERATION DAMPER (Rensselaer Polytechnic Inst., Troy, N.Y.) Rept no. TR AE54021; Contract Nonr-59101; 1 June 1954; ASTIA AD-37 289

ABSTRACT: The 2 steady state solutions previously developed (RPI Aeronautical Laboratory Report No. 1, March 15, 1952) are examined for stability, and only one is found to be correct. A steady state analysis is developed for a damper attached to a 2 degree of freedom system, one of the degrees of freedom being subjected to a simple harmonic force. Numerical results obtained from this work are unsatisfactory and indicate an error in the theory.

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Gruvet, W.L. 1960 HORIZONTAL SHOCK APPARATUS
1960 Proceedings of the Institute of Environmental Sciences
(Mt. Prospect, Ill. Inst. of Environmental Sciences, 1960) pp. 447-454.

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Gualtierotti, T. & D. Passerini 1958 SOGLIA CEREBELLARE ALLE ACCELERAZIONI ROTATORIE E SOMMAZIONE TEMPORALE NEL PICCIONE VIAGGIATORE (The Cerebellar Threshold of Rotatory Accelerations and Time Circulation in the Passenger Pigeon)
Accad. Nazl. Lincei (Rome) Ser. 8, 25(1-2):115-118, July-Aug. 1958.
See Also (U.S.Air Force, Office of Scientific Research) Contr. AF 61(052)-23, Rept. no. TN 59-378.

2,192

Gualtierotti, T., & D. Passerini 1958 RISPOSTE ROTATORIE E POSTROTATORIE CEREBELLARI E NISTAGMO NUCALE DEL PICCIONE (ROTATORY AND POST-ROTATORY CEREBELLAR RESPONSES AND NUCHAL NYSTAGMUS OF THE PIGEON) Accad. Nazl. Lincei (Rome) Ser. 8, 25(3-4):219-233, Sept. Oct. 1958
See also (U. S. Air Force, Office of Scientific Research) Contr. AF 61(052)-23, Rept. no. TN 59-377

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Gualtierotti, T., B. Schreiber, D. Mainardi & D. Passerini 1959 EFFECT OF ACCELERATION ON CEREBELLAR POTENTIALS IN BIRDS AND ITS RELATION TO SENSE OF DIRECTION. Amer. J. Physiol. 197(2):469-474

ABSTRACT: Rotatory and postrotatory cerebellar responses of homing and domestic pigeons and of migratory and sedentary doves have been studied by means of a centrifuge, the speed and plane of rotation of which could be changed at will. No appreciable differences have been found in the rotatory cerebellar responses in all the animals tested. Spindle-like post-rotatory discharges, however, are a peculiar response of nearly all the homing pigeons and all the migratory doves tested; only 6-8% of the domestic pigeons and no sedentary doves showed similar afterdischarges. Of the hybrids, nearly half had the same postrotatory electrical activity in the cerebellum. The threshold value of centripetal acceleration to produce postrotatory discharges in homing and migratory birds has been found to be 0.0004-0.005 g. Postrotatory responses show temporal summation; repetitive stimuli give more numerous and more ample afterdischarges. Nystagmus or, in general, contraction of the neck muscles, does not influence directly the cerebellar afterdischarges. The latter are present in curarized animals, which show no nystagmus and in domestic pigeons, nystagmus is not

accompanied by cerebellar afterdischarges. Not coincident in time, however, nystagmus and cerebellar afterdischarges show at times a tendency to synchronization, through physiological factors, which are discussed. The threshold for afterdischarges has been found to be 1000 times higher than changes in possible geodetic forces involved in orientation. This seems to rule out the Ising hypothesis that geodetic forces may be responsible for direction in migration that, notwithstanding the existence of kinesthetic centers of higher sensitivity, is postulated in migratory animals.

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Gualtierotti, T., B. Schreiber, D. Mainardi, & D. Passerini 1959 EFFECT OF ACCELERATION ON CEREBELLAR POTENTIALS IN BIRDS AND ITS RELATION TO THE SENSE OF DIRECTIONS. (Paper, 28th Annual Meeting of the Aerospace Medical Assoc., Denver, Colorado) Amer. J. Physiol. 197(2):469-474, Aug. 1959
See also Schreiber, B., T. Gualtierotti, D. Mainardi, & D. Passerini, (Milan University, Italy) Technical Note 1 June 1956 - 31 May 1957; Rept. No. 1 AFOSR TN-57-519; Contract AF 61(514)-[illegible]; ASTIA AD-130 661

ABSTRACT: Rotatory and postrotatory cerebellar responses of homing and domestic pigeons and of migratory and sedentary doves have been studied by means of a centrifuge, the speed and plane of rotation of which could be changed at will. No appreciable differences have been found in the rotatory cerebellar responses in all the animals tested. Spindle-like postrotatory discharges, however, are a peculiar response of nearly all the homing pigeons and all the migratory doves tested; only 6 to 8 per cent of the domestic pigeons and no sedentary doves showed similar after-discharges. Of the hybrids, nearly half had the same postrotatory electrical activity in the cerebellum. The threshold value of centripetal acceleration to produce postrotatory discharges in homing and migratory birds has been found to be 0.004-0.005 G. Postrotatory responses [illegible] repetitive stimuli give more numerous and more ample after-discharges. Nystagmus or, in general, contraction of the neck muscles, does not influence directly the cerebellar after-discharges. The latter are present in labyrinthless animals, which show no nystagmus and, in decerebrate preparations, nystagmus is not accompanied by cerebellar after-discharges. Not coincident in time, however, nystagmus and cerebellar after-discharges show at times a tendency to synchronization, through physiological factors, which are discussed. The threshold for after-discharges has been found to be 1000 times higher than changes in possible geodetic forces involved in orientation. This seems to rule out the Ising hypothesis that geodetic forces may be responsible for direction in migration that, notwithstanding the existence of kinesthetic centers of higher sensitivity, is postulated in migratory animals. (Author)

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[illegible]

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Guedry, F. E., Jr. 1960 THE EFFECT OF VISUAL STIMULATION ON THE DURATION OF POST-ROTATIONAL APPARENT MOTION EFFECTS J. Gen. Psychol. 43:313-322

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Guedry, F. E. 1960 AGE AS A VARIABLE IN POST-ROTATIONAL PHENOMENA. In: U.S. Office of Naval Research, A Symposium: Psychophysiological Factors in Spatial Orientation (Washington, D. C.: 1960), pp. 67-69.

ABSTRACT: In previous studies of post-rotational experiential phenomena (1, 3), it was found that the mean duration of the first post-rotational apparent-motion effect was of the order of 20 seconds on the initial rotation. The subjects used in these studies were between 19 and 24 years of age. In subsequent experiments involving conditions similar to the previous studies, a few older subjects were employed as preliminary observers because of their immediate availability. It was noted that these subjects reported illusions of longer duration than the younger subjects in the previous studies.

The present report is concerned with an investigation of the possibility that the difference noted above may be attributable either to change or to slight differences in experimental conditions.

2,198

Guedry, F. E. 1960 AGE AS A VARIABLE IN POST ROTATIONAL PHENOMENA (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 110 500. 19., 1 Nov. 1960

ABSTRACT: Twenty-four subjects (mean age 38, range: 30-53 years) tended to exhibit longer durations of the post-rotational apparent-motion phenomenon than 24 subjects (ages 19 to 23 yrs.) under identical experimental conditions. Each man was rotated twice in a Link trainer at 20 r.p.m. for 60 sec. Attached to the nose of the plane was a black, perforated box illuminated from within, the box being the only visible object in the room. After rotation, the subjects indicated the duration of the apparent movement of the box to indicate the duration of the phenomenon. Several suggestions for the results are given: (1) older subjects are more cautious to report actual or apparent motion; (2) older subjects may not habituate to rotation as readily (the duration factor when the vestibular system becomes subordinate to a central process); (3) there were probably more subjects with poor oculomotor control or poor vision among the older men; and (4) the condition of the semicircular canals may change with age.

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Gubernale, A 1952 RELAZIONE SU UN VOLO A REASIONE (Account of a Jet Flight) Rivista di Medicine Aeronautica (Roma), 15(4):521-526.

ABSTRACT: Observations and experiences of the author aboard a jet propelled aircraft, F-80, are analyzed. The pressurization of the cockpit (automatically controlled) went into effect at 10,000 ft. and remained unchanged up to 18,000 ft. From this altitude on, the pressure differential was maintained at 2.75 pounds per square inch. During the first part of the flight, up to an altitude of 26,000 ft., no disturbing symptoms were experienced and respiration and pulse were normal. In the second part of the flight, however, acrobatic maneuvers were carried out at an altitude of 13,000 ft. The effects of positive acceleration were a sensation of being nailed to the seat, heaviness of the extremities, and stifffness of the muscles. When 4 g was reached, it felt as if all the organs would be pulled downwards and it was difficult to breathe.

2,200

Guedry, F. E., J. T. Ray & J. I. Niven 1952 THE INFLUENCE OF VISUAL ORIENTATION ON APPARENT BODILY ROTATION FOLLOWING ACTUAL ROTATION. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 110 500.23 Jan. 14, 1952. ASTIA TIP U21937

ABSTRACT: Three subjects were each rotated in the horizontal plane in a modified Link Trainer for 1-minute periods in alternating illuminated and dark surroundings. The time for acceleration to 20 r.p.m. was 15 seconds; for deceleration, 0.5 seconds. The subjects reported the end of the first postrotational effect and the beginning of the second by pressing a key which flashed a light in the control room. The duration of the first effect was always less under conditions of illunimation. The results do not support the concept that postrotational perception of apparent body rotation results from tracking of images over the retina. (TIP abstract)

2,201

Guedry, F. E. 1952 RELIABILITY OF RESULTS PREVIOUSLY REPORTED: THE INFLUENCE OF VISUAL STIMULATION ON HABITUATION TO ROTATION. (U.S.N. School of Avia. Med. Research, Pensacola, Fla.) Research Rept. NM 001 110 500.25, June 15, 1952. ASTIA ATI 159 830.

ABSTRACT: The major conditions of an investigation by Brown and Guedry (J. General Psychol. 45:151-161, 1951) were repeated. A Link trainer, rotating about its vertical axis for 60 sec. at 20 r.p.m., was the principal item of apparatus. It carried a black box, faintly illuminated, fastened 2 ft. from the subject's head. The 24 subjects were divided into 2 groups of 13 each. Group I was subjected to 20 trials in which no overhead illumination was used until after the postrotational effect was ended. Group II's trials were similar except that the experimental room was illuminated by an overhead light for a 5-sec. period which started 2 sec. after the cessation of rotation. Group II subjects exhibited more habituation to rotation; this verified the results of Brown and Guedry. A brief period of room illumination interposed during the postrotational period apparently reduced the duration of illusory effects. (TIP abstract)

2,202

Guedry, F. E. 1953 THE TRANSFER OF HABITUATION TO ROTATION WITH RESPECT TO THE MAGNITUDE OF THE VESTIBULAR STIMULUS. (Naval School of Aviation Medicine Pensacola, Fla.) Joint Rept. No. 34; Proj. No. NM 001 063.01.34; Contract N7onr-434, T. O. 1; ASTIA AD-17 609

ABSTRACT: The duration of oculogyral illusion (OGI) of 20 subjects was measured at 2 angular velocities (10 and 22 rpm) before and after a series of 39 rotation trials at 16 rpm. A significant decrement in OGI effects occurred on the unpracticed trials after the habituation series, indicating the transfer of habituation to vestibular stimuli of different magnitude. After the habituation series, the responses also showed a greater sensitivity to differences in vestibular stimuli. A comparison of rotational and postrotational results suggested that the overhead light produced an habituatory effect which did not generalize to vestibular stimuli with opposite directional components.

2,203

Guedry, F. E. 1953 THE RETENTION OF EFFECTS OF 'MASSED' AND 'DISTRIBUTED' VESTIBULAR STIMULATION AS INDICATED BY THE DURATION OF THE OCULOGYRAL ILLUSION. (Naval School of Aviation Medicine, Pensacola, Fla.) Joint Proj. Rept. No. 33; Proj. No. NM 001 063.01.33; Contract N7onr-434, T. O. 1; ASTIA AD-17 532

ABSTRACT: The influence of the distribution of rotational practice trials was studied in relation to (1) rate of habituation to the rotation and (2) retention of the habituation. After preliminary indoctrination, 20 subjects received 39 separate rotational trials and reported the rotational and postrotational durations of oculogyral illusion, a form of apparent motion observed following stimulation of the semicircular canals. One group received rotational trials massed into a single period, while the other group received trials distributed over 4 daily sessions. The rates of habituation of the 2 groups were not significantly different. Results of the tests of retention, given 7 days after habituation, suggested that the massed series produced greater retention. The habituatory effect of visual stimulation did not generalize to a vestibular stimulus with an opposite directional component.

2,204

Guedry, F. E., & J. I. Niven 1954 INTERACTION OF VESTIBULAR STIMULI OF DIFFERENT MAGNITUDES AND OPPOSITE DIRECTIONS. PART I. PERCEPTION OF VISUAL APPARENT MOTION DURING ANGULAR ACCELERATIONS. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 110 500.36., 8 Dec. 1954

ABSTRACT: Where a positive angular acceleration is immediately followed by a negative one, the actual direction of rotation is perceived well into the latter period. This perception is terminated by a clear-cut reversal in directio

of apparent motion. Theoretically, the time between commencement of deceleration and the point of reversal is indicative of the time of travel of the cupula from a deviated position and also of the cupula's responsiveness to an acting force. An extension of van Egmond's equations permits prediction of the time interval (t_R) where the duration and magnitude of positive and negative angular accelerations are known. Data obtained from three subjects were in good agreement with theoretical curves and displayed a striking degree of consistency between subjects and within subjects.

2,205

Guedry, F.E. & J.I. Niven 1954 INTERACTION OF VESTIBULAR STIMULI OF DIFFERENT MAGNITUDES AND OPPOSITE DIRECTION. PART II. PERCEPTION OF VISUAL APPARENT MOTION AFTER INTERACTING ANGULAR ACCELERATION.
(Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 110 500.38

ABSTRACT: Three subjects were accelerated to a predetermined level and then braked to a stop to produce positive and negative angular accelerations in quick succession. They reported on the direction and duration of apparent motion of a visual target. The data obtained were in agreement with theoretical equations which had been derived from the standard differential equation for a torsion pendulum. The data showed a high degree of consistency between subjects and within subjects. The striking similarity between theoretical and experimental data tends to confirm the validity of the torsion pendulum analogy for semicircular canal function.

2,206

Guedry, F. E., & H. Kalter 1956 DESCRIPTION OF HUMAN ROTATION DEVICE.
(Army Medical Research Lab., Ft. Knox, Ky.) Proj. No. 6-95-20-001, Subtask AMRL S-5, Rept.242; ASTIA AD-109 230

ABSTRACT: A turntable was constructed for rotating subjects positioned within a radius of three feet from the center of rotation. Recorded performance of this device indicates that control of angular velocity is excellent. Control of angular accelerations and decelerations below 30 degrees/sec.^{2} is very good and easily obtained with a cam system for driving the speed control potentiometer. Accelerations of 60 degrees/sec.^{2} and decelerations of 50 degrees/sec.^{2} can be obtained with the cam control system. However, to obtain these higher magnitudes the cam must be cut to compensate for a lack in linearity of response. The system provides sufficient range of angular velocities and angular accelerations for conducting a wide variety of experiments in vestibular research. (AUTHOR)

2,207

Guedry, F. E., L. J. Peacock and R. L. Cramer 1956 NYSTAGMIC EYE MOVEMENTS DURING INTERACTING VESTIBULAR STIMULI (U.S. Army Medical Researvh Lab., Ft. Knox, Ky.) Report No. 275, Nov. 2, 1956. Project No. 6-95-20-001. ASTIA AD 129 449

ABSTRACT: This is a study of the ocular nystagmic reaction to angular acceleration collowed immediately by angular deceleration. During the deceleration period, nystagmus from the acceleration terminates and shortly thereafter nystagmus in the opposite direction commences. Time from the onset of deceleration to a point midway between nystagmus of opposite directions was measured. Electronic amplification of corneo-retinal potential was the method of recording eye-movement. The results obtained on vestibular nystagmus were essentially the same as those previously obtained where subjective reports were recorded. Both sets of results show close correspondence to theoretical curves but there is a small consistent difference between obtained and theoretical results.

2,208

Guedry, F. E., Jr. 1957 SOME EFFECTS OF INTERACTING VESTIBULAR STIMULI. (Army Research Lab., Ft. Knox, Ky.) Report no. 261, USAMRL Proj. 6-95-20-001. 18 March 1957.

ABSTRACT: This is a study of the subjective vestibular reaction to a positive angular acceleration followed by negative angular acceleration without an intervening period of constant angular velocity. One phase of the subjective experience, which theoretically is indicative of the response of the vestibular system while it is being driven, showed systematic change with variation in the independent variable. A second phase of the subject experience, which theoretically is indicative of the recovery of the vestibular system after the stimulus is removed, was more variable, and is much less predictable than the first. It is suggested that the vestibular response is consistent and predictable where stimuli approximate conditions of motion encountered under normal living conditions.

2,209

Guedry, F.E., L.J. Peacock, and R.L. Cramer 1957 NYSTAGMIC EYE MOVEMENTS DURING INTERACTING VESTIBULAR STIMULI. (Army Medical Research Lab., Fort Knox, Ky.) Rept. on Vestibular Motion Problems; ASTIA AD-129 449

2,210

Guedry, F. E., & N. Beberman 1957 APPARENT ADAPTATION EFFECTS IN VESTIBULAR REACTIONS. (Army Medical Research Lab., Fort Knox, Ky.) ARML Proj. No. 6-95-20-001; Rept. No. 293; ASTIA AD-141 108

ABSTRACT: Twenty subjects received 3 series of 6 angular decelerations of different magnitudes. The duration of each deceleration was calculated to produce a theoretical cupula deviation which would be the same for all decelera-

tions. Since the higher decelerations were applied briefly and the lower decelerations were applied for much longer intervals, it was hypothesized that adaptation effects, if present, would shorten the after-response to the lower decelerations. A systematic shortening of the after-response with the longer applied decelerations supported the hypothesis. This means that either there is an adaptation effect or the torsion pendulum theory is grossly in error. A pilot study in which the magnitude of deceleration was constant but duration of acceleration was varied gives strong support to the notion that an adaptation effect or some process antagonistic to an ongoing vestibular reaction builds up during a prolonged vestibular reaction. (AUTHOR)

2,211

Guedry, F. E., & G. Richmond 1957 DIFFERENCES IN RESPONSE LATENCY WITH DIFFERENT MAGNITUDE ANGULAR ACCELERATION. (Army Medical Research Lab., Fort Knox, Ky.) AMRL Proj. 6-95-20-001; Rept. No. 301; ASTIA AD-146 281.

ABSTRACT: Fifteen subjects received a series of 8 angular accelerations during each of 5 sessions. They were required to signal onset of apparent rotation as quickly as possible. The interval between onset of acceleration and the subject's signal of apparent rotation, termed response latency, bears an inverse relationship to magnitude of angular acceleration. This relationship appears very systematic in all subjects in spite of fairly large differencies between some individuals in the magnitude of their responses. Discrepancies between the obtained results and predictions, derived from theoretical mechanics of the semicircular canals, are discussed. (AUTHOR)

2,212

Guedry, F. E., R. L. Cramer & W. P. Koella 1958 EXPERIMENTS ON THE RATE OF DEVELOPMENT AND RATE OF RECOVERY OF APPARENT ADAPTATION EFFECTS IN THE VESTIBULAR SYSTEM.
(Army Medical Research Lab., Fort Knox, Ky.) USAMRL Proj. 6-95-20-001, Rept. 338, June 1958. ASTIA AD 203 578

ABSTRACT: Two experiments were performed to study the rate of development and rate of recovery of adaptation to angular acceleration. In the first experiment, conditioning stimuli were varied in duration and standard test stimuli were always presented 5 sec after termination of the primary subjective effects from the conditioning stimuli to indicate the rate of development of the adaptation effects. In the second experiment, the conditioning stimulus was always of 50 sec duration and test stimuli were presented at various intervals after the conditioning stimulus to ascertain the rate recovery to normal. Reactions to test stimuli of the same direction as the conditioning stimuli were reduced and indicated a relatively rapid onset of effect and prolonged recovery period. Reactions to test stimuli opposite in direction to the conditioning stimuli were increased and indicated a relatively slow onset of effect and shorter recovery period. (Author)

2,213

Guedry, F. E. & S. J. Ceran 1959 DERIVATION OF 'SUBJECTIVE VELOCITY' FROM ANGULAR-DISPLACEMENT ESTIMATES MADE DURING PROLONGED ANGULAR ACCELERATIONS: ADAPTATION EFFECTS. (Army Medical Research Lab., Fort Knox, Ky.) AMRL Proj. No. 6-95-20-001; Rept. No. 376; ASTIA AD-211 385

ABSTRACT: Subjective estimates of angular displacement of a target light, fixed with respect to the observer, were made during prolonged constant angular acceleration of the entire body in a dark room. These estimates provided an indication of subjective velocity throughout the course of the vestibular reaction. Results obtained from 10 subjects indicated that subjective velocity rises and then declines during the course of a constant angular acceleration. Within the range of stimuli applied (0.5 deg/sec^2 to 2.0 deg/sec^2) rise time to maximum subjective velocity appears constant regardless of stimulus magnitude. The maximum attained and the rate of change of subjective velocity up to this maximum are directly related to the magnitude of the angular acceleration. However, after about 30 sec of constant angular acceleration, the subjective velocity declines even though the angular acceleration remains constant. Implications of certain characteristics of the results for the torsion pendulum theory are discussed. (AUTHOR)

2,214

Guedry, F. E., & A. Graybiel 1960 ROTATION DEVICES, OTHER THAN CENTRIFUGES AND MOTION SIMULATORS: THE RATIONALE FOR THEIR SPECIAL CHARACTERISTICS AND USE. (National Academy of Sciences, --- National Research Council, Washington D. C.) Publication 902; ASTIA AD-262 435, Library of Congress Catalog No. 61-60054, April 1960

ABSTRACT: This report deals with rotation devices used in studying the role of the semicircular canals and otolith organs in aerospace flight. Most of these devices have limited capability as flight simulators but are instrumented for controlling and recording the dynamic performance of the rotary structure and for measuring electrophysiological and behavioral responses of the subjects. The greater number are designed primarily to stimulate the semicircular canals, organs uniquely structured to respond to angular accelerations. The otolith organs, which are stimulated by linear accelerations, respond to change in body (head) position with respect to the directional of gravity or any inertial force of sufficient magnitude. (ASTIA)

2,215

Guedry, F. E., W. Johnson, R. Kennedy 1960 ADAPTATION TO BIZARRE STIMULATION OF THE SEMICIRCULAR CANALS AS INDICATED BY THE OCULOGYRAL ILLUSION (U.S.N. School of Aviation Medicine, Pensacola, Fla.) Research Project MR005.13-6001, Subtask 1, Report No. 53, 27 July, 1960.

ABSTRACT: Four healthy male subjects 19 to 23 years of age were exposed to tilt in a specially constructed chair mounted in a rotating room which is built

around the center of a human centrifuge. Determinations of the course of their adaptation to the oculogyral illusion are reported. Also compared are the effects of their voluntary head movements. Information obtained appears to have application to anticipated problems in manned orbiting satellites and to any rotating installation where personnel will be exposed to angular velocities above 2.0 rpm.

2,216

Guedry, F. E., Jr. and E. K. Montague 1960 RELATIONSHIP BETWEEN MAGNITUDES OF VESTIBULAR REACTIONS AND EFFECTIVE CORIOLIS COUPLES IN THE SEMICIRCULAR CANAL SYSTEM.
(U.S.Army Medical Research Lab., Fort Knox, Ky.) Rept. No. 456, Nov. 2, 1960. ASTIA AD 248 885L

ABSTRACT: When a human rider on a rotating structure rotates his head in a plane other than the plane of rotation of the structure, he perceives ortation in a plane approximately orthogonal to the other two. In this experiment, subjects were rotated at rates within the range 0.2 to 1.6 rad/sec. Recordings were made of the angular velocity of the structure, head rotation relative to the structure, vestibular nystagmus, and subjective estimates of angular displacement and velocity. Results indicate that the magnitude of the effective resultant mechanical couples which develop in the semicircular canal system due to Coriolis accelerations are directly related to the magnitudes of the subjective and oculomotor aspects of the vestibular reactions. Changes in spatial orientation indicated by a 'control stick' provide an estimate of the magnitudes of errors to be anticipated in pilots exposed to this source of 'vertigo.'

2,217

Guedry, F. E., & L. S. Lauver 1960 THE OCULOMOTOR AND SUBJECTIVE ASPECTS OF THE VESTIBULAR REACTION DURING PROLONGED CONSTANT ANGULAR ACCELERATION. (Army Medical Research Lab., Ft. Knox, Ky.) Rept. No. 438.
ASTIA AD 244813L

ABSTRACT: The present experiment is designed to determine whether the oculomotor nystagmic reaction rises and declines in magnitude during constant angular acceleration with a time course similar to that previously established for the subjective aspect of the vestibular reaction. The primary objectives however are (1) the determination of psychological and physiological reactions to angular acceleration with a view to increasing the range of predicting such events in any future military situation and (2) determination of the degree to which a physiological parameter might be used as an indicator of the experimental events which would influence the human operator.

Although some subjects occasionally showed a rise and decline in the slow phase velocity of nystagmus during constant angular acceleration, the more typical course of events was the attainment of near-maximum eye velocity in about 30 sec. with little subsequent gain or loss in velocity until the stimulus was terminated. When the stimulation ceased, the eye velocity typically slowed but did not show the rapid decline suggested by previous work, although there

were occasional examples of this pattern. The nystagmic response was routinely of longer duration than the subjective reaction.

Departures from previous results are probably attributable to the "state of alertness" of the subjects which was maintained in the present experiment by requiring continuous estimates and repeated signals of subjective events. This subjective technique serves a dual function of providing estimates of subjective events while preventing replacement of systematic nystagmus by the intrusion of autogenous wandering eye movements.

2,218

Guedry, F. E., Jr. & L. S. Lauver 1961 VESTIBULAR REACTIONS DURING PROLONGED CONSTANT ANGULAR ACCELERATION.
J. Appl. Physiol. 16(2):215-220, March 1961.

ABSTRACT: Stimuli of 2 deg/sec.^{2} for 45 seconds and 1.5 deg/sec.^{2} for 60 seconds was received by six human subjects. Eye movements were recorded by direct-coupled amplification of corneoretinal potential. Generally, near maximum velocity was attained in about 30 seconds with little subsequent gain or loss until acceleration ended. However, some subjects occasionally showed a rise and decline in the velocity of nystagmus during constant angular acceleration. As a rule, nystagmus outlasted the subjective after-reaction. Departures from previous results seem attributable to maintenance of alertness by requiring continuous estimation of subjective events. Theoretical implications of the divergence between the subjective and oculomotor aspects of the reaction are discussed.

2,219

Guedry, F. E., W. E. Collins and P. L. Sheffey 1961 PERCEPTUAL AND OCULOMOTOR REACTIONS TO INTERACTING VISUAL AND VESTIBULAR STIMULATION.
Perceptual and Motor Skills 12:307-324.
See also (Army Medical Research Lab., Ft. Knox, Ky.) Rept. 463; 15 Mar. 1961

ABSTRACT: Six men received repeated vestibular stimulation under several conditions of visual stimulation. Nystagmus, suppressed during brief room illumination, recovered almost competly in a following period of darkness; the subjective response remained suppressed. A small light (or large fixation field) inhibited nystagmus but did not suppress the subjective response. Apparently any visual still fixation field suppresses nystagmus, but the subjective response depends upon visual sensory information denying relative motion between the fixation field and the earth; intellectual information alone is ineffective. Nystagmic and subjective reactions diminish with repeated rotation. Only the subjective reaction recovered after a 9-day rest.

2,220

Guedry, F. E., Jr., W. E. Collins & P. Lynn Sheffey 1961 PERCEPTUAL AND OCULOMOTOR REACTIONS TO INTERACTING VISUAL AND VESTIBULAR STIMULATION (USA Medical Research Lab., Fort Knox, Ky.) Proj. 6X95 25 001, Task 15, Rep. 463, March 1961.

ABSTRACT: To ascertain perceptual and oculomotor effects of interacting visual and vertibular stimuli, six Ss were given a test series of ten clockwise rotations per day for five days. Odd-numbered trials were conducted in complete darkness; even-numbered trials were in darkness except for a five-sec. period of full room illumination two sec. after turntable stopped. A standard series of ten trials of both clockwise and counterclockwise rotation preceded and followed the 50 test trials. Vestibular nystagmus and signals indicating subjective velocity were recorded and analyzed in terms of changes in the stimulation. The use of nystagmus alone as an indicator of perceptual problems arising from vestibular stimulation was discussed. (Tufts)

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Guedry, F.E., & E.K. Montague 1961 QUANTITATIVE EVALUATION OF THE VESTIBULAR CORIOLIS REACTION. Aerospace Medicine 32(6): 487-500, June, 1961

ABSTRACT: The magnitude and direction of the "vestibular Coriolis reaction" nystagmic and subjective aspects, are predictable from analysis of the kinematics of the vestibular endorgan.

During frontal-plane head movements and clockwise turntable rotation, the greatest apparent velocity and discomfort results from head return to upright from right tilt; greatest apparent displacement results from head return to upright from left tilt.

The intensity of nystagmus can be approximately equal in two individuals, or in some individual in several conditions, but the apparent velocity and discomfort experienced may differ markedly. The present experiments suggest that the "Coriolis vestibular reaction" diminishes within evan a fairly short series of stimuli. Habituation, which has been demonstrated clearly during prolonged exposure to this kind of stimulation, and the pronounced individual differences noted herin and elseqhere represent two practical solutiors to problems which will be encountered when necessity demands that people shall be exposed to this kind of stimulation.

2,222

Guedry, F. E., Jr. & A Graybiel 1961 THE APPEARANCE OF COMPENSATORY NYSTAGMUS IN HUMAN SUBJECTS AS A CONDITIONED RESPONSE DURING ADAPTATION TO A CONTINUOUSLY ROTATING ENVIRONMENT.
(USN School of Aviation Medicine, Pensacola Air Station, Fla.) Proj. MR005.13 6001, Subtask 1, Rep. 61, Aug. 1961. ASTIA AD 268 793.

ABSTRACT: To determine the course of adaptation in a slowly rotating room, using vestibular nystagmus produced by controlled head and body movements as indicator of the state of adaptation:

Seven men lived in a rotating room (5.4 RPM) for sixty-four hours. Controlled tests before and during this interval demonstrated that Coriolis vestibular phenomena including Coriolis nystagmus diminished markedly. A compensatory nystagmus, induced by head or whole body movements, was recorded more than one hour after the rotation had ceased. Factors of possible significance in conditioning the compensatory nystagmus are: 1) otolith and proprioceptor sensory influx prior to and during discordant canal input; 2) consistent producing movements; 3) visual inhibition. Contributions of compensatory and arousal factors to vestibular suppression are considered in relation to practical problems of transfer of habituation from one acceleration environment to another. (Author)

2,223

Guedry, F. E., & A. Graybiel 1962 COMPENSATORY NYSTAGMUS CONDITIONED DURING ADAPTATION TO LIVING IN A ROTATING ROOM. J. Applied Physiol. 17(3):398-404, May 1962

ABSTRACT: Seven men were rotated at 5.4 r.p.m. in a room for 64 hours. Controlled tests before and during this interval demonstrated that disorientation and nystagmus attributable to Coriolis acceleration effects diminished markedly. A compensatory nystagmus, induced by head or whole-body movements, was recorded more than 1 hour after the rotation had ceased. Factors of possible significance in conditioning the compensatory nystagmus are: (1) otolith and proprioceptor sensory influx prior to and during discordant canal input; (2) a consistent sensory influx for each stimulus-producing movement; (3) intention in stimulus-producing movements; and (4) visual inhibition. Contributions of compensatory and arousal factors to vestibular suppression are considered in relation to practical problems of transfer of habituation from one acceleration environment to another. (AUTHOR)

2,224

Guedry, F.E., A. Graybiel, and W.E. Collins 1962 REDUCTION OF NYSTAGMUS AND DISORIENTATION IN HUMAN SUBJECTS (Naval School of Aviation Medicine, Pensacola, Fla.) Rept. no. 69, Proj. MR005.13-6001, 19 June 1962, ASTIA AD-282 954

ABSTRACT: The course of adjustment to a rotating environment and the transfer of habituation from one vestibular environment to another were determined. Nystagmus, disorientation, and nausea were reduced in subjects living and moving about for several days in a slowly rotating room. The reduced nystagmus was

not reinstated by assigning 'arousal-tasks' which are ordinarily effective in this respect. After rotation was stopped residual effects were noted for several hours. These included compensatory nystagmus, compensatory illusory reactions, and some motion sickness. Other subjects were exposed to similar circumstances for shorter periods wherein only restricted head movements in a particular plane were permitted. Nystagmus, illusory phenomena, and nausea were reduced by this procedure. However, the habituation did not transfer to forms of vestibular stimulation including head movements in an unpracticed quadrant' which produce reactions similar in direction and plane to those repeatedly experienced during the habituation period. Residual effects from this shorter more restricted exposure were slight. (Author)

2,225

Guedry, F. E., Jr., & A. Graybiel, & W. E. Collins 1962 NYSTAGMUS AND DISORIENTATION REDUCTION IN HUMAN SUBJECTS. (Paper, 33rd Annual Meeting of the Aerospace Medical Assoc., Chalfonte-Haddon Hall, Atlantic City, N. J., April 9-12, 1962)

ABSTRACT: Nystagmus, disorientation and nausea were reduced in most subjects living and moving about for several days in a slowly rotating room. The reduced nystagmus was not reinstated by assigning "arousal-tasks" which are ordinarily effective in this respect. After rotation was stopped, residual effects were noted for several hours. These included compensatory nystagmus, compensatory illusory reactions and some motion sickness. Other subjects were exposed to similar circumstances for shorter periods wherein only restricted head movements in a particular plane were permitted. Nystagmus, illusory phenomena and nausea were reduced by this procedure. However the habituation did not transfer to forms of vestibular stimulation including head movements in an "unpracticed quadrant" which produce reactions similar in directionand plane to those repeatedly experienced during the habituation period. Residual effects from this shorter more restricted exposure were slight.

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Guedry, F. E., A. Graybiel, & W. E. Collins 1962 REDUCTION OF NYSTAGMUS AND DISORIENTATION IN HUMAN SUBJECTS. Aerospace Medicine 33(11):1356-1360, Nov. 1962

ABSTRACT: Nystagmus, disorientation, and nausea were reduced in subjects living and moving about for several days in a slowly rotating room. The reduced nystagmus was not reinstated by assigning "arousal-tasks" which are ordinarily effective in this respect. After rotation was stopped residual effects were noted for

several hours. These included compensatory nystagmus, compensatory illusory reactions, and some motion sickness. Other subjects were exposed to similar circumstances for shorter periods wherein only restricted head movements in a particular plane were permitted. Nystagmus, illusory phenomena, and nausea were reduced by this procedure. However, the habituation did not transfer to forms of vestibular stimulation including head movements in an "unpracticed quadrant" which produce reactions similar in direction and plane to those repeatedly experienced during the habituation period. Residual effects from this shorter more restricted exposure were slight. (AUTHOR)

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Guedry, F.E. Jr., R.S. Kennedy et al 1962 HUMAN PERFORMANCE DURING TWO WEEKS IN A ROOM ROTATING AT THREE RPM. (Naval School of Aviation Medicine, Pensacola, Fla.) NSA joint rept. no. 74; Proj. MR005.13-6001 ASTIA AD-290 496

ABSTRACT: Four men were tested before, during, and after being rotated at 3 RMP for two weeks in the Pensacola Slow Rotation Room. The men also lived in the room preceding the commencement of the rotation. Tests of intellectual and physiological function were included. The principal finding was that no serious phychological or physiological deficit was detected during two weeks of rotation or during the subsequent readaptation to normal environment. The only test showing pronounced deterioration of performance at the beginning of rotation and upon returning to normal environment was the Craybiel-Fregly Posture Test. This means that any task requiring ordinarily difficult locomotion would be disturbed at these critical intervals. Ordinary walking with adequate visual reference was not so obviously affected. Results are discussed in relation to: problems of rotating space stations, the vestibular system, and experiments involving optically distorted visual information. (Author)

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Guignard, J.C. 1959 THE PHYSIOLOGY OF HIGH SPEED FLIGHT. PART I. Brit. J. Clin. Pract. 13(1):23-30. Jan. 1959.

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Guignard, J.C. 1959 THE PHYSIOLOGY OF HIGH SPEED FLIGHT. PART II. Brit. J. Clin. Pract. 13(2):116-122. Feb. 1959.

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Guignard, J. 1961 REVIEW OF BRITISH IMPACT WORK AND PLANS. (Paper, Symposium on acceleration stress, San Antonio, Texas).

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Guignard, J.C. 1962 SOME CURRENT IMPACT STUDIES IN GREAT BRITAIN
(In: Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, pp. 301-311)

ABSTRACT: This paper gives a general outline of some of the work which has been done in recent years or is currently in progress in Great Britain in the field of impact acceleration stress. Bearing in mind the sponsorship of this Symposium, it is perhaps important for me to make it clear at the outset that there is as yet no official British manned spaceflight program. There is, therefore, no work on impact or vibration being done in Government establishments which is specifically related to problems in space medicine. Acceleration research at I.A.M., for example, is directed solely to current problems in service aviation medicine.

2,232

Guilbert, E.A. 1952 BACKWARD SEATING
S.A.E. Journal 60(6): 56 June 1952

ABSTRACT: Most passenger fatalities in aircraft accidents result from impact in crash landings and not from burning, according to current medical opinion. Injuries prevent the passenger from escaping a crash fire. Also, the present safety belt is inadequate because it only restrains the lower part of the body, letting the torso act as a weighted lever driving the ten-pound human head forward and subjecting it to an impact force greater than that acting on the aircraft structure at that point. Therefore it became logical for investigators to experiment with a rear-facing seat. The general reaction to this proposal was that "people do not like to ride backwards." However, this was not borne out by investigation. The Military Air Transport Service provided for rearward facing seats in part of its Boeing C-97 fleet, using a seat designed to take a 16 g forward load based on a passenger weight of 225 pounds. With a normal passenger weight of 175 pounds, the permissible forward g load increases to approximately twenty-four. The seat can be folded against the side of the fuselage to make room for cargo. (J. of Aviation Medicine 23(5): 533. October, 1952)

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Guillemin, V., Jr. 1942 INSTRUMENTS OF THE HUMAN CENTRIFUGE AT ROYAL CANADIAN AIR FORCE NO. 1 INITIAL TRAINING CENTER, TORONTO, CANADA. (War Dept., Air Corps, Materiel Div., Wright Field, Ohio) EXP-M-49-695-16A, 15 Sept. 1942.

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Guillemin, V., Jr. 1942 MOTOR DRIVE AND CONTROL FOR THE HUMAN CENTRIFUGE. (U. S. War Dept., Air Corps, Materiel Division, Wright Field, Ohio) Rept. No. EXP-M-49-695-16; 15 Sept. 1942

ABSTRACT: An AC motor drives a DC generator which drives a DC motor. Two series fields, F1 and F1' are connected in series with each other and with armatures. The motor field F2' is fed by the electronic exciter which generates field F2' under special control from ABC. Before operation the AC motor is turned on "set" and the DC generator is brought up to full speed. The rubes in ABCD are warmed up. The current in F2 is zero and OR is open so current in F1 is zero also. The motor does not turn over although the field F2 is excited. Equipment is "ready".

To start, close OR and start current in F2. The generator produces current larger than but proportional to the current in F2. This gives a proportional torque in the DC motor and a proportional rate of speed increase in the centrifuge. The current for F2 is produced by thyratron unit B, but the output of B is controlled directly by A.
A receives two potentials, Es and Ea, from the centrifuge drive. Es comes from the tachometer generator and is directly proportional to the speed of the centrifuge. Ea is a potential drop across 2 series fields and is directly proportional to the rate of speed increase or acceleration of the centrifuge. Es' produces a counter potential to Es. When Es is equivalent to Es' the safety limit is reached and the current cut off. Ea' opposes Ea and is the safety limit for acceleration. During deceleration the motor feeds the current back to the generator. Thus the current through F1, F1' and the potential Ea are reversed. Ea' opposes this so the rate of deceleration is controlled. This device, A, is not used in an ordinary run because the maximum values are not reached. Instead the present speed control C is used.

A heavily inked graph of the run is drawn through a photoelectric scanning device. The scanner causes the potentiometer to rotate and introduces a varying potential, similar in action to Es, into A. Safety devices automatically open the relay OR and apply emergency mechanical brake if the scanner fails to operate. The scanner also automatically returns the device to "ready" position at the end of the run. The recording "g" meter is actuated by a tachometer generator and draws a record of time variation of "g" on a moving strip of paper. This record is compared with the graph introduced into C to check the performance of the entire equipment.

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Guimaraes, G. 1953 BIBLIOGRAFIA DE MIDICINA AERONAUTICA. (Bibliography of Aviation Medicine)
Revista Medica da Aeronautica (Rio de Janero) 5: 129-132, March 1953.

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Tidsskrift for den Norske Laegeforening, Oslo, 71:762-764, Dec. 1, 1951

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Gurdjian, E. S. and J. E. Webster 1943 EXPERIMENTAL HEAD INJURY WITH SPECIAL REFERENCE TO MECHANICAL FACTORS IN ACUTE TRAUMA.
J. Surg., Gyn., & Obst. 76:623-634.

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Gurdjian, E. S., & H. R. Lissner 1944 MECHANISM OF HEAD INJURY AS STUDIED BY THE CATHODE RAY OSCILLOSCOPE, PRELIMINARY REPORT.
J. of Neurosurgery 1(6):393-399, Nov. 1944

ABSTRACT: Certain aspects of head injury are well suited for study with the aid of the cathode ray oscilloscope. This instrument is particularly useful in connection with measurements of deformation of the skull and intracranial pressure changes that occur at the time of injury, since the element of inertia in the measuring and recording of the phenomena is entirely absent. A preliminary report of our investigations is given in this paper.

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Gurdjian, E. S., & H. R. Lissner 1945 DEFORMATION OF THE SKULL IN HEAD INJURY, A STUDY WITH THE "STRESSCOAT" TECHNIQUE. J. Surg., Gyn., & Obst. 81:679-687, Dec. 1945

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Gurdjian, E.S. and J.E. Webster 1945 EXPERIMENTAL AND CLINICAL STUDIES ON MECHANISM OF HEAD INJURY.
A. Research Nerv. and Ment. Dis., Proc. 24:48-97

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Gurdjian, E. S., & H. R. Lissner 1946 DEFORMATIONS OF THE SKULL IN HEAD INJURY STUDIED BY THE "STRESSCOAT" TECHNIQUE, QUANTITATIVE DETERMINATIONS.
J. Surg., Gyn., & Obst. 83:219-233, Aug. 1946

This brief summary of automobile accident statistics reveals serveral important factors. One is that the driver gains considerable protection by holding onto the steering wheel, thus preventing his head from being thrown forward into the windshield or instrument panel.

The procedure used to determine the amount of energy necessary to produce fractures of the skull in cadaver heads is presented. As a result of the stresscoat tests it was found that linear fractures are, in general, initiated on the external surface of the skull due to outbending at a considerable distance from the point of impact. The fracture line generally reaches the point of impact since after its initial inbending this area rebounds and becomes a region of maximum tensile stress on the external surface as seen from strain gauge studies.

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Gurdjian, E. S., H. R. Lissner, & J. E. Webster 1950 THE MECHANISM OF SKULL FRACTURE. Radiology 54:313-339

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Gurdjian, E. S., J. E. Webster, & H. R. Lissner 1953 OBSERVATIONS ON PREDICTION OF FRACTURE SITE IN HEAD INJURY. Radiology 60(2): 226-235

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Gurdjian, E. S., H. R. Lissner, F. R. Latimer, B. F. Haddad and J. E. Webster 1953 QUANTITATIVE DETERMINATION OF ACCELERATION AND INTRACRANIAL PRESSURE IN EXPERIMENTAL HEAD INJURY - PRELIMINARY REPORT. Neurology, 3 (6): 417-423, June 1953

ABSTRACT: In most previous studies in experimental head injury where records of acceleration have been obtained, measurements have been made on the object striking the flow. Due to the error introduced resulting from deformation of the scalp, muscles, skull and striker itself, it appeared more accurate to measure the acceleration of the skull, and this procedure was followed simultaneously with the measurement of the accelerations.
Concussive effects were produced by blows resulting in accelerations of 250 g to over 500 g. The intracranial pressure rise measured at the same time ranged from 25 to 95 p.s.i. Concussions of minimal, moderate and severe degree were obtained. The time duration of the pressure and the acceleration appeared to be the significant single factor which explained the clinical effects following impact. It was noted that at the lower values of pressure and acceleration a concussion was produced only if the duration of the acceleration and pressure was of an appreciable length.

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Gurdjian, E. F., H. R. Lissner and J. E. Webster 1947 THE MECHANISM OF PRODUCTION OF LINEAR SKULL FRACTURE. Surg. Gyn., & Obstet. 85:195-210.

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Gurdjian, E. S., & H. R. Lissner 1947 DEFORMATIONS OF THE SKULL IN HEAD INJURY AS STUDIED BY THE "STRESSCOAT" TECHNIC. Amer. J. of Surgery 73:269-281, Feb. 1947.

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Gurdjian, E. S., & H. R. Lissner 1947 A STUDY OF THE MECHANICAL BEHAVIOR OF THE SKULL AND ITS CONTENTS WHEN SUBJECTED TO INJURING BLOWS. (Wayne Univ. & Grace Hosp., Detroit, Michigan)

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Gurdjian, E. S., et al. 1947 THE MECHANISM AND MANAGEMENT OF INJURIES OF THE HEAD. J. American Medical Association 134:1072-1076

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Gurdjian, E. S., H. R. Lissner, & J. E. Webster 1948 MECHANICS OF SKULL FRACTURE. (Wayne Univ. & Grace Hosp., Detroit, Michigan)

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Gurdjian, E. S., & J. E. Webster 1948 EXPERIMENTAL AND CLINICAL STUDIES ON THE MECHANISM OF HEAD INJURY. (Dept. of Surgery, Wayne Univ., College of Medicine, The Dept. of Neuro., Grace Hospital, Detroit, Michigan)

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Gurdjian, E. S., J. E. Webster & H. R. Lissner 1949 STUDIES ON SKULL FRACTURE WITH PARTICULAR REFERENCE TO ENGINEERING FACTORS. Am. J. of Surgery 78(5):736-742, Nov. 1949.

ABSTRACT: It is a well known fact that head injury is a frequent cause of death. Head injuries also figure prominently in automobile accidents.

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Gurdjian, E. S. & J. E. Webster 1953 RECENT ADVANCES IN THE KNOWLEDGE OF THE MECHANISM, DIAGNOSIS AND TREATMENT OF HEAD INJURY. American Journal of the Medical Sciences 226:214-220, August 1953.

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Gurdjian, E.S., H.R. Lissner, J.E. Webster, F.R. Latimer and B.F. Haddad 1954 STUDIES ON EXPERIMENTAL CONCUSSION--RELATION OF PHYSIOLOGIC EFFECT TO TIME DURATION OF INTRACRANIAL PRESSURE INCREASE AT IMPACT. Neurology, 4(9) :674-681, Sept. 1954

ABSTRACT: The experiments show that the shorter the time duration the higher the pressure necessary to result in a concussive effect. The longer the time duration the lower can the pressure be in order to effect a concussion. Concussion resulting from acceleration, deceleration, or compression is caused by an increase in intracranial pressure at the time of impact.

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Gurdjian, E. S., & J. E. Webster 1955 MECHANISM OF SCALP AND SKULL INJURIES, CONCUSSION, CONTUSION, AND LACERATION. Proceedings, 2nd International Congress of Neuropathology, London, 1955.

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Gurdjian, E. S., J. E. Webster & H. R. Lissner 1955 OBSERVATIONS ON THE MECHANISM OF BRAIN CONCUSSION, CONTUSION, AND LACERATION. Surg. Gyn., & Obst. 101:680-690

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Gurdjian, E. S., J. E. Webster & H. R. Lissner 1956 MECHANISM OF HEAD INJURY. (Paper, Wayne State University)

Typed paper with charts and pnotographs.

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Gurdjian, E. S. and J. E. Webster 1958 HEAD INJURIES--MECHANISMS, DIAGNOSIS AND MANAGEMENT. (Boston: Little, Brown and Co, 1958)

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Gurdjian, E. S., Webster, J. E. & H. R. Lissner 1958 MECHANISM OF SCALP AND SKULL INJURIES, CONCUSSION, CONTUSION, AND LACERATION. Symposium on Head Injuries. J. Neurosurg. 15:125-128.

ABSTRACT: (1) Since the effects of mechanical alterations at the moment of impact in head injury must ultimately be reflected by alterations of the properties of neuronal membranes, this has been studied by recording the electrical activity at various levels of the nervous system. (2) Whereas there may be surprisingly little change in the spontaneous electrical activity of the cerebral cortex and many subcortical structures, there is consistent reduction of activity in the reticular formation of the midbrain following a concussive blow. (3) Whereas there is no alteration of conduction of sensory impulses over the classical sensory pathways to thalamus and cortex evoked sensory responses in the reticular formation are blocked or markedly attenuated by concussion. (4) Since it is known that such sensory driving of the reticular activating system is necessary to maintain consciousness, the genesis of coma following head injury would seem to be on this basis. (5) These alterations of properties of neuronal membranes following concussion may be related to biochemical alterations, including the metabolism of acetylchloine, which are known to follow concussion.

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Gurdjian, E. S. and H. R. Lissner 1961 PHOTOELASTIC CONFIRMATION OF THE PRESENCE OF SHEAR STRAINS AT THE CRANIOSPINAL JUNCTION IN CLOSED HEAD INJURY. J. Neurosurg 18:58-60.

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Gurdjian, E. S., H. R. Lissner, F. G. Evans, L. M. Patrick and W. G. Hardy 1961 INTRACRANIAL PRESSURE AND ACCELERATION ACCOMPANYING HEAD IMPACTS IN HUMAN CADAVERS
(Paper Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Material Center, Philadelphia, Pa., June 14-15, 1961)

ABSTRACT: Heads of human cadavers were permitted to strike glass panels at impact velocities of from 2.5 to 34.8 mph. Average accelerations as high as 125g and 90g measured at the occiput occurred for forehead mid-line blows to tempered and laminated glass. The time duration varied from about 6 to 12 milliseconds. Average temporal pressures reached a maximum of 20.9 psi. with the glass remaining intact and the pressures lasting from about 6 to 12 milliseconds. When the glass broke, the pressures and their time durations remained very low. Parietal pressures were always less than temporal pressures.

Study of the cinephotographs showed that the head oscillated three or four times following impact to the glass panel. The oscillations also occurred when the glass fractured, but were reduced in number to an average of about 2 1/2. Under the conditions of these experiments no fractures of the skull or cervical spine or dislocations of the vertebra were noted when the thinner glass panels were used.

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Gurdjian, E. S. H. R. Lissner F. G. Evans, L. M. Patrick and W. G. Hardy 1961 INTRACRANIAL PRESSURE AND ACCELERATION ACCOMPANYING HEAD IMPACTS IN HUMAN CADAVERS Surg., Gyn. & Obst. 113:185-190. Aug. 1961.

ABSTRACT: Heads of human cadavers were permitted to strike glass penels at impact velocities of from 2.5 to 34.8 mph. Average accelerations as high as 125g and 90g measured at the occiput occurred for forehead midline blows to tempered and laminated glass. The time duration varied from about 6 to 12 milliseconds. Average temporal pressures reached a maximum of 20.9 psi. with the glass remaining intact and the pressures lasting from about 6 to 12 milliseconds. When the glass broke, the pressures and their time durations remained very low. Parietal pressures were always less than temporal pressures.

Study of the cinephotographs showed that the head oscillated three or four times following impact to the glass panel. The oscillations also occurred when the glass fractured, but were reduced in number to an average of about 2 1/2. Under the conditions of these experiments no fractures of the skull or cervical spine or dislocations of the vertebra were noted when the thinner glass panels were used.

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Gurdjian, E.S. 1961 DAMAGE OF THE SKELETON
(Paper, Symposium On Impact Acceleration Stress, Brooks Air Force Base, San Antonio, Texas, November 27-29, 1961)

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Gurdjian, E. S. 1962 EXPERIENCES IN HEAD INJURY AND SKELETAL RESEARCH Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, pp. 145-158.

ABSTRACT: The mechanism of skull fracture and concussion has been outlined. Strength characteristics of various bones in the body have been studied. Effects of embalming on the strength characteristics of bone have been evaluated. Impact tests upon the femur, pelvis and spine have been conducted, and the results summarized. Recent studies on cadaver head impacts into safety glass are briefly analyzed. Proposals for future studies include the careful study of the problem of shiplash injury, clinical studies of minimally, moderately and severely injured humans by electroencephalography, study of chamical and metabolic changes following head injury in the human and analysis of primary shock following human impacts.

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Gurdjian, E. S. 1962 MECHANISM OF BRAIN CONCUSSION, CONTUSION AND LACERATION. In M. K. Cragun, ed., The Fifth Stapp Automotive Crash and Field Demonstration Conference, Sept. 14-16, 1961. Pp. 133-142.

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Gurdjian, E. S., H. R. Lissner, & L. M. Patrick 1962 PROTECTION OF THE HEAD AND NECK IN SPORTS. J. American Medical Association 182:509-512, Nov.3, 1962

ABSTRACT: Existing data on factors at work in athletic injuries to the head and neck are reviewed. Measurements have been made of the energies, accelerations, and changes of intracranial pressure involved in cases of concussion and skull fracture. In the cadaver, linear skull fractures can be produced by energies of 4.6 to 6.9 kg.m. These impart an average acceleration of 112 g and increase the intracranial pressure by about 1,450 mm. Hg. Such figures afford a basis for the construction of protective helmets. The thickness of padding required can be computed from the weight and velocity of the injuring object. If the velocity is doubled, the padding has to be 4 times thicker. (AUTHOR)

SECOND ABSTRACT: Helmets for use in one sport might not be satisfactory for another. Individual design of the helmet for each sport is mandatory if maximum protection is to be obtained. Protection of one part of the body at the expense of another must be avoided. Protection of the face, for example, in some instances has lead to injury in the neck region. Basically, the protection afforded by a helmet is a function of the thickness of the padding and shell construction. For maximum protection, a given thickness and padding characteristics must be chosen to obtain the optimum deceleration. Human cadaver experimental studies indicate that the skull fractures with an expenditure of 400 to 600 in.-lb. of energy. At this level of injury, records of acceleration average 112 g with peaks of 200 g. Studies of intracranial pressure at the time of impact reach the neighborhood of 28 psi. Although in the living these figures may be different for moderate concussion, they represent approximations which may be useful in calculation for human protective devices.

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Biul. Eksperimental Noi Biologii I Med. (Moscow), 48(11):12-18, Nov. 1959.

ABSTRACT: The effect of rapidly alternating phases of increased and decreased gravitational force on motor coordination and posture was studied in seven human subjects. Experiments were conducted in the elevator of Moscow University, which permits changes in gravity ranging from 2 G to 0.3 G within two to three seconds. Positional changes of body and extremities and motor coordination were recorded graphically. Under the experimental conditions no significant disturbances were registered either in coordination of positioning of the body and limbs or in the adequacy of motor performance. The role of the visual analysor in maintaining equilibrium does not increase significantly under conditions of subgravity, as shown by analysis of equilibrium reactions of subjects with their eyes closed or open. It is concluded that a 50 per cent increase or decrease in gravity does not materially affect the system which regulates posture and movement on the basis of proprioceptive afferentation. (Authors)

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Gurnee, H. 1931 THE EFFECT OF A VISUAL STIMULUS UPON THE PERCEPTION OF BODILY MOTION. Amer. J. Psychol. 43:26-48

ABSTRACT: Using sine-wave rotary oscillation of the body and sine-wave oscillation of a simple visual object (hexagonal figure, 2½ cm diameter, made by punching holes of 1mm. diameter through a piece of black cardboard at the corners and center of the hexagonal) as stimuli, an attempt was made to obtain quantitative and qualitative data on the effect of a visual situation upon the perception of the movement of the body. The movements of the body and of the visual stimulus, together with a time-line and operator's reports were recorded on a kymograph. Three trained operators were used. Reactions to the independent bodily and visual movement were first taken for comparison purposes, then the bodily and visual movements were observed together. The results show that in rotary oscillation of the body at 2° amplitude, the percentages of correct responses varied directly, and the percentages of negative responses tended to vary inversely, with the average velocity. A higher percentage of correct responses tended to vary inversely, with the average velocity. A higher percentage of correct responses occurred for all operators in the decelerating phase of bodily oscillation than in the accelerating phase.

2,270

Gurovskii, N. N. and M. A. Gerd 1961 IN THE SPACEFLIGHT LABORATORY
Trans. of Nauka i Zhizn' (USSR) 28(10):21-28, 1961.
(Office of Technical Services, Washington, D.C.)
June 8, 1962 62-32301

2,271

Gurovskiy, N.N., & M.A. Gerd 1962 IN THE SPACEFLIGHT LABORATORY.
Nauka i Zhizn'(10):21-28. (Translation Services Branch, Foreign Technology Division, Wright-Patterson AFB, Ohio)
Trans. No. FTD-TT-62-652-1+2+4, 8 June 1962. ASTIA AD 286 201.

2,272

Guttwein, G.K. & A.I. Dranetz 1951 SELF-GENERATING ACCELEROMETERS
Electronics, v. 24, pp. 120-123

ABSTRACT: Compression type and bending type accelerometers are described. One of the compression type has a sensitivity of 45 m.v. per g and a natural frequency greater than 6000 c/s. Acceleration ranges of 0.022 g to 600 g can be obtained on a single instrument. Since the accelerometers are self generating, their output does not depend on supply voltages.

2,273

Gwilt, S. R. 1961 TRAJECTORY ANALYSIS IN AIRCRAFT ACCIDENT INVESTIGATION.
(National Research Council of Canada, National Aeronautical Establishment) Aeronautical Report LR-310: Oct. 1961 ASTIA AD-269 592.

SUMMARY: With the publication of trajectory tables compiled by personnel of the Aerodynamics Section, National Aeronautical Establishment, it has been possible to outline some methods of their application in analyses following aircraft disintegration. Examples are given for the determination of throw-distances and times analysis may be used to determine a region of primary failure and so may form a basis for a more detailed structural analysis.

In addition to the calculation of trajectories, methods are also outlined for the determination of wind vectors, heights and positions of item separation, and also for estimates of drag coefficients and terminal velocities for falling items.
(AUTHOR)

ACCELERATION

H

2,274

Haas, E. & J. Matzker 1958 ÜBER DEN EINFLUSS DER LINEARBESCHLEUNIGUNG AUF DIE ENTSTEHUNG VON VESTIBULARISSCHWINDEL (Effect of Linear Acceleration Etiology of Vestibular Vertigo)
Z. Laryng. Rhinol. (Stuttgart) 37(1):17-21.

2,275

Hass, G. M. 1944 TYPES OF INTERNAL INJURIES OF PERSONNEL INVOLVED IN AIRCRAFT ACCIDENTS.
J. Aviation Med. 15:77-84.

ABSTRACT: The author comments on internal injuries which offer new problems in pathognesis, diagnosis and treatment. In the general case, the occupant of a rapidly decelerated aircraft is held securely in his seat by the safety belt and is momentarily subjected to the action of very large forces. The forces may be resolved along the three principal axes. At times, the vertical seat to head forces are very large. At other times, the anteroposterior forces are large. In still other instances, lateral forces directed in the long axis of the wings are large. Whenever one part of the body is decelerated at a rate which is different from that of another part of the body, the connections between the two parts are placed under stress which is proportional to the differences in the rates of deceleration. That difference in rate of deceleration causes injury.

2,276

Haber, H. 1951 ASTRONOMY AND SPACE MEDICINE
In Marbarger, J. P., ed., Space Medicine; the Human Factor in Flights Beyond the Earth (Urbana, Ill.: University of Illinois Press, 1951) pp. 49-61

2,277

Haber, H. 1951 THE HUMAN BODY IN SPACE
In (School of Aviation Medicine, Randolph AFB, Texas) Epitome of Space Medicine, Item #12
See also Scientific American 184:16-19, Jan. 1951

ABSTRACT: This article discusses the measures which must be taken to enable men to survive in the alien environment of the void beyond our atmosphere. The

first problem to be dealt with is acceleration. Another problem is weightlessness. Control of cabin temperature and oxygen supply is another consideration. Meteors are a field of real danger for astronauts. The author discusses each of the preceding problems. (CARI)

2,278

Haber, H. 1952 CAN WE SURVIVE IN SPACE?
In Ryan, C., ed., Across the Space Frontier
(New York: Viking, 1952) Pp. 71-97

ABSTRACT: A popular presentation of physiological and psychological problems arising in space travel from high acceleration, lack of atmosphere, from cosmic and solar radiations, lack of gravitational forces, and from hazards like meteorites and inadequate temperature regulation.

2,279

Haber, H. 1952 THE CONCEPT OF WEIGHT IN AVIATION
J. Aviation Med. 23(6):594-596, 1952.

ABSTRACT: For purposes of aviation engineering and medicine, the concept of weight is redefined. The principle of d'Alembert states that the sum of the force of gravity, the force of inertia, and the external forces acting upon a body is zero. The weight of the body is then the resultant external force exerted upon the body by a restraining agent in response to forces of gravity and inertia. Six dynamic situations are illustrated, in which the three forces are represented as vectors.

2,280

Haber, H. 1952 FLIGHT AT THE BORDERS OF SPACE.
In (School of Aviation Medicine, Randolph AFB, Texas) Epitome of Space Medicine, Item #16.
See also Scientific American 185:20-23, Feb. 1952.

ABSTRACT: Man's conquest of space will not be a single event. Before that time, there will be many other firsts. At the present time, an unmanned two-stage rocket has climbed to 250 miles above the Earth's surface. Naturally most of the data on the performance of the newest rocket craft and planes must remain secret for reasons of national security. Therefore the author discusses the problems of high-altitude and oxygen deficiency, dangerous radiation and meteorites, weightlessness, and acceleration during space flight. (CARI)

2,281

Haber, H. 1952 GRAVITY, INERTIA, AND WEIGHT
In White, C.S. & O.O. Benson, Jr., eds., Physics and Medicine of the Upper Atmosphere (Albuquerque, N. Mex.: University of New Mexico Press, 1952) Pp. 123-136

ABSTRACT: To evaluate properly the physiological processes in flight, a new formulation of the concept of weight is required. In reversing and implementing the classical definition of weight (or the force of attraction which the earth exerts on a body, with its direction toward the center of the earth) the following definition is proposed: weight is the resultant external force exerted upon a body by a restraining agent in response to forces of gravitation and inertia. This definition makes it evident that weight of a body is not a constant nor a property of the body but depends upon the dynamic conditions to which the body is subjected (e.g. inertia, drag, or propulsion in an aircraft). On the basis of this definition a formula is developed to determine the weight of a pilot under all conditions of propelled and unpropelled flight. The possibility of prolonged weightlessness is a factor to be counted on in future flights and is going to become an outstanding aviation medical problem. While no major disturbances in the normal physiological functions (such as digestion, breathing, etc.) are foreseen, normal orientation might be impaired.

2,282

Haber, H. 1952 MEDICAL RESEARCH IN DEVELOPMENT OF MANNED ROCKET FLIGHT
Contact, April 1952, pp.30-32

ABSTRACT: A discussion of the medical problems associated with manned rocket flight by a member of the Department of Space Medicine of the School of Aviation Medicine.

2,283

Haber, H. 1952 MEDICAL RESEARCH IN THE DEVELOPMENT OF MANNED ROCKET FLIGHT.
Technical Data Digest 17(2):12-13

ABSTRACT: A tentative schedule of present and future aviation- and space medical research tasks is presented. The establishment of an artificial satellite would be the next step in line, with animal experiments preceding the employment of humans. Future studies will have to concentrate particularly on problems resulting from conditions in an environment without gravity and atmosphere (supply of climate and breathing air, filtering of radiation, and supply of mechanical support).

2,284

Haber, H. 1952 ON SPACE MEDICINE PROBLEMS
(Hayden Planetarium Symposium on Space Travel, Oct. 12, 1951)
J. Brit. Interpl. Soc. 11:3-9

2,285

Haber, H. 1952 PROBLEMS OF SPACE TRAVEL
Science News Letter 62(12):180

ABSTRACT: An analysis of psychological, physiological, and physical problems of space travel, presented by the author in an address before the American Society of Mechanical Engineers, is summarized. Meteors constitute a danger above 90 miles; cosmic rays are a health hazard between 13 and 23 miles; and ozone and ultraviolet light require protective measures. Frictional heat and extreme temperature differentials between lighted and shaded parts of the rocket present an additional problem. Weightlessness in free space merely creates slight physiological disturbances; little is known, however, about the psychological consequences of subgravitational flight. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space Medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903, ASTIA AD 227 817, Feb. 1959)

2,286

Haber, F. 1953 HUMAN FLIGHT AT THE LIMITS OF THE ATMOSPHERE: G-FORCES AND WEIGHT IN SPACE TRAVEL. J. Brit. Interplanetary Soc. 12:32-34
See also Sky and Telescope 12(4):97-98, 114, Feb. 1953
NOTE: Reel 7, Flash 7, Item 2
ABSTRACT: This is a general discussion of the problem of body weight with respect to human subjects traveling in rockets to the upper limits of the atmosphere and beyond. In a rocket take-off, the acceleration (and weight) will increase toward the end of the propulsion period. The human body can for a maximum of 3 minutes, tolerate 11 g in the prone position and 14 g in the supine position. These tolerances will effectively limit the acceleration of a rocket with human cargo. Assuming that the initial stage of rocket flight is achieved with the passengers still in good condition, the problem of weightlessness must next be overcome. It is expected, on the basis of animal experimentation, that no major circulatory disturbances will develop; but there might be some difficulty in orientation and muscular coordination. The effects of prolonged weightlessness, are however, unknown---either with regard to animals or humans.

2,287

Haber, H. 1953 MAN IN SPACE
(New York: Bobbs-Merrill, 1953)

ABSTRACT: This book is primarily concerned with the human problems involved in artificial satellites and space stations.

2,288

Haber, H. 1953 THE MECHANICAL ENVIRONMENT IN THE FUTURE AIRCRAFT. In Haber, H., ed., Frontiers of Man-Controlled Flight.

2,289

Haber, H., ed 1953 PROCEEDINGS OF A SYMPOSIUM ON FRONTIERS OF MAN-CONTROLLED FLIGHT, INSTITUTE OF TRANSPORTATION AND TRAFFIC ENGINEERING, UNIVERSITY OF CALIFORNIA, LOS ANGELES, 3 APRIL 1953

ABSTRACT: Contents include:
Lippert, S., "Limitations to Noise and Vibration Control"
Haber, H., "The Mechanical Environment in the Future Aircraft"
Roth, H.P., "Impact and Dynamic Response of the Body"
Blockley, W.V., "Combined Physiological Stresses"
All Speakers, Panel Discussion on Frontiers of Man-Controlled Flight.

2,290

Haber, H. 1954 MAN AND MACHINE BETWEEN ATMOSPHERE AND SPACE Aeronautical Engineering Review 13(11):56-62, Nov. 1954.

ABSTRACT: Problems to be solved before man can survive flight into space. Extensive bibliography.

2,291

Haber, H. 1954 FROM HIGH-ALTITUDE FLIGHT TO SPACE FLIGHT. In Kendricks, E.J., et al., "Medical Problems of Space Flight" Reprint Instructors' Journal, Winter, 1954.

ABSTRACT: High-altitude flight will eventually become space flight as a natural result of our continual efforts to extend our vertical freedom of movement. During flight, high-altitude and high-speed go together. Several ways of avoiding the dangers of overheating are as follows: better structural materials which are more heat resistant than present ones; and, of course, flying at greater altitudes where the air is thinner. As high-altitude flight will eventually blend with actual space flight, the man in the rocket must be protected against the various hazards of space. The crew must sit in a pressurized cabin and wear a pressure suit. The crew will experience up to six minutes of weightlessness. It is the task of space medicine to help pilots avoid the disturbing effects of weightlessness. (CARI)

2,292

Haber, H. 1955 FROM HIGH-ALTITUDE FLIGHT TO SPACE FLIGHT.
In USAF School of Aviation Medicine, Randolph AFB, Texas, Epitome of Space Medicine, Pp. 13-16. ASTIA AD-144 581.

ABSTRACT: High-altitude flight will eventually become space flight as a natural result of our continual efforts to extend our vertical freedom of movement. During flight, high-altitude and high-speed go together. Several ways of avoiding the dangers of overheating are as follows: better structural materials which are more heat resistant than present ones; and, of course, flying at greater altitudes where the air is thinner. As high-altitude flight will eventually blend with actual space flight, the man in the rocket must be protected against the various hazards of space. The crew must sit in a pressurized cabin and wear a pressure suit. The crew will experience up to six minutes of weightlessness. It is the task of space medicine to help pilots avoid the disturbing effects of weightlessness. (CARI)

2,293

Haber, H. 1955 CAN MAN SURVIVE IN SPACE?
Flying Review 10:15-16

ABSTRACT: Phenomena man will experience in space flight and his physiological reactions to them; hazards to space flight; use of space suits. Article is condensed from the author's Man in Space (New York: Bobbs-Merrill, 1953).

2,294

Haber, H. 1957 THE ASTROPHYSICIST'S VIEWS
In Campbell, P. A., K. Dannenberg, W. O. Roberts, H. Haber, A. S. Crossfield, G. W. Hoover, A. M. Mayo, J. P. Hagen, & H. Strughold, SPACE TRAVEL: A SYMPOSIUM J. Avia. Med. 28:487-492

2,295

Haber, H. 1959 THE PHYSICAL FACTORS IN THE SPACE ENVIRONMENT
In: Seifert, H.S., ed. Space Technology (New York: T. Wiley and Sons, 1959) Chapter 27

2,296

Hack, W. F. 1962 HYGE SHOCK TEST FACILITY AT 6571ST AEROMEDICAL RESEARCH LABORATORY. (6571 Aeromedical Research Laboratory, Holloman AFB, N. Mex.) ARL-TDR-62-22; ASTIA AD-286 168

ABSTRACT: The HYGE Shock Tester is a unit produced by the Consolidated Electro-Dynamics Corporation as a test device to generate high acceleration (g) forces

for short duration time periods. The HYGE Shock Tester will also accurately reproduce these shock pulses.
A total of 90 preliminary runs was accomplished on the unit installed at the 6571st Aeromedical Research Laboratory during which time a detailed review of system operational characteristics and vibrations throughout the system was studied. On 22 December 1961 the first living subjects were tested. (AUTHOR)

2,297

Hackler, C. T. 1956 EQUATIONS OF MOTION AND COMPUTER SET-UP FOR IM-HEP HUMAN ENGINEERING FLIGHT SIMULATOR. (Bell Helicopter Co., Ft. Worth, Texas) TR 299-099-043, July 1956

2,298

Haddad, B. F., H. R. Lissner, J. E. Webster & E. S. Gurdjian 1955 EXPERIMENTAL CONCUSSION - RELATION OF ACCELERATION TO PHYSIOLOGIC EFFECT. Neurology 5(11):798-800, November 1955.

ABSTRACT: In a previous report on measurements of acceleration in experimental head injury, it was found that the values of acceleration varied greatly and the concussive effect was not predictable. Further studies utilizing similar techniques were carried out to gain additional information concerning the relationship between acceleration and concussive effect.

2,299

Haddad, B.F., J.L. Chason, H.R. Lissner, J.E. Webster, & E.L Gurdjian 1956 ALTERATIONS IN CELL STRUCTURE FOLLOWING SUDDEN INCREASE IN INTRACRANIAL PRESSURE. Surgical Forum: Clinical Congress of the American College of Surgeons (Philadelphia) 6:496-498

2,300

Haddon, W. A., Jr. and R. A. McFarland 1957 A SURVEY OF PRESENT KNOWLEDGE OF THE PHYSICAL THRESHOLDS OF HUMAN HEAD INJURY FROM AN ENGINEERING STANDPOINT. (Commission on Accidental Trauma, Armed Forces Epidemiological Board, Dept. of Defense, Wash., D. C.).

2,301

Hadfield, G. and R. V. Christie 1941 CASE OF PULMONARY CONCUSSION (BLAST) DUE TO HIGH EXPLOSIVES
British Medical Journal 1:77-78

2,302

Hagen, J. P. 1957 THE VANGUARD PROJECT
In Campbell, P. A., K. Dannenberg, W. O. Roberts, H. Haber, A. S. Crossfield, G. W. Hoover, A. M. Mayo, J. P. Hagen, & H. Strughold, SPACE TRAVEL: A SYMPOSIUM. J. Avia. Med. 28:503-507

2,303

Hahn, R. 1956 RICERCHE SULLE MODIFICAZIONI DELLA SOGLIA UDITIVA DOVUTE AL FENOMENO DI PURKINJE. (RESEARCH ON MODIFICATIONS OF AUDITORY THRESHOLD CAUSED BY THE PURKINJE PHENOMENON). Rivista di medicina aeronautica (Roma) 19(3):466-475. July-Sept. 1956

ABSTRACT: Four subjects with normal hearing were subjected to vestibular stimulation by rotation. Immediately after cessation of the rotation (in the so-called first post-rotatory phase) the subject's head was flexed abruptly. Audiograms taken after the experiment showed an increase of the auditory thresholds for 500-, 1000-, and 2000-c.p.s. tones amounting to 5-20 decibels. This increase was greatest for the 500-cycle frequency. The threshold value did not return rapidly to the values observed before the experiment, but showed a phasic course with a 15-20 decible variation between two successive determinations and returned to normal values only 30 minutes after rotation. These threshold variations were not dependent upon the audiometrically studied ear or upon the sense of rotation, but upon central phenomena. The importance of auditory failure in relation to conditions of the pilot in flight is discussed.

2,304

Hale, H. B., J. P. Ellis, Jr., & C. H. Kratochvil 1959 CHANGES IN PLASMA CORTICOSTEROIDS AND BICARBONATE AS A RESULT OF PILOTING SUPERSONIC AIRCRAFT. (School of Avia. Med., USAF Aerospace Medical Center, (ATC) Brooks AFB Texas) Research Rept. No. 59-61, April 1959.

2,305

Hale, H.B., R.B. Mefferd, Jr., G. Vawter, G.E. Foerster, & D. Criscuolo 1959 INFLUENCE OF LONG-TERM EXPOSURE TO ADVERSE ENVIRONMENTS ON ORGAN WEIGHTS AND HISTOLOGY. (School of Aviation Med., USAF Aerospace Medical Center, (ATC) Brooks AFB, Texas) Research Rept. No. 59-13, Jan. 1959.

2,306

MOTION PICTURE

Hall, F. G., G. L. Maison, G. A. Hallenbeck & C. A. Maaske 1945 THE HUMAN CENTRIFUGE - DEMONSTRATION (A MOTION PICTURE)

ABSTRACT: A motion picture with sound track illustrating the construction and use of the AAF Air Technical Service Command Centrifuge. (Fed. Proc. 4(1):29, March 1945)

2,307

Hall, F. G. & J. Salzano 1959 EFFECT OF BODY POSTURE ON MAXIMAL INSPIRATORY AND EXPIRATORY STROKE VOLUME.
(USAF Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TR 59-128; March 1959. ASTIA AD 212 319.

2,308

Hall, G. E. 1942 THE EFFECT OF POSITION ON INCIDENCE OF SWING SICKNESS. (National Research Council of Canada, Toronto) Report No. C-2878, 22 Aug. 1942.

2,309

Hall, G. E. 1943 MEMORANDUM ON AIRCRAFT CRASHES
(National Research Council of Canada, Toronto) C-2347, January 1943.

ABSTRACT: Reference is made to research work in the United States of aircraft accidents and prevention. Three projects are described: (1) survey of type and location of injury, fractures resulting from aircraft accidents, (2) study of the forces on the body in simulated crashes and development of protective features to be incorporated in safety harness and seat control units, (3) investigation into the use of controlled powder charges, ignited by electric current, for the release of various devices for the protection of aircraft occupants.

2,310

Hall, I. A. M. 1961 HUMAN PILOT TRACKING DYNAMICS AS AFFECTED BY CONTROLLED ELEMENT CHARACTERISTICS. (Paper, Panel on Acceleration Stress of the Armed Forces-NRC Committee on Bio-Astronautics, 6-11 March 1961, NASA Ames Research Ctr., Moffett Field, Calif.)

2,311

Hallenbeck, G.A., C.A. Maaske & E.E. Martin 1943 EVALUATION OF ANTI-G SUITS (Wright-Patterson AFB, Ohio) Rept. No. 2; Eng-49-696-51B; 12 Dec. 1943
See also: National Research Council, Com. on Aviat. Med. Rept. No. 254

ABSTRACT: Centrifuge tests on 32 subjects at Wright Field and the Mayo Clinic show that the Berger Bros. GPS raises the "g" threshold between 1 and 2 "g". To simulate the condition found at high altitudes where the output of the vacuum pump is limited, maximum suit pressures were kept to 4 to 4.5 psi. Protection offered by the suit remained good. Protection offered by the suit summates with that afforded by muscle straining maneuvers. Individuals wearing the suit have a very high threshold for unconsciousness, a valuable feature. Graphs of the performance of the Berger valve when supplied by the B-12 pump are included.

2,312

Hallenbeck, G. A. 1944 THE EFFECT OF REPEATED SHORT EXPOSURES AND PROLONGED EXPOSURES TO INCREASED "G" ON HUMAN SUBJECTS.
(AAF, Aero Medical Lab., Wright Field, Ohio)
Memo Rept. No. ENG.49-696-56, 5 Feb. 1944. ASTIA ATI 13212

ABSTRACT: (a) During 60 second exposures to positive "g", 6 subjects who suffered either PLL or blackout during first 10 to 15 seconds of the run showed varying degrees of improvement thereafter.
(b) When 6 subjects were given 6 rapidly repeated 10 second exposures to 4.2 "g", vision improved during second and following trials. Improvement was consistent when interval between exposures was 10 seconds or less, and was less marked when interval was 15 to 30 seconds.
(c) Thus repeated exposures to "g" are probably not responsible for unfavorable symptoms reported by pilots during rat race maneuvers.
(d) Vision improves even though pulse rate drops on repeated exposure to "g".

2,313

Hallenbeck, G. A. 1944 THE LINDQUIST-RYAN TENSIOMETER.
(National Research Council, Committee on Aviation Medicine, Washington, D.C.)
CAM No. 310; 8 April 1944.

ABSTRACT: Description of an apparatus for recording "g" produced in opening shock of parachute jumps by stylus writing on moving clear film.

2,314

Hallenbeck, G.A. 1944 THE MAGNITUDE AND DURATION OF PARACHUTE OPENING SHOCKS AT VARIOUS ALTITUDES AND AIR SPEEDS (Aerospace Medical Div., Wright-Patterson AFB,Ohio) Memo rept. no. ENG-49-696-66, 8 July 1944, ASTIA AD-289 146

ABSTRACT: This publication presents the results of studies of the forces developed during parachute openings at altitudes up to 40,000 feet. Descent time data for 200 pound dummies with 24 foot nylon canopies fitted a calculated rate of descent curve based on a velocity of 25 feet per second at sea level. These data do not provide information regarding actual landing velocity. The total duration of parachute opening shocks was unaffected by altitude up to 40000 feet and true air speeds up to 232 m.p.h., and was in the range of one to two seconds. As the magnitude of force increased, the time from the beginning of impact to the final peak decreased. The magnitude of the parachute opening shock was greater at higher altitudes than at lower altitudes: (a) When the horizontal launching speed was constant at all altitudes. (b) When the horizontal launching speed varied and was the calculated terminal velocity of a falling man at each altitude. When the horizontal launching speed of the dummies was increased at a given density altitude, the magnitude of the force at opening was increased. The increase in force per m.p.h. increase in launching speed was greater at 26000 feet than at 7000 or 15000 feet. Data collected with these hard rubber dummies can be transferred to the living body with reasonable validity.

2,315

Hallenbeck, G. A. 1944 MEETING OF NATIONAL RESEARCH COUNCIL SUBCOMMITTEE ON ACCELERATION, WASHINGTON, D. C., 7 JUNE 1944 (Wright Field) Memo Rept. Eng.-49-696-51E; 22 June 1944

2,316

Hallenbeck, G. A., E. J. Baldes and C. F. Code 1944 THE EFFECT OF IMMERSION IN WATER ON THE TOLERANCE OF DOGS TO CENTRIFUGAL FORCE. (Mayo Clinic) (National Research Council, Committee on Aviation Medicine, Washington, D.C.) CAM no. 278, 14 Mar. 1944

ABSTRACT:

(a) When dogs are immersed in water to the junction of the second rib with the sternum so that most of the chest is submerged, "g"-golerance is lowered. All six dogs on which this was tried died at "g" levels they previously withstood with minimal symptoms.

(b) When dogs are immersed in water to the level of the xiphoid process so that most of the chest is above water, tolerance increases up to 3 or more "g".

2,317

Hallenbeck, G. A., & R. L. Engstrom 1944 THE RESPONSE OF NORMAL DOGS TO PROLONGED EXPOSURE TO CENTRIFUGAL FORCE. (National Research Council, Division of Medical Science, Committee on Aviation Medicine) Rept. CAM No. 279, 3 March 1944

ABSTRACT:

(a) The reaction of dogs to "g" is graded as follows:

Grade 1 response: Dog is conscious. Pupils of eyes fail to react to light. Slight ataxia is present. Pulse is 100 to 200.

Grade 2 response: Dog is limp and unconscious. There is a weak, irregular pulse, often bradycardia. Severe ataxia is noted when consciousness returns.

Grade 3 response: Death. Only postmortem pathology is gross distention of the vessels below the heart, occasional hemorrhage into colon.

(b) Unanesthetized dogs withstand exposure to 8 or more "g" for 5 or more minutes with Grade 1 response.

(c) Unlike rats when subjected to 2 to 12 "g" forces, dogs do not respond to "g"-time values of 80 "g"-minutes in a constant fashion.

(d) General nembutol anesthesia does not appreciably lower "g" tolerance.

(e) The work of Holt (reference 79) showing that carotid blood pressure is zero at 5 "g" is questioned because of the survival of dogs exposed to over 5 "g" for 8 minutes. Maybe blood gets to brain some other way than by carotid arteries.

2,318

Hallenbeck, G. A. 1945 EFFECTS ON MAN OF REPETITIVE EXPOSURE TO CENTRIFUGAL FORCE.
Federation Proceedings 4:29-30, March 1945.

ABSTRACT: This study was undertaken to determine the response of subjects to increased "g" when exposures follow one another at time intervals brief enough that the response to one exposure could be conditioned by previous trials. The Air Technical Service Command centrifuge was operated such that six ten-second episodes of 4.2 "g", a level sufficient to produce marked visual symptoms in the chosen subjects in a single test run, were delivered in sequence. Time intervals from the end of maximal "g" in one episode to the beginning of maximal "g" in the next were set at 4.7, 9.6, 19.4, and 29.1 seconds. Continuous exposure for 60 seconds was also imposed.
During continuous 60 second exposures, six subjects who suffered either loss of peripheral vision or blackout during the first ten or fifteen seconds showed varying degrees of improvement in vision thereafter. When exposed to the series of repeated ten second episodes of increased "g", the six subjects showed improvement of vision in the second and subsequent episodes of each series. This improvement was constant and marked when the interval between exposures was ten seconds or less, and less consistent when the interval was 15 or 30 seconds. (Federation Proceedings 4(1):29-30, March 1945)

2,319

Hallenbeck, G.A., et al 1945 THE SYMPTOMS WHICH OCCUR IN MAN DURING EXPOSURE TO POSITIVE ACCELERATION
Fed. Proc. 4: 43.

ABSTRACT: This motion picture illustrates the sequence of the symptoms which develop in normal men when exposed to positive acceleration while sitting in a comfortable physical and mental state, free from undue excitement or muscle tension. Under these conditions there is a definite sequence or pattern in the symptoms. As accelerations of greater magnitude are experienced, symptoms of increasing consequence are encountered. These symptoms are ushered in by dimming or graying of vision which is most noticeable in the peripheral fields and occurs on the average at about 3 g. At still higher accelerations (on the average 5 to 6 g) consciousness is lost. The color changes in the faces of the subjects seen in the motion picture indicates a period of progressive failure during which blood is progressively lost from the face, and a period of compensation during which blood is returned to the face. The motion picture illustrates that if visual symptoms are encountered, they occur during the period of progressive failure and that recovery from visual symptoms often takes place during the period of compensation while the accelerative force is still at maximum.

2,320

Hallenbeck, G., J. Glazier & G. Maison 1946 RADAR MEASUREMENT OF RATES OF FREE FALL OF ANTHROPOMORPHIC DUMMIES AND MAN.
(Aero Medical Lab., ATSC, Wright-Patterson AFB, Ohio)

ABSTRACT: Problems of parachute escape and present knowledge of high shock forces resulting from parachute opening at high altitudes demand more information on man's rate of free fall for prediction of wind velocities he must withstand and duration of exposure to cold and anoxia. Figures thus far available are based almost entirely on theoretical considerations. To actually measure rates of free fall, anthropomorphic dummies and a man were tracked by radar during free fall from altitudes up to 40,000 feet. Analysis of radar data provided vertical velocities at various altitudes and curves of altitude versus time during descent. A freely falling body reaches terminal velocity when its drag equals its weight. At terminal velocity, drag = weight = $C_D S \frac{pV2}{2}$ where C_D = drag coefficient, S = drag area, p = air density, and v = velocity. The C_DS of a nonsymmetrical object varies with changes of attitude during fall. With weight and velocity known and with air density obtained from standard atmosphere tables, C_DS values for the dummies and the man were calculated thus:

	Dummy weight, lbs.			Man, lbs.
	180	220	280	240
Number of Drops	8	6	2	1
Means C_DS	5.53	6.30	5.99	3.97
Standard Deviation	0.37	0.35	0.29	0.26
No. of Observations	75	59	87	24

More data on rates of free fall of man are needed to discover whether the fact that this man had a lower C_DS and fell faster than the dummies is the exception or the rule. By assuming C_DS values in the range of 3.5 to 7 and various weights, one can draw predictive curves of time required to fall freely at terminal velocity from any given altitude to sea level and calculate wind velocities encountered during fall. (Fed. Proc. 5(1):40, 1946)

2,321

Hallenbeck, G. A., E. H. Lambert, E. H. Wood & M. A. McLennan 1946 EFFECTS OF POSITIVE G ON SUBJECTS STUDIED AT THE MAYO AND AIR MATERIAL COMMAND CENTRIFUGES.
(USAF AMC, Engr. Div., Dayton, Ohio) Memo Rept. TSEAA-695-60; 26 Sept. 1946. ASTIA ATI 123 453

ABSTRACT: Comparison of the responses of 12 subjects to positive acceleration on the Mayo and Air Material Command centrifuges indicated the following:

a. The average G-tolerance of the group, appraised by assay using visual symptoms and equivalent ear pulse amplitude changes as end points was 0.6 and 0.5 G, respectively, lower on the Mayo than on the Air Material Command centrifuge.

b. The basic pattern of the cardiovasuclar response of these subjects to acceleration was the same at both laboratories. The sequence of the measured physiological events which occur in response to positive acceleration and, with one exception, the timing of these events, were repeated on the two centrifuges.

The data suggest that the difference in G-tolerance observed on the two machines is related more to differences in psychological factors associated with exposure to G than to any physical differences between the two centrifuges.

2,322

Hallenbeck, G. A., E. H. Wood, E. H. Lambert & S. C. Allen 1946 COMPARISON OF EFFECTS OF POSITIVE G ON SUBJECTS STUDIED AT BOTH THE MAYO AND AIR TECHNICAL SERVICE COMMAND CENTRIFUGES.
(Acceleration Lab., Mayo Aero Medical Unit, Rochester, Minn.; Aero Medical Lab., Engineering Division, AAF Air Technical Service Command, Wright Field, Ohio)

ABSTRACT: G tolerances of twelve men were determined on the ATSC centrifuge (radius 20 feet) and on the Mayo centrifuge (radius 15 feet). At the Mayo laboratory tests were run in an illuminated room; at ATSC, in darkness. The time from 1.5 g to 5 g was 2.6 seconds on the Mayo centrifuge and 1.8 seconds on the ATSC centrifuge. In both laboratories: (a) duration of maximal g was 15 seconds, (b) environmental temperature was 70 to 72 degrees F., (c) subjects were urged to relax, (d) vision was tested using similar light signal systems, (e) the g-time curves, response to light signals, electrocardiogram, heart rate, ear pulse and ear opacity were recorded. Recording methods differed technically in some cases. Average accelerations at heart level at which vision was dimmed, lost peripherally and lost completely were 4.3 g, 4.8 g and 5.3 g, respectively on the ATSC centrifuge. These values were 0.6 g higher ($P < 0.001$) than those obtained on the Mayo centrifuge. (Fed. Proc. 5(1):40-41, Feb. 1946)

2,323

Hallpike, C.S. and G.M. Fitzgerald 1946 FLYING PERSONNEL RESEARCH COMMITTEE OBSERVATIONS OF THE PATHOLOGY OF AIRSICKNESS (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. No. 334; Dec. 1946, ASTIA ATI No. 206 440

ABSTRACT: Hot and cold caloric tests of external semicircular canal function were carried out in 17 normal individuals of whom 6 were R.A.F. personnel without flying experience.
A standard technique was used with low intensity stimulation and the responses were measured as the time in seconds between the application of the stimulus and the disappearance of the nystagmus. The results are reported in this publication.

2,324

Hallpike, C. S., J. D. Hood, & G. H. Byford 1952 THE DESIGN, CONSTRUCTION AND PERFORMANCE OF A NEW TYPE OF REVOLVING CHAIR; SOME EXPERIMENTAL RESULTS AND THEIR APPLICATION TO THE PHYSICAL THEORY OF THE CUPULAR MECHANISM. Acta Oto-Laryngologica 42:511-538

SUMMARY: Constructional and performance specifications are given of a new type of revolving chair designed for the investigation of the function of the human horizontal semicircular canals.
The chair is driven by a servo-mechanical system of conventional design and high precision. It provides angular accelerations within the range of 0.1 degrees sec.$^{-2}$ to 10 degrees sec.$^{-2}$. Any acceleration within this range may be applied for periods limited only by the attainment of an angular velocity of 150 degrees sec.$^{-1}$, a limitation imposed by certain physiological considerations.
Provision is made for the direct observation of ocular nystagmus occurring during rotation. This is achieved by means of a prismatic viewing system which provides a stationary image of the subject's eye.
Using this equipment, measurements have been made of the durations of the after sensations resulting from the application of accelerations of known magnitude and duration.

The results obtained are found to be in striking agreement with the general theory of the cupular mechanism outlined by Steinhausen and with the physical constants of the system as determined by Van Egmond and his co-workers. (AUTHOR)

2,325

Hallpike, C. S., & J. D. Hood 1953 FATIGUE AND ADAPTATION OF THE CUPULA MECHANISM OF THE HUMAN HORIZONTAL SEMICIRCULAR CANAL: AN EXPERIMENTAL INVESTIGATION. Proc. Roy. Soc. B, 141:542-561

2,326

Hallpike, C. S., & J. D. Hood 1953 A STUDY OF THE FUNCTION OF THE HUMAN SEMI CIRCULAR CANAL WITH ESPECIAL REFERENCE TO ADAPTATION OF THE CUPULA. Proceedings 5th International Congress Otorhinolaryngol. Pp. 2-5

2,327

Hallpike, C. S. and J. D. Hood 1953 THE SPEED OF THE SLOW COMPONENTS OF OCULAR NYSTAGMUS INDUCED BY ANGULAR ACCELERATION OF THE HEAD: ITS EXPERIMENTAL DETERMINATION AND APPLICATION TO THE PHYSICAL THEORY OF THE CUPULAR MECHANISM.
Proc. Roy. Soc. (London) B. 141(903):216-230, April 17, 1953.

ABSTRACT: By means of a newly designed rotating chair, a number of normal human subjects have been exposed to angular acceleration around the vertical axis,

of known magnitude and duration. Evidence from this study supports Graybiel's hypothesis that the oculo-gyral illusion is dependent upon vestibular eye nystagmus. A new technique is described for the quantitative evaluation of the oculo-gyral illusion occuring during known angular accelerations. The technique makes it possible to obtain instanteneous measurements of the speed of the slow component of such vestibular eye nystagmus occuring at any point in the course of application of known angular accelerations and accordingly of the instantaneous magnitude of the corresponding cupular deflexion. It has been possible to substantiate the general theory of the cupular mechanism outlined by Steinhausen and to re-evaluate and confirm the physical constants of the system assigned to it by Van Egmond and his co-workers.

2,328

Ham, G. C. & J. C. Hortenstine 1942 OBJECTIVE DETERMINATION OF CIRCULATORY CHANGES PRECEDING, DURING AND FOLLOWING GREYING, BLACKOUT, AND SYNCOPE ON THE TILT TABLE.
(National Research Council, Committee on Aviation Medicine, Washington, D.C.) CAM No. 54; 28 May 1942.

ABSTRACT: Thirty tilt table observations were made on 14 male subjects 20 to 30 years of age and on one 41 years old. In 14 cases, sodium nitrite was given in addition to tilting.

It was demonstrated that objective changes do occur in ear opacity, the rate and amplitude of pulse in the temporal artery, and blood pressure in the brachial artery prior to grey or blackout and syncope. As confusion frequently precedes these symptoms, an individual's subjective recollection of blackout is unreliable. Objective criteria should be used in judging protection on the centrifuge or in the plane.

2,329

Ham, G. C. and E. M. Landis 1942 APPARATUS FOR THE STUDY OF CHANGES IN THE PERIPHERAL CIRCULATION DURING ACCELERATION.
(National Research Council, Committee on Aviation Medicine, Washington, D.C.) CAM No. 48, 23 April 1942.

ABSTRACT: Description of a modification of Millikan's oximeter to record ear opacity and pulse amplitude changes in response to circulatory changes. Duplicates appendix to CAM No. 44.

2,330

Ham, G.C. 1943 EFFECTS OF CENTRIFUGAL ACCELERATION ON LIVING ORGANISMS. War Med., 3(1):30-56, Jan. 1943

ABSTRACT: This article discusses positive, negative, and angular acceleration and its effects on respiration, mental efficiency, heart rate and blood pressure. Centrifugal effects on animals are also included.

2,331

Ham, G. C. & J. L. Patterson, Jr. 1943 QUANTITATIVE DETERMINATION OF CHANGES IN BLOOD CONTENT OF THE HUMAN EAR WITH A MODIFIED OXIMETER. (National Research Council, Committee on Aviation Medicine, Washington, D.C.) CAM No. 140; 26 May 1943.

ABSTRACT:

(a) The oximeter has been modified so that the opacity of the ear tissue and of the blood in the human ear can be measured separately.

(b) Both the opacity of the ear tissue alone and that of the blood alone differ from individual to individual. These two variables would necessitate a large number of curves if all situations were to be covered.

(c) One variable can be eliminated if the effective opacity of the bloodless ear tissue of all individuals is made the same by varying the intensity of the incident light.

(d) A method of obtaining empiric curves with an artificial ear to simulate a decrease or increase in blood content of the human ear has been described. This method can be used to calibrate recording instruments in terms of percentage change in blood content.

(e) The properties of photocells which may produce errors in results are discussed.

2,332

Ham, G. C., J. L. Patterson, Jr. & E. M. Landis 1943 QUANTITATIVE MEASUREMENTS OF CHANGES IN BLOOD CONTENT OF THE HUMAN EAR WITH A MODIFIED OXIMETER. (National Research Council, Committee on Aviation Medicine, Washington, D.C.) CAM NO. 188, 10 June 1943.

ABSTRACT:

(a) A modified oximeter ear unit is described which allows separate measurement of both the thickness ("opacity") of the bloodless ear and of the blood in the human ear.

(b) It is calibrated with sheets of tracing paper to represent the bloodless ear and glass chambers of known thickness to represent the blood contained in the ear.

(c) A method for the measurement of percentile changes in the blood content of the ear with the cathode ray oscillograph and this ear unit is described. It is adaptable to use in either the centrifuge or aircraft.

2,333

Ham, G. C. & E. M. Landis 1957 OBJECTIVE MEASUREMENTS OF CIRCULATORY CHANGES IN MAN DURING ACCELERATION IN THE CENTRIFUGE AND IN THE PLANE. (National Research Council, Committee on Aviation Medicine, Washington, D.C.) CAM No. 67; 9 Aug. 1957.

ABSTRACT: In 8 plane tests (maximum 2.5 "g" for approximately 5 seconds) and 27 centrifuge runs on 8 subjects it was found that "g" well below the graying level diminishes the blood content of the ear consistently and strikingly. At high "g" this blanching is even more marked at the time that grayout, blackout, and unconsciousness appear. Reactive hyperemia follows short exposures to "g".

When 4 "g" was maintained on the centrifuge for 45 seconds, vascularity of the ear decreased, then increased and, after a brief compensatory rise, stabilized at a level lower than normal but definitely above the minimum. It is though that this reaction was due to a carotid sinus reflex becoming active 11 to 13 seconds after the onset of "g".

Measurements were made by means of a photoelectric ear unit (modified oximeter) and a portable self-contained oscillograph. The apparatus is offered as a safe method for objective study of circulatory adjustment to "g" in the plane and in the centrifuge and for evaluating the protection offered by anti-g devices.

2,334

Hamacher, J.M. 1941 DER KREISLAUF UNTER BESCHLUNIGUNG. ELECTROKARDIOGRAMM BEI KANINCHEN (Effect of Acceleration on Heart Rate: Electrocardiographic Studies in Rabbit)
Luftfahrtmedizin 5: 149-160

2,335

Hamel, G. and C. C. Turner 1914 FLYING: SOME PRACTICAL EXPERIENCES. (London: Longmans, Green, and Co.)

2,336

Hamilton, J. E., J. S. Lichty, & W. R. Pitts 1932 CARDIOVASCULAR RESPONSE OF HEALTHY YOUNG MEN TO POSTURAL VARIATIONS AT VARIED TEMPERATURES. Amer. J. Physiol. 100:383-393

2,337

Handford, S.W., T.E. Cone, Jr., H.I. Chinn and P.K. Smith 195 DRUGS PREVENTING MOTION SICKNESS AT SEA. J. Pharmacol. and Exper. Therap., 111 : 447

2,338

Hanks, T. G. 1961 ACCELERATION
In Sells, S. B., & C. A. Berry, eds., Human Factors in Jet and Space Travel (New York: Ronald Press Co., 1961) pp. 284-295, 327-328

2,339

Hanrahan, J.S. 1958 BIODYNAMICS: DECELERATION AND IMPACT AT THE AIR FORCE MISSILE DEVELOPMENT CENTER. (Holloman AFB, New Mexico) October 1958.

2,340

Hanrahan, J.S., & D. Bushnell 1960 SPACE BIOLOGY: THE HUMAN FACTORS IN SPACE FLIGHT. (New York: Basic Books, Inc., 1960)

ABSTRACT: The book is a survey of the research accomplishments in the field of space biology. Included in the survey are the following topics: (1) man's motivation for space travel; (2) the development of a suitable vehicle; (3) the hazards of acceleration and weightlessness; (4) potentially dangerous Van Allen and cosmic radiation. The social, religious, and political implications of space travel are also included.

2,341

Hansen, A.T. 1949 PRESSURE MEASUREMENT IN THE HUMAN ORGANISM (Copenhagen: Teknish Farlag, 1949)

2,342

Hansen, H. April 1948 SOME PERFORMANCE CRITERIA FOR THE GIMBAL DRIVES ON THE HUMAN CENTRIFUGE. (McKiernan-Terry Corp., Harrison, N. J.) Device 9-G-1, Navy Contract N6ori-133, 13 April 1948.

2,343

Hansen, H. 1954 GENERAL ENGINEERING REPORT, HUMAN CENTRIFUGE (McKiernan-Terry Corp., Harrison, N. J.) S.O. 4621, Contract N6ori-133, 14 July 1954.

ABSTRACT: This report is intended to supplement the instruction manuals and engineering drawings as a general source of engineering information pertinent to the design of the human centrifuge. It contains a discussion of the basic factors which were considered both in the overall design, and, in the design of selection of components.

It includes a general description of the principles of operation of the control systems.

The report contains, also, a brief description of particularly important or especially interesting phases of manufacturing and erection.

Several unusual features are incorporated in the design. The sandwich construc-

tion for the gondola is a notable example. The description of this construction, aside from its general interest, may be of some value to others working on similar problems.

References are given throughout the text to assist the reader in locating additional information, and a complete list of references is included in the appendix. Information from these reference sources has been freely abstracted or summarized here when pertinent to the discussions in this report.

2,344

Hanson, A. 1961 DEVELOPMENT TEST PROGRAM, GROUND AND WATER LANDINGS. (Stanley Aviation Corp., Denver, Colo.) Doc. No. 1259; Contract No. AF 33(600) 36200; 4 Jan. 1961

2,345

Harbert, F. and Schiff, M. 1950 MOTION SICKNESS. U. S. Armed Forces M. J., 1 :979

2,346

Hardacre, L.E. & R.S. Kennedy 1962 A PRACTICAL ISSUE IN THE ADMINISTRATION OF A MOTION SICKNESS QUESTIONNAIRE TO FLIGHT STUDENTS
Paper: 33rd Annual Meeting of the Aerospace Medical Association, Chalfonte-Haddon Hall, Atlantic City, N.J., April 9-12, 1962

ABSTRACT: A motion sickness questionnaire was developed and validated on 100 subjects who had been exposed to a reliable test for measuring susceptibility to "canal sickness" on the Pensacola Slow Rotation Room. The reliability of the questionnaire was then ascertained under three conditions. Three forms of the questionnaire were administered to three groups. Forms differed in the kind of assurance given that this questionnaire would influence subsequent career possibilities. The results will be discussed not only in terms of the above variables but also in terms of the reliability of the test items.

2,347

Hardgrove, B. J. & F. L. Warren 1956 ASTRONAUTICS INFORMATION ABSTRACTS. (Jet Propulsion Laboratory, Pasadena, Calif.)

ABSTRACT: This periodical contains a series of abstracts dealing with astronautics. It is restricted to the subject of spaceflight and to applicable data and techniques. Coverage is given to propulsion when related to specific space travel missions and to meteorology when related to the envelope beyond the stratosphere. Aeronautics, communications, guidance, instrumentation, materials, vehicle engineering, etc., are treated similarly, the intent being to give full coverage to astronautics but to exclude peripheral material.

2,348

Hardy, J. D., & C. C. Clark 1958 THE DEVELOPMENT OF DYNAMIC FLIGHT SIMULATION. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5817, Dec. 4, 1958 ASTIA AD-216 508
See also Aero Space Eng. 18:48, 1959

ABSTRACT: The development of the Dynamic Flight Simulation Program at the Aviation Medical Acceleration Laboratory is traced. The adaptation of the 50-foot human centrifuge to the demands of closed loop simulation and the computer control involved are explained. Also discussed is the role played by dynamic flight simulation in the training of pilots to fly the X-15 research plane. (Author)

2,349

Hardy, J. D., C. C. Clark and R. F. Gray 1959 ACCELERATION PROBLEMS IN SPACE FLIGHT.
(USN, Air Development Center, Johnsville, Pa.) Rept. No. NADC-MA-5909, 1 Oct. 1959. ASTIA AD 230 379.

SUMMARY: The problem of man's tolerance to acceleration forces has become of increased importance with the development of aircraft and spacecraft capable of traveling at tremendous velocities. The major problems associated with the effects of acceleration upon man and details of the work which has already been done in this field on centrifuges, rocket sleds, and other simulators are described. The problem of weightlessness is discussed with special reference to Gerathowohl's investigation of human tolerance to the weightless state produced during ballistic trajectory aircraft flight. A detailed account is given of advances in high G protection including the use of the contour couch and water immersion in the total immersion capsule and with chest pressurization Gray in a record centrifuge run, recently withstood 31 G for 5 secs with no lasting ill effects. (Author)

2,350

Hardy, J. D. 1959 ACCELERATION PROBLEMS IN SPACE FLIGHT. (Address to XXI International Congress of Physiological Sciences, Buenos Aires, Aug. 1959)

2,351

Hardy, J. D. 1959 REPORT TO ACCELERATION PANEL.
(Armed Forces-NRC Committee on Bio-Astronautics, Woods Hole, Mass., Aug. 1959).

2,352

Hardy, J.D. & C.C. Clark 1960 ACCELERATION TERMINOLOGY IN AEROSPACE MEDICAL RESEARCH
U.S. Naval Air Development Center, Johnsville, Pa. October 1960 (A Report to the North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Conference, preprint of paper given in Turkey)

ABSTRACT: A notation is presented to be used to describe the physiological effects of acceleration on man. The usefulness of a standardized means of describing physiological effects in G environments is detailed by showing the variety of descriptive terms and words now in general use and the need for better and more exact interchange of information on acceleration among scientists. Special emphasis is placed on a notation which would provide a mathematical description of the acceleration environment referred to some convenient point, such as the center of gravity of the man-seat combinations. The physiological acceleration terminology presented in this paper emphasizes the reactive forces on the man rather than on the vehicle.

2,353

Hardy, J. D. 1960 ACTIVITIES OF THE ACCELERATION PANEL.
(Paper, 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960)

ABSTRACT: The Armed Forces National Research Council Committee on Bio-astronautics has established as one of its areas of interest the problems of acceleration stress which may be encountered in space travel. The Acceleration Panel of the Committee was organized "to review and report upon the research and development problems concerned with the biological effects of mechanical forces which may be of interest in the area of bioastronautics." Membership of the Panel includes representatives of all of the centrifuge laboratories of the United States as well as those investigating the effects of weightlessness, impact, angular accelerations, oscillatory and random accelerations and noise. At its first meeting, the Panel made a review of the existing devices in the United States for the study of acceleration and concluded with a preliminary discussion of the needed areas of study in the acceleration field which are considered of especial interest to bioastronautics. A brief presentation of the Panel's deliberations will be made.

2,354

Harper, E. D. 1956 AIRCREW RECOVERY FROM AIRBORNE MISHAPS.
Canad. Aeronaut. J. (Ottawa) 2(5):151-153, May 1956

ABSTRACT: The aircrew ejection devices presently in use in Canadian aircraft are considered largely inadequate for the special conditions of high altitude, low altitude, high speed, and low speed flight. The CF-100 possesses the most advanced escape equipment, including an automatic parachute operating system timed for ejections at any altitude above 200-300 feet, a barostatic operating device which opens the parachute at a predetermined altitude, maximum available support and protective devices, and a stabilization parachute to prevent tumbling. The problem

of air blast, violent contortion, and high acceleration during ejection at high speeds has not been solved, and may require the development of an escape capsule.

2,355

Harrington, R.R. 1961 LOWER LIMIT ON BOOSTER REQUIREMENTS TO ORBIT AND SUBSEQUENTLY DE-ORBIT A PAYLOAD. (Air Force Special Weapons Center, Kirtland Air Force Base, N. Mex.) AFSWC TN 61-38, ASTIA AD 265 375

ABSTRACT: A study is presented of a simplified approach to the calculation of minimum booster requirements for a typical earth-launched orbit and subsequent deorbit mission. It is intended primarily as an introduction to the orbital mechanics of such a mission. A two-dimensional inverse square force field centered within a circular nonrotating earth is assumed. The propulsion mechanism is assumed to be 100 per cent efficient and capable of directing thrust into any direction. At any instant the masses present are those of useful payload and unburned propellant with no mass assumed for dead casing weight. Atmospheric losses are neglected. The results establish the lower limit on velocity increments below which the mission cannot be accomplished. (Author)

2,356

Harris, C. S., F. E. Guedry, & A. Graybiel 1962 POSITIONAL ALCOHOL NYSTAGMUS IN RELATION TO LABYRINTHINE FUNCTION. (Naval School of Aviation Medicine, Pensacola, Fla.) BuMed Project MR005.13-6001 Subtask 1, Rept. No. 76; NASA Order No. R-47, 3 Dec. 1962

ABSTRACT: The main objective was to evaluate the use of positional alcohol nystagmus as an indicator of otolith function. Individuals without functional labyrinths did not exhibit nystagmus comparable in quality or magnitude to results obtained from a group of normal subjects. Several individuals suspected of having residual otolith function exhibited weak responses reminiscent of PAN, but the "responses" may have been attributable to artifacts. A relationship was found in normal subjects between nystagmus obtained by caloric stimulation and nystagmus obtained by positional alcohol testing. The relationship between nystagmic output and arousal was found to be essentially the same for positional alcohol nystagmus as for nystagmus obtained by other procedures. All labyrinthine-defective subjects tested for alcohol gaze nystagmus exhibited alcohol gaze nystagmus. (AUTHOR)

2,357

Harris, W., R.R. Mackie, and C.L. Wilson 1956 PERFORMANCE UNDER STRESS: A REVIEW CRITIQUE OF RECENT STUDIES. (Human Factors Res., Inc., Los Angeles, Calif.) TR VI, July 1956. ASTIA AD 103 779.

2,358

Harrison, W. E. 1957 WE CHASE THE JETS ON FILM
Popular Mechanics, June 1957, pp. 91-96; 228-232.

ABSTRACT: This is a review of high-speed photography done by the author at Edwards Air Force Base, California. He relates the problems involved in shooting airplane crashes, ejection seat tests, and rocket-sled track tests. The author also discusses the various dangerous assignments that might be expected in work of this type.

2,359

Harsen, Asmus 1937 PROBLEMS OF HIGH-ALTITUDE FLYING (PROBLEME DES HOEHENFLUGS)
ASTIA ATI 22587

ABSTRACT: Problems and recent developments in high-altitude flying are discussed. Advantages of high-altitude flying can be put into three general groups: speed, augmentation of meteorological and navigational security, and military advantages. Practical physiological difficulties in high altitudes have been overcome. Through use of superpressure altitude chamber, human existence has been proved possible in the stratosphere without oxygen respiration or special clothing. A complete report about high-altitude power plants is given and diagrams on high-altitude equipment and performance graphs are shown.

2,360

Hart, E.M. 1961 EFFECTS OF OUTER-SPACE ENVIRONMENT IMPORTANT TO SIMULATION OF SPACE VEHICLES.
(Aerospace Medical Laboratory, Aeronautical Systems Division, Wright-Patterson AFB, Ohio) Contract AF 33(616)-6858, ASD TR 61-201, Project No. 6114, Task No. 60806, August 1961. ASTIA AD-269 014

ABSTRACT: The results of a literature survey undertaken to define the effects of the outer-space environment important to the simulation of space vehicles are presented. The discussion is general, having not been constrained by the inclusion of specific vehicles or trajectories. Only the natural environment of space is considered and the survey is limited to the solar system with particular emphasis on the region in the near vicinity of the earth-moon system and at heights greater than 80 kilometers above the earth's surface. To specify those effects that need to be incorporated into a space training simulator, the exterior environment, its effects on the vehicle and crew, and the malfunctions that may result must be determined. These subjects are treated, along with a consideration of the adequacy of the existing data in the study. Recommendations for further study are presented.

2,361

Hartinger, H. 1951 MOTION AND PERCEPTION OF SPACE
(USAF Sch. Av. Med., Brooks AFB, San Antonio, Tex.)
Spec. Rpt.. Aug. 1951

2,362

Hartkoph, Stewart E. 1960 RUNWAY BARRIER EVALUATION OF THE F-102 ARRESTING HOOK
(Air Force Flight Test Center, Edwards Air Force Base, California) AFFTC-TR-60-42, September 1960. ASTIA AD 245529

ABSTRACT: An F-102 aircraft equipped with an arresting hook was tested at the Air Force Flight Test Center to evaluate the compatibility of the hook installation with aircraft arresting barriers. Twelve runs were made into a modified MA-1A Runway Overrun (Chain) Barrier with successful arrestments being achieved 11 times. The unsuccessful attempt was the result of hook bounce. This deficiency was corrected during the test program. Eighteen of the 19 arrestment attempts with the BAK-6/F27A Aircraft Arresting (Water Squeezer) Barrier Absorber were successful. Failure of the runway pendant cable caused the unsuccessful attempt. Aircraft arrestments were demonstrated up to 165 knots (ground speed) utilizing the "Water Squeezer" barrier and up to 112 knots using the "Chain" barrier.

2,363

Hartman, B. 1960 PROBLEMS OF HUMAN RELIABILITY IN SPACE FLIGHT: TIME AND LOAD FACTORS. (Paper presented at the Symposium on the Psychophysiological Aspects of Space Flight, School of Aviation Medicine, Aerospace Medical Center (ATC) Brooks AFB, Texas, May 1960)

2,364

Hartman, B. O., & R. E. McKenzie 1961 SYSTEMS OPERATOR PROFICIENCY: EFFECTS OF SPEED STRESS ON OVERLOAD PERFORMANCE (School of Aerospace Medicine, Brooks AFB, Texas) Rept. 61-40; June 1961

2,365

Hasbrook, A. H. 1952 CRASH INJURY STUDY OF THE NORTHEAST AIRLINES-CONVAIR 240 ACCIDENT AT LA GUARDIA AIRPORT ON JANUARY 14, 1952.
(Department of Public Health and Preventive Medicine, Cornell University Medical College)
Informative Accident Release 14. August 1952.

ABSTRACT: Analysis of an accident involving a Northeast Airlines Convair 240 in Flushing Bay near La Guardia Airport on January 14, 1952, revealed the following facts: (1) the hull and the passenger cabin were exposed to localized peak

forces of over 6 g; (2) all passengers were seated in forward-facing seats designed to resist forward loads up to 6 g; (3) 10 of the 20 seats sustained anchorage failure, (7 seat frames were extensively damaged and 10 seat backs deformed); (4) the C-22a "3,000 lb" safety belts remained intact; and (5) although some passengers struck and dented seat backs, no dangerous injuries resulted from the impacts. It is recommended that a strong cable or ductile wire linkage be used to carry safety belt loads directly to the hull structures, by passing the seats. The safety advantage of light, ductile, well-padded, "de-lethalized" seat-back structures is emphasized.

2,366

Hasbrook, A. H. 1953 CRASH SURVIVAL STUDY: NATIONAL AIRLINES DC-6 ACCIDENT AT ELIZABETH, N. J. ON FEBRUARY 11, 1952. (Cornell Univ. Medical College, Crash Injury Research, New York, N.Y.) Oct. 1953. ASTIA AD 30 398

ABSTRACT: Crash survival details of a 140 m.p.h. crash involving a Douglas DC-6 transport aircraft, in which 32 of the 59 passengers survived, are presented and analyzed. Information is given on impact speed and altitude, directions of principal impact force, kinematic behavior of the fuselage, damage to cabin and seats, and injuries sustained in relation to passenger location; photographs and diagrams are shown. Findings are discussed and recommendations are made relative to crash survival design in future transport aircraft.

2,367

Hasbrook, A. H. 1953 CIR RELEASE 15: CRASH SURVIVAL STUDY: NATIONAL AIRLINES DC-6 ACCIDENT AT ELIZABETH, N. J. ON FEBRUARY 11, 1952. Oct. 1953.

2,368

Hasbrook, A.H. 1954 CRASH SURVIVAL STUDY: DeHAVILLAND DOVE ACCIDENT AT STATEN ISLAND AIRPORT, DECEMBER 9, 1952 (Cornell-Guggenheim Aviation Safety Center, N.Y., N.Y.) Release 3-13

ABSTRACT: Crash-survival details of a 95 mph - 35° nose-down angle crash involving a twin-engine de Havilland Dove transport aircraft, in which two of four occupants survived, are presented and analyzed. Information is given on the impact speed and attitude of the aircraft, and on the magnitude, direction and duration of the principal impact (crash) force. The kinematic behavior ofthe intact fuselage, the damage to the cabin and seats, and the injuries sustained in relation to occupant location are described. Photographs and diagrams are shown. Findings are discussed and recommendations are made relative to crash-survival design in future transport aircraft.

2,369

Hasbrook, A. H. 1954 CRASH INJURY INVESTIGATOR'S CHECK LIST; TRANSPORT AIRCRAFT. (For the panel on aircraft accident survival committee on operating problems, National Advisory Committee for Aeronautics.)

2,370

Hasbrook, A. H. 1954 CRASH SURVIVAL STUDY OF A SURVIVABLE ACCIDENT INVOLVING A PIPER PA-11.
(Cornell-Guggenheim Aviation Safety Center, New York, N.Y.) May 1954 Release 1-16

ABSTRACT: Crash survival details of a 90-95 mph vertical impact accident involving a light training plane in which the lone occupant survived with non-dangerous injuries are presented and discussed. Information is given on impact speed and attitude, direction of principal impact force, damage to the aircraft, and injuries sustained in relation to structure. Findings are discussed and recommendations are made relative to crash survival design in future light aircraft.

2,371

Hasbrook, A. H. 1954 CRASH SURVIVAL STUDY: DE HAVILLAND DOVE ACCIDENT AT STATEN ISLAND AIRPORT DECEMBER 9, 1952.
(Cornell-Guggenheim Aviation Safety Center, New York, N. Y.) Nov. 1954. Release 3-13.
See also Aviation Age 23(1):16-23.

2,372

Hasbrook, A. H. 1955 AVIATION CRASH INJURY RESEARCH.
J. Aviation Med. 26(3):180-183.

SUMMARY: Crash-injury and crash-survival data on military accidents are needed so that engineers can, by design, moderate or prevent unnecessary injuries and deaths in survivable accidents involving future military and civilian aircraft. To obtain such information, medical officers and accident investigators must work together in the investigation and analyses of accidents, the injuries sustained, and the causes of injury.

In order to properly identify and catalogue the injuries sustained in accidents, flight surgeons and pathologists should make detailed examinations of the injured persons and report in detail the results of the medical examinations or autopsies. The results of the investigations and analyses must be given to engineers in language they can understand, both from a qualitative and quantitative (statistical) point of view. Classifications and terms that are meaningful to engineers, as well as to safety groups and other medical personnel, should also be utilized.

2,373

Hasbrook, A. H. & J. T. Parin 1955 AvCIR PHOTOGRAPHIC REPORT: BRANIFF INTERNATIONAL AIRWAYS CONVAIR 340 ACCIDENT AT CHICAGO, ILL., 17 JULY 1955. (Aviation Crash Injury Research, Cornell University) Office of Naval Research Contract #N6onr 264-12, Release 2P-5-19, October 1955.

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Hasbrook, A.H. 1955 AvCIR CRASH INJURY ANALYSIS OF A DC-6B ACCIDENT AT IDLEWILD AIRPORT, 19 DECEMBER 1954. (Cornell Aviation Crash Injury Research)

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Hasbrook, A. H. 1956 CRASH INJURIES IN AIRCRAFT ACCIDENTS (National Fire Protection Association, Boston, Mass.) Bulletin No. 163 July 1956

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Hasbrook, A. H. 1956 BOEING 707 EVALUATION (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc., Phoenix, Arizona) Report AvCIR-1-V-65; June 1956

2,377

Hasbrook, A. H. 1956 STUDY OF INJURY RATES IN SURVIVABLE TYPE ACCIDENTS INVOLVING EIGHT PERSONAL TYPE AIRCRAFT OF VARIOUS MODELS. (Aviation Crash Injury Research, Cornell U. New York, N. Y.) Sept. 1956

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Hasbrook, A. H. 1956 AvCIR PHOTOGRAPHIC REPORT OF U. S. ARMY BELL H-13 HELICOPTER ACCIDENT, MONMOUTH COUNTY AIRPORT, N. J. (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc., Phoenix, Arizona) Report AvCIR-5-PR-68; Dec. 1956

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Hasbrook, A. H. 1956 A PROGRESS REPORT ON A PRELIMINARY AvCIR STUDY OF THE PROBLEMS ASSOCIATED WITH A CRASH INJURY RESEARCH PROGRAM IN THE FIELD OF HELICOPTER AND STEEP GRADIENT AIRCRAFT, FOR THE U. S. ARMY, FOR THE PERIOD OF 12/1/55 THROUGH 6/30/56. (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc., Phoenix, Arizona) Rept. AvCIR-46-0-69; June 1956

2,380

Hasbrook, A.H. 1956 DESIGN OF PASSENGER "TIE-DOWN"
(Aviation Crash Injury Research of Cornell University) Naval Research Contract Nonr-401(21). Av-CIR-44-0-66, September 1956. ASTIA AD 217660

ABSTRACT: Factors requiring consideration in the design of passenger seats and adjacent attachment structure of transport aircraft are discussed. The four basic causes of injury in accidents, and survivable crash force limits, are outlined. Design factors affecting survival as related to crashworthy cabin and floor structure, safety belts, seats and other interior components are reviewed. The directions and magnitudes of crash loads to be expected in survivable type crashes are given. Static versus dynamic loading is touched on. The controversial subject of aft facing and forward facing seats is discussed. Photographs and diagrams are included with the text. Recommendations are made for improved crash-survival design of passenger tie-down.

2,381

Hasbrook, A. H., S. Macri, & M. Haberman 1956 AN AvCIR PRELIMINARY REPORT ON A STUDY OF INJURY RATES IN SURVIVABLE TYPE ACCIDENTS INVOLVING EIGHT PERSONAL TYPE AIRCRAFT OF VARIOUS MODELS. (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc., Phoenix, Arizona) Report AvCIR-4-SS-72; Sept. 1956

2,382

Hasbrook, A. H., & J. T. Pairn 1956 PRELIMINARY AvCIR PHOTOGRAPHIC REPORT ON EASTERN AIRLINES MARTIN 404, OWENSBORO, KENTUCKY. (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc., Phoenix, Arizona) Report AvCIR-4-PR-63; June 1956

2,383

Hasbrook, A. H. 1957 DESIGNING FOR SURVIVAL IN VTOL AIRCRAFT.
(Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc., Phoenix, Arizona) Report AvCIR-51-0-83, March 1957
Issued under Office of Naval Research Contract No. Nonr-401(21)
ASTIA AD 217 660

ABSTRACT: The need for crashworthy design and delethalization of VTOL aircraft is discussed in relation to human tolerance to impact force. Crash-injury factors and photographs related to two survivable helicopter crashes are briefly reviewed; recommendations for crash-safety design are proposed.

2,384

Hasbrook, A. H. 1957 CRASH INJURY REPORT FOR U. S. ARMY SAFETY DIVISION.
(Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc., Phoenix, Arizona) Report AvCIR-54-0-89, Sept. 1957

2,385

Hasbrook, A. H. 1957 CRASH INJURY RESEARCH. A MEANS OF GREATER SAFETY IN AIRCRAFT ACCIDENTS.
J. Aviation Med. 28(6):541-552.

SUMMARY: The need for crash-injury investigations of survivable type aircraft accidents, in combination with detailed structural, medical and pathologic studies, is reviewed. In addition, the results of past crash-injury investigations, and their use in the design of present propeller driven, and future jet, transports are discussed. Similarly, several recent accident investigations, one, of a helicopter, are reviewed, and pertinent crash-injury findings are shown to illustrate the engineering-medical information which can be extracted from such crashes for the benefit of future design.

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Hasbrook, A. H. 1957 CRASH INJURY RESEARCH A MEANS FOR GREATER SAFETY IN ACCIDENTS.
(Aviation Crash Injury Research, Phoenix, Ariz.) Report No. AvCIR-50-0-82, March 1957.

ABSTRACT: The need for crash-injury investigations of survivable type aircraft accidents - in combination with detailed structural, medical and pathological studies - are reviewed. In addition, the results of past crash-injury investigations, and their use in the design of present propeller driven, and future jet, transports are discussed. Similarly, several recent accident investigation (one, a helicopter) are reviewed, and pertinent crash injury findings are shown to illustrate the engineering-medical information which can be extracted from such crashes for the benefit of future design.

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Hasbrook, A. H., J. T. Pairn, & H. R. Guggenheimer 1957 AvCIR CRASH SURVIVAL STUDY OF U. S. ARMY BELL H-13 ACCIDENT AT MONMOUTH COUNTY AIRPORT, BELMAR, N. J., JUNE 21, 1956 (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc., Phoenix, Arizona) Report AvCIR-H-5-CSS-81; Feb.1957 ASTIA AD-129 743

ABSTRACT: Photographs with descriptive captions relating to crash-survival details of a Bell H-13 helicopter crash involving a minimum vertical impact speed of 41 miles per hour and not less than a calculated 28.5 g vertical deceleration - in which two crew members survived without spinal injuries - are presented. An accident diagram and the damage to the cockpit, seats and other components are shown; the injuries sustained by the occupants - and the probable injury causes - are described. The method of calculating the crash forces is demonstrated. In addition, the significance of the lack of spinal injuries in an accident involving heavy vertical crash loads is discussed in relation to the design of aircraft seats.

2,388

Hasbrook, A. H., J. T. Pairn, & H. R. Guggenheimer 1957 AvCIR ANALYSIS AND PHOTOGRAPHIC REPORT - U. S. ARMY BEECHCRAFT L-23 ACCIDENT, COLORADO SPRINGS, COLORADO (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc., Phoenix, Arizona) Report AvCIR-6-PR-88; Aug. 1957

2,389

Hasbrook, A. H. and W. R. Knowles 1957 A HELICOPTER CRASH-INJURY REPORT FORM. (Cornell-Guggenheim Aviation Safety Center, New York, N.Y.) AvCir 55-0-91 (Office of Naval Research, Washington, D.C.) Contract No. Nonr-401-(21).

2,390

Hasbrook, A. Howard 1958 GROSS PATTERN OF INJURY OF 109 SURVIVORS OF FIVE TRANSPORT ACCIDENTS
(Aviation Crash Injury Research of Cornell University, Phoenix, Arizona) Office of Naval Research Contract No. Nonr 401(21) Av-CIR-5-SS-96 July 1958 ASTIA AD 218708

ABSTRACT: This report discusses the distribution and seriousness of injuries sustained by the survivors of five survivable transport aircraft accidents. One of the five accidents resulted in a relatively low injury rate and only moderate structural damage; the other four accidents showed higher injury rates, more aircraft damage, and greater impact severity. Comparison of the moderate accident with the four severe accidents indicates that statistical accident data can be misleading unless accidents are classified in a meaningful way - by using "degrees" of severity. For purposes of classifying severity, factors should be used which relate to the impact conditions as well as to the resulting demolition of the aircraft and its major components.

Recommendations following the study are: (1) All aviation medical and rescue personnel be alerted to the frequency of concussion and lower extremity fractures that may be expected among survivors of severe but survivable transport accidents. (2) All non-medical rescue personnel be trained in the proper handling of survivors sustaining the types of injuries which may normally be expected in such accidents. (3) Seat tie-down (anchorage) strength be increased to prevent complete failure of the seats prior to demolition of the basic fuselage structure. (4) All seats and components adjacent to the occupants be adequately delethalized. (5) All possible means of preventing post-crash fires be utilized in order to provide sufficient time to evacuate all occupants.

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Hasbrook, A. H., W. R. Knowles, J. Carroll and H. Roegner 1958 A FIXED-WING CRASH-INJURY REPORT FORM.
(Cornell-Guggenheim Aviation Safety Center, New York, N.Y.) AvCir 56-0-97. (Office of Naval Research, Washington, D. C.) Contract No. Nonr-401(21).

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Hasbrook, A. H., S. Macri, & M. H. Piazza 1958 PRELIMINARY REPORT - HEADINGS FOR IBM CODING OF CRASH INJURY AND SURVIVAL DATA FROM HELICOPTER AND LIGHT-PLANE ACCIDENTS. (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc., Phoenix, Arizona) Aug. 1958

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Hasbrook, A. H., H. F. Roegner, & W. R. Knowles 1958 AvCIR ANALYSIS AND PHOTOGRAPHIC REPORT, NEW YORK AIRWAYS SIKORSKY S-58 ACCIDENT, LA GUARDIA AIRPORT, FLUSHING, NEW YORK, NOVEMBER 30, 1956 (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc., Phoenix, Arizona) Report AvCIR-7-PR-95, Apr. 1958

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Hasbrook, A.H. 1959 MAGNITUDE DURATION AND RATE OF ONSET OF MEAN DECELERATIONS SUSTAINED BY NINE (9) SURVIVORS OF FREE FALLS FROM HEIGHTS OF 55 to 185 FEET (FROM DE HAVEN, 1942). Av-CIR Human Factors Design Data Sheet. Av-CIR of Flight Safety Found.

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Hasbrook, A.H 1959 HUMAN IMPACT SURVIVAL AT 162 G. (Cornell-Guggenheim Aviation Safety Ctr., New York) Rept. Av-CIR-58-0-101, March 1959. ASTIA AD 219 196

ABSTRACT: This report is a condensed version of a report entitled 'Informative Accident No. 7" dated 7 May 1948, written by Hugh DeHaven and Ruth M. Petry of Crash Injury Research, Cornell Univ. Med. College.

A free fall, survived by a man, involving an impact of approximately 162 g for 0.014 second and an onset rate in excess of 22,000 g per second, is reviewed for its significance in the problem of crash safety. His injuries were largely confined to the left side of his body; he sustained fractures of the left ankle, a chip fracture of the right ankle and a linear fracture of the left side of the lower jaw. He also evidenced rigidity of the abdomen, which suggested the possibility of either spinal injury or injury of the abdominal viscera, this rigidity, however, subsided uneventfully in a short time. There were also a few red blood cells in his urine and he coughed up a little blood and complained of pain in the chest for a period not exceeding thirty-six hours. His recovery from all these injuries was rapid.

2,396

Hasbrook, A. H., J. Carroll, H. F. Roegner, G. M. Bruggink, & W. R. Knowles 1959 PRELIMINARY PHOTOGRAPHIC EVALUATION OF OTTER ACCIDENT, FORT CARSON, COLORADO (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc., Phoenix, Arizona) Report AvCIR-9-PR-104, Sept. 1959

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Hasbrook, A. H. 1959 SEVERITY OF INJURY IN LIGHTPLANE ACCIDENTS; A STUDY OF INJURY RATE, AIRCRAFT DAMAGE, ACCIDENT SEVERITY, IMPACT ANGLE, AND IMPACT SPEED INVOLVING 1596 PERSONS IN 913 LIGHTPLANE ACCIDENTS. (Aviation Crash Injury Research, A Divison of Flight Safety Foundation, Inc., Phoenix, Ariz.) Report AvCIR-6-SS-105, July 1959

2,398

Hasbrook, A. H. 1960 "CRASH-SAFE" DESIGN CAN MAKE MANY ACCIDENTS SURVIVABLE Space Aeronautics, 34(3):79-87, Sept. 1960.

ABSTRACT: This article reviews some statistics from a ten-year study (1942 to 1952) of approximately 900 lightplane accidents. The main tabulation presents number of people injured and degree of injury as a function of: over-all accident damage, impact speed, cabin damage, and structural damage in the seat area. These figures are related to design for "survivability" and some general recommendations are made. (Tufts)

2,399

Hasbrook, Howard A. 1962 CRASH SAFETY
(Paper, Medical Symposium at C.A.R.I. October 20, 1962)

ABSTRACT: The philosophy of crash safety is based on the understanding that some accidents will occur despite the best efforts of industry and government to prevent accidents. To date, crash survival study has been limited because of two reasons. First, it has taken this length of time to evoke the interest of a sufficient number of scientists, engineers, leaders, and organizations. Second, there has been no public support for crash safety design resulting from research.

The first major group to do crash safety work was the Protection and Survival Branch of the Civil Aeromedical Research Institute. Past research and crash injury investigation has shown that the human body can withstand enormous impact force for a brief period of time (measured in milliseconds) and in many cases can surviva - with little injury- forces capable of destroying aircraft structure. In fact, this has led to a broad classification of accidents as survivable or non-survivable. We must develop data defining the explicit and definitive limits of crash tolerance of not only the human body as a whole but of each vital organ.

2,400

Hasbrook, A. H. & J. C. Earley 1962 FAILURE OF REARWARD FACING SEAT-BACKS AND RESULTING INJURIES IN A SURVIVABLE TRANSPORT ACCIDENT. (U. S. Civil Aeromed. Res. Inst., Oklahoma City, Oklahoma) 62-7:1-11, April, 1962.

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Hasbrook, A. H., J. D. Garner, & C. C. Snow 1962 EVACUATION PATTERN ANALYSIS OF A SURVIVABLE COMMERCIAL AIRCRAFT CRASH. (Civil Aeromedical Research Institute, Federal Aviation Agency, Oklahoma City, Oklahoma) Rept. No. 62-9; ASTIA AD-282 893; May 1962

ABSTRACT: The evacuation pattern of 99 of 106 survivors of a jet transport crash involving a post crash fire is described, factors possibly effecting the suffocation and ultimate death of 16 passengers are listed and photographs and diagrams are presented. (AUTHOR)

2,402

Hass, G. 1943 AN ANALYSIS OF RELATIONS BETWEEN FORCE, AIRCRAFT STRUCTURE AND INJURIES TO PERSONNEL INVOLVED IN AIRCRAFT ACCIDENTS WITH RECOMMENDATIONS FOR SAFER PRINCIPLES IN DESIGN OF CERTAIN TYPES OF AIRCRAFT (School of Aviation Medicine, Randolph Air Force Base, Tex.) Proj. no. 187 Rept. no. 1 1 Nov. 1943. ASTIA AD 131 867

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Hass, G. 1943 RELATIONS BETWEEN INJURIES DUE TO AIRCRAFT ACCIDENTS AT BROOKS FIELD, TEXAS IN 1942 AND THE CAUSES AND NATURE OF THE ACCIDENTS. (War Dept., Air Forces, Randolph Field, Texas) #144 (1), 29 April 1943

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Hass, G. M. 1944 INTERNAL INJURIES OF PERSONNEL INVOLVED IN AIRCRAFT ACCIDENTS.
Air Surgeon's Bull. 1:5.

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Hass, G. M. 1944 TYPES OF INTERNAL INJURIES OF PERSONNEL INVOLVED IN AIRCRAFT ACCIDENTS.
J. Aviation Med. 15:77-84.

ABSTRACT: The author comments on internal injuries which offer new problems in pathognesis, diagnosis and treatment. In the general case, the occupant of a rapidly decelerated aircraft is held securely in his seat by the safety belt and is momentarily subjected to the action of very large forces. The forces may be resolved along the three principal axes. At times, the vertical seat to head forces are very large. At other times, the anteroposterior forces are large. In still other instances, lateral forces directed in the long axis of the wings are large. Whenever one part of the body is decelerated at a rate which is different from that of another part of the body, the connections between the two parts are placed under stress which is proportional to the differences in the rates of deceleration. That difference in rate of deceleration causes injury.

2,406

Hass, G.M. 1944 UNSUCCESSFUL USE OF PARACHUTES AND CASES RESULTING FROM FORCES GENERATED BY AIRCRAFT SPINS. Air Surg. Bull., 1:6-7

ABSTRACT: Fliers should be informed that if they are immobilized by a force of sufficient magnitude to cause blackout on standing they should crawl to the nearest exit keeping the trunk and head parallel to the long axis of the fuselage.

Among the causes of nonuse of parachutes may be (1) limitations of speed and accuracy of physiologic reactions, such as slow perception or reaction to stimulus of a stall abnormal attitude or direction of spin; acute disorientation or vertigo; (2) improper spatial relations between occupants and avenues or facilities of escape; (3) inadequate spatial relations between the aircraft and the occupant or his opening parachute after the occupant has jumped from the aircraft.

2,407

Hass, G.M. 1944 RELATIONS BETWEEN FORCE, MAJOR INJURIES AND AIRCRAFT STRUCTURE WITH SUGGESTIONS FOR SAFETY IN DESIGN OF AIRCRAFT. J. Aviation Med. 15:395-400

ABSTRACT: Pathological findings in aviators who have been subjected to the barely survivable range of impact are described in detail. The prevention of injuries is of greater importance than their diagnosis and treatment.

Hazardous structures are present in the cockpit and should be eliminated. Collapse of the cockpit structure also causes injury. Emergency escapes are not adequate.

Data concerning the tolerance of the body to impact have not been obtained quantitatively in ranges of impact involving large force and brief time need to be known and is now being studied with animal experimentation.

Above 500 ft. the only chance of survival is by parachute. Corrective measures for emergency escape are needed.

2,408

Hatch, H. G., Jr. 1959 EFFECTS OF WATER LANDING IMPACT ON AN ORBITAL CAPSULE FROM THE STANDPOINT OF OCCUPANT PROTECTION. (National Aeronautics and Space Administration, Washington, D. C.) NASA TN D-39, 17 Sept. 1959. ASTIA AD 225 620.

SUMMARY: The terminal phase of the flight on one type of manned orbital capsule consists of a parachute descent through the lower atmosphere with a landing on water. One proposed configuration is a conical-shaped capsule with a segment of a sphere as the bottom. The spherical surface would be used as the landing surface as well as the re-entry surface. A form fitted heat shield would be attached to the bottom to provide protection during reentry and may be jettisoned before landing, if desired. The water-landing characteristics of this type cap-

sule were investigated and it was found that acceleration onset rates of 25,000 g/sec with an acceleration varying between [illegible] g and 60 g, depending upon the impact conditions, should be expected for an impact velocity of 30 ft/sec. This velocity is a reasonable parachute descent speed. Literature on human tolerance to rapid acceleration indicates that an acceleration rate of 1,500 g/sec to a 40 g level is about the maximum a human can endure without injury. The duration of the 40 g level should not be more than 0.1 second. For this acceleration, at an initial velocity of 30 ft/sec, the distance required to stop is 8.54 inches. If the capsule were provided with some means (internal or externally) to ease the occupant down 8.54 in. within the tolerable acceleration limits during impact, he could survive the landing. Internally, the cushioning could be achieved with a crushable structure or a mechanical spring system. (Author)

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Haurann, W. 1930 DIE WIRBELBRUCHE UND IHRE ENDERGEBNISSE. (Stuttgart: Ferdinand Enke, 1930)

2,410

Hausknecht, D. F. & R. P. Vaitys 1961 AN INVESTIGATION OF TWO METHODS OF ARRESTMENT OF HIGH-SPEED AIRCRAFT. (American Machine and Foundry Co., Niles, Ill.) ASD TN 61-128. ASTIA Doc. No. AD-268 378.

ABSTRACT: Two methods of aircraft arrestment are investigated to determine their suitability for aircraft landing speeds far above the capabilities of present systems. One method is preacceleration of components of a present arresting system to reduce the relative impact velocity between the aircraft and preaccelerated components. Energy requirements and tolerances affecting timing of the preacceleration are investigated and illustrated with numerical examples. The other method is the use of an energy-absorbing material in the cable of an arresting system to obviate a separate arresting engine. Basic formulas for interactions of waves in a yielding cable are developed. The formulas are applied in numerical examples for specific arrangements of the cable. Results indicate that both methods offer sufficient promise of success to be worthy of development. (Author)

2,411

Hauty, G. T., & G. R. Wendt 1953 STUDIES OF VESTIBULAR FUNCTION. I. The Duration of Primary Nystagmus as a Function of Speed of Rotation and of Acceleration. J. Psychol. 36:143-151

Hauty, G. T. 1953 PRIMARY OCULAR NYSTAGMUS AS A FUNCTION OF INTENSITY AND DURATION OF ACCELERATION. J. exp. Psychol. 46:162-170, Sept. 1953

ABSTRACT: Three male students were selected after appropriate preliminary examination. One was subjected to five different velocities of rotation, 180°/sec. to 12°/sec., reached by each of six different accelerations, a total range of 360°/sec.² to 1 °/sec.². The other two Ss served in spot-checks at critical stimulating conditions. The head was fixed so that forward inclination was approximately 15°. The trial consisted of a selected value of acceleration followed by 5 min. of constant rotation at a selected terminal velocity, then, a selected value of deceleration, and following this, a 5 min. stationary period. The entire sequence of nystagmic responses (primary and secondary of positive acceleration and primary and secondary of negative acceleration) were continuously recorded by the mirror recorder for recording eye movements through the closed lids. Two or more trials per stimulating condition were given on widely separated days.

2,413

Hauty, G. T. 1958 HUMAN PERFORMANCE IN THE SPACE TRAVEL ENVIRONMENT
In (Air University, School of Aviation Medicine, Randolph AFB, Texas) Reports on Space Medicine - 1958, Feb. 1958
See also (Air University, Maxwell AFB, Ala.) Air University Quarterly Review 10(2):

ABSTRACT: By necessity, man will have to be incorporated as an integral component in systems designed for extended space operations. Together with the other principal components, he will be subjected to extensive and systematic testing for reliability determinations. The need for such testing is occasioned not so much by a lack of information on human limitations as by the lack of information on the interactions of these inherent limitations with the conditions man will experience in space. Since these interactions are somewhat unique, a brief discussion of the presently obvious conditions peculiar to a closed ecological system in space and of certain relevant human limitations will serve to indicate what man's performance will have to tolerate.

2,414

Hauty, G. T. and G. R. Wendt 1960 SECONDARY OCULAR NYSTAGMUS AS A FUNCTION OF INTENSITY AND DURATION OF ACCELERATION
(School of Aviation Medicine, Brooks AFB, Tex.) Rept. no. 60-29; April 1960. ASTIA AD 241 862

ABSTRACT: Neither intensity nor duration of stimulation was found to be consistently related to the intensity and duration of secondary nystagmus. Yet, total secondary nystagmic output was directly related to the product of intensity and duration of stimulation and, moreover, was roughly one-half that of the total output of the preceding primary phase of nystagmus. These results, interpreted in the light of existing knowledge, suggest that the response characteristics of secondary nystagmus are determined by activity occurring in the vestibualr nuclei complex. (Author)

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Hawkins, R. D. 1955 ANALYZING SHOCK AND VIBRATION EFFECTS WITH HIGH SPEED PHOTOGRAPHY.
Machine Design. April 1955, 214-218.

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Hawkes, R. 1956 AEROMEDICINE REINFORCES FRAIL MAN.
Aviation Week 65(6):360-361, 363-365, 6 Aug. 1956

ABSTRACT: An overall view is presented of the basic and applied research carried out by branches of the Aero Medical Laboratory. The current ideas in research and design of oxygen systems, pressure breathing devices, and pressure suits are noted. Studies of the effects of acceleration and deceleration have culminated in the requirement of an escape capsule in all designs capable of supersonic speeds or high-altitude flight. Further, studies in aviation psychology, bioacoustics, vision in an empty visual field, and flight feeding are mentioned.

2,417

Hawkins, W. R., R. R. Hessberg and K. H. Houghton 1961 USAF IMPACT ACCELERATION PROGRAM AND FACILITIES.
(Presented at the Space Science Board Symposium on "Impact Acceleration Stress", 27-29 Nov. 1961).
(Brooks AFB, Tex.)

2,418

Hawkins, Willard R. & Rufus R. Hessberg 1962 USAF IMPACT ACCELERATION PROGRAM AND FACILITIES
(In: Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, pp. 313-322)

ABSTRACT: The purpose of the program is to establish criteria for design of manned aerospace vehicles in which accelerations, decelerations, buffeting, impact, and pressure differentials are to be encountered during any normal or emergency phase of flight. Actual determination of human tolerance to each conceivable dynamic complex would be prohibitive in terms of time, cost, and effort. The alternative is the elucidation of sound principles of estimating tolerance to complex biodynamic stress.

Two resources have, to date, permitted testing in areas potentially too dangerous to justify using human volunteers. The large primate has proven an excellent subject for such testing by virtue of his anatomical and physiological resemblance to man. The anthropomorphic dummy has been the second rescourse. In short, the perfect dummy will never approach the live primate in anthropomorphism.

The program ahead must be limited to carefully defining fundamental principles of Biodynamic interrelationships. These principles will, when verified, permit

calculations of tolerance estimates when dynamic input data are provided. The accuracy of such estimates depends on the capacity with which the program is pursued.

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Hawthorne, R. 1951 FLIGHT IN THE AEROPAUSE
Aviation Age 16(6, 29-31, Dec. 1951

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Hawthorne, R. 1958 AVIATION AGE RESEARCH AND DEVELOPMENT TECHNICAL HANDBOOK 1957-1958. (Conover - Mast Publications, Inc.)

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Haynes, A. L., R. H. Fredericks & W. J. Ruby 1956 AUTOMOTIVE COLLISION IMPACT PHENOMENA
(Ford Motor Company, Dearborn, Mich.)

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Haynes, A.L. 1961 IMPACT STUDIES OF THE UNITED STATES AUTOMOBILE INDUSTRY
(Paper, Symposium On Impact Acceleration Stress, Brooks Air Force Base, San Antonio, Texas, November 27-29, 1961)

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Haynes, A.L. 1962 AUTOMOTIVE IMPACT
In: Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, pp. 69-82

ABSTRACT: An outline is presented for some of the techniques employed for obtaining factual data on automotive impacts. These research studies have been conducted as part of an ever-expanding program to develop design features and methods for reducing occupant injuries in actual accidents. Some values of human tolerance to impact forces have been estimated by comparisons of actual accidents and occupant injury with the force and kinematic data obtained in research impact studies. Techniques have been developed for predicting the loading patterns and structural behavior characteristics which can be anticipated under particular crash-impact conditions. However, much less is known about the human response to impact loading. Studies in this field are underway at various medical centers, frequently with the financial sponsorship of automobile manufacturers. Statistical analysis of accidents involving late model cars have demonstrated that at reduction in occupant injuries already has been achieved.

2,424

Haynes, A. L. and H. R Liesner 1962 EXPERIMENTAL HEAD IMPACT STUDIES. (In M. K. Cragun, ed., The Fifth Stapp Automotive Crash and Field Demonstration Conference, Sept. 14-16, 1961) Pp. 158-170.

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Hayum, R. 1959 COMPENSATION OF A DIGITAL INTEGRATING ACCELEROMETER. (Master's Thesis, Instrumentation Lab., Mass. Inst. of Tech., Cambridge) (Contract AF 04(647)303) Rept. No. T-209, ASTIA Doc. No. AD-269 249.

ABSTRACT: Compensation of a Digital Integrating Accelerometer, necessitated by the unusual moding behavior of a nonlinear sampled-data system, is presented. With the system compensated, highest frequency limit cycles are established and system errors are minimized. A new configuration is proposed using a conventional torque generator microsyn as both a torquing and sensing device. The microsyn is commanded by a flip-flop. This pulsed microsyn also presents a convenient and easy method for attaining the compensation. REAC simulation is used to demonstrate the effect of the compensation and to illustrate the systems' dynamic behavior. Cross-coupling error is investigated to determine if any appreciable error is introduced. A pure sampled-data approach is presented to show a new method of analysis. The nonlinear difference equation of the compensated system is derived. Acceleration commands are given to the system with and without compensation and the resultant error in the indicated velocity is plotted. (Author)

2,426

Hazel, J.T. 1962 THE EFFECT OF DIRECTION, MAGNITUDE, AND DURATION OF BODY TILT ON SIZE ESTIMATION WITH VARIED SURROUND CONDITIONS. (Ph.D. thesis, Florida University, Gainesville, 1962) ASTIA AD 294 567

ABSTRACT: The effect of variations in the direction, extent, and duration of body tilt on the visual estimation of lengths of lines, when the lines are presented with different surrounds, are investigated.

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Head, H. 1920 THE SENSE OF STABILITY AND BALANCE IN THE AIR. Aviat. Med. Invest. Comm., Special Rept. Series No. 28, Med. Res. Council, London, 1919. (Reprinted in The Medical Problems of Flying. [London: His Majesty's Stationery Office, 1920.)

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Headley, R. N., R. F. Managan, J. W. Brinkley, & G. Lokatos 1960 HUMAN FACTOR RESPONSES DURING GROUND IMPACT. (Paper, 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960)

Headley, R. N., J. W. Brinkley, et al. 1960 HUMAN FACTORS RESPONSES DURING GROUND IMPACT. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 60-590, ASTIA AD-252 444; Nov. 1960
See also J. Aerospace Medicine 33(2):141-146, Feb. 1962

ABSTRACT: Forty-six vertical impact experiments utilizing a simulated B-70 escape capsule were conducted on eleven subjects in the seated position. Impact velocities ranged from 9.8 ft per sec. up to 30 ft per sec.; a crushable paper honeycomb material was employed as an impact attenuator. Three restraint systems were tested. Accelerometer data from the subjects revealed mean rates of onset of deceleration as high as 1620 g per sec. with maximum g-loadings up to 35 g. After conservative evaluation of the data, it was concluded that impact decelerations of 24 g with a velocity change of 30 ft per sec. and a rate of onset of 500 g per sec. can be tolerated by human subjects in the seated position. This tolerance was attained, however, by using a proper body restraint system with good upper torso support, proper torso and neck positioning, and by eliminating all possible elastic recoil components in the subject-support restraint complex. (AUTHOR)

2,430

Headley, R. N. 1961 HUMAN TOLERANCE AND LIMITATIONS TO ACCELERATION. In Bergeret, P., ed., Bio-Assay Techniques for Human Centrifuges and Physiological Effects of Acceleration. (London, New York, Paris: Pergamon Press, 1961) AGARDograph 48. Pp. 35-41.

ABSTRACT: Human tolerance and limitation to some of the accelerations anticipated in manned space travel have been discussed. Increased knowledge of the physiological and psychological sequence of events occuring during these accelerations is mandatory. Human factors investigation must keep abreast of rocket technology so that problems can be anticipated and remedied on the drawing board and not 500 miles out in space.

2,431

Headley, R. N., J. W. Brinkley, & K. K. Kaiser 1961 ABRUPT ACCELERATION OF HUMAN SUBJECTS IN THE SEMI-SUPINE POSITION. (Paper, 32nd Annual Meeting, Aerospace Medical Association, 24-27 April 1961, Chicago, Ill.)

ABSTRACT: One hundred and twenty experiments have been conducted to determine the salient biomechanics of human protection against the potentially fatal hazard

of abrupt acceleration during aerospace flight. Twenty human subjects have been exposed to acceleration forces ($+A_x$) of extremely short total duration, brief rise time, and magnitudes about fifty "g's". The acceleration profiles have been controlled by varying impact velocities and rate of attenuation. Numerous configurations of crushable paper and aluminum honey-comb have been utilized to attenuate velocities ranging up to 30 feet per second. Human volunteer subjects have been subjected to transverse impact in the semi-supine position using body support systems incorporating contoured, rigid, urethane couches and ureaformaldehyde sphere mattresses. This research effort has exposed new and unique problem areas and has led to development of new design criteria for protective body support and restraint systems. (Aerospace Medicine 32(3):234, Mar. 1961)

2,432

Headley, R.N, J.E. Brinkley, G. Lokatos and R.F. Managan 1962 HUMAN FACTORS RESPONSES DURING GROUND IMPACT. Aerospace Med., 33(2):141-146, Feb. 1962 ASTIA AD 252 444

ABSTRACT: Forty-six vertical impact experiments, utilizing a simulated B-70 escape capsule, were conducted on eleven subjects in the seated position (+Az) Three drops only are reported "in toto" in this report. Impact velocities ranged from 9.6 feet per second up to 30 feet per second, a crushable paper honeycomb material was employed as an impact attenuator. Three restraint systems were tested in this program: (1) the standard military lap belt-shoulder harness configuration, (2) an experimental nylon full-restraint suit, (3) an early prototype of the Stanley B-58 capsule restraint harness.

Accelerometer data recorded on the subjects revealed mean rates of onset of deceleration as high as 1620 "g" per second with maximum "g" loadings up to 35 "g". Complete pre-test and post-test clinical examinations were performed, and the only noteworthy finding was one episode of microscopic hematuria lasting for one month.

After a conservative evaluation of the data, the authors conclude that impact decelerations of 24 "g" with a velocity change of 30 feet per second and a rate of onset of 500 "g" per second (maximum calculated value) can be tolerated by human subjects in the seated position. This tolerance can only be attained, however, by the employment of a proper body restraint system with good upper torso support, proper torso and neck positioning, and by the elimination of all possible elastic recoil components in the subject-support restraint complex. (Authors)

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Heald, C. B. 1925 SOME MEDICAL ASPECTS OF AIR TRANSPORT J. Royal Aero. Soc. 29(174):246-268, June 1925

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Healy, F. 1959 NOTES ON THE BASIS OF OUTSIDE SAFETY DISTANCES FOR EXPLOSIVES INVOLVING THE RISK OF MASS EXPLOSION (Interdepartmental Explosives Storage and Transport Committee, Ministry of Works(Gt. Brit.)Rept. no. 3/7 EXPLOS. /43, March 1959, ASTIA AD-221 164

CONTENTS:
Safety distances used previous to post-war review
Information available for post-war review
Analysis of bomb damage
Tabulation of bomb damage and accidental damage in terms of RB
Relationship between actual explosion results and various safety distance curves
Estimates of the risk of werious damage with traversed explosives beyond proposed safety distances
Estimates of the risk of serious damage with untraversed explosives beyond proposed safety distances
Safety distances adopted for category Z explosives
Continuation of analysis of information from accidental explosions

2,435

Heden, C.-G. 1961 [HORIZONTAL-ROTOR CENTRIFUGE CONSTRUCTION REPORT]

SEE Karolinska Institutet

2,436

Heden, C. G. 1962 FINAL TECHNICAL REPORT UNDER CONTRACT DA-91-591-EUC-2036. (Karolinska Institutet, Bakteriologiska Institutionen, Stockholm, Sweden) Nov. 1961 - Nov. 1962. ASTIA AD 299 128

ABSTRACT: The physical and mechanical tests on the machine designed, calculated, and manufactured under this contract revealed that a heavy (112 kg without rotor and liquid) stainless steel rotor, cylindrical in shape, can be spun horizontally as a routine operation at speeds up to 15,000 r.p.m. on water lubricated bearings. The auxiliary devices permitting rapid starting and stopping and preventing heating of the test suspensions functioned very well. The bacterial cells (E. coli B) collected evenly in the cylindrical chambers at the periphery of the rotor, but, unlike in the light miniature rotor tested several years ago, larger amounts of cells tended to immobilize the suspending rods of aluminium. This was done so efficiently that only very violent motions would release them, thus permitting resuspension to take place. Since the situation was not improved by the use of heavier rods (stainless steel), a basic redesign of the rotor seemed necessary. Against this background the improvement of the sedimentation efficiency of the present rotor was only carried so far as was regarded useful to illustrate the main phenomena controlling the performance. Actually the efficiency was not pushed beyond 40 liters of E. coli culture per hour with a 95% sedimentation efficiency. It was strongly influenced by three phenomena;

pumping capacity, turbulence and foaming, each involving a number of parameters.

The experience gained in operating a horizontal rotor has been of great value, and a simplified rotor is now being designed to fit the housing and drive assembly used. It is shaped as a simple bowl, has a much larger sludge space and a single suspending roller retracted towards the center during sedimentation.

2,437

Hedlyn, J. M. 1959 NYSTAGMUS INDUCED BY VISUAL FEEDBACK. J. Opt. Soc. Amer. 49:729-730, July '959.

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Hegenwald, J. R., Jr. 1954 HUMAN TOLERANCE TO ACCELERATIONS. (North American Aviation, Inc., El Segundo,Calif.) Rept. No. NA 54-191 Feb. 1954.

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Hegenwald, J. F., Jr. 1956 THE ROLE OF THE EXPERIMENTAL TRACK IN EMERGENCY EGRESS SYSTEM DEVELOPMENT. (Paper, Third Annual Supersonic Track Symposium at U.S. Naval Ordnance Test Station, China Lake, California, 24-27 September 1956.)

2,440

Hegenwald, J. F., Jr. and W. V. Blockley 1956 SURVIVABLE SUPERSONIC EJECTION, A CASE STUDY TO CORRELATE ANALYTICAL, EXPERIMENTAL, AND MEDICAL DATA BY RECONSTRUCTION OF AN INCIDENT (North American Aviation, Inc., Los Angeles, Calif.) Rept. No. NA-56-452 ASTIA AD 138 762.

ABSTRACT: An anthropomorphic dummy, which was dressed and equipped in the manner of an inspection test pilot, was ejected 4 times from a simulated F-100 airplane cockpit at 533 to 677 kn. The objective was to obtain information which could be used to prevent the recurrence of injuries which were sustained by a pilot who was ejected from an F-100A airplane over the Pacific Ocean. All tests were performed by utilizing the M-5 catapult with an ejected weight of about 350 lb. The standard F-100 ejection seat colfiguration was employed, except for the incorporation of the drag parachute in later runs. In addition to the photographic coverage, continuous acceleration data were provided by means of a telemetering transmitter mounted within the dummy's torso. The pilot was believed to experience, at the head, (1) a maximal period of 290 msec with an acceleration greater than 20 g, (2) a period of 120 msec

at an acceleration above 35 g, (3) a peak acceleration of 64 g, and (4) a rate of onset of the peak of 700 g/sec; the direction of application was chest to back. The imposition of a single properly directed force vector upon the seat-man unit would benefit ejection seat escape in 3 main aspects: (1) orientation of the seat attitude to produce accelerative forces in physiologically favorable directions; (2) attenuation of acceleration magnitude at the seat occupant's extremities, and (3) improvement of aerodynamic lift characteristics.

2,441

Hegenwald, J.F. & E.A. Murphy 1957 SLED TESTING THE EMERGENCY ESCAPE SYSTEM: THE HUMAN FACTOR
Paper, ARS Spring Meeting, April 1957, Washington, D.C.

ABSTRACT: During escape from high-performance airplanes, the aircrew may be subjected to hazards of bodily accelerations, windblast, noise, pressure gradients, and equipment disintegration. Rocket-propelled sleds on the experimental track provide a ready medium for determination of the physiological, mechanical, and structural effects of escape unit ejection at all airspeeds. A primary design objective is aerodynamic control of the escape unit's actions after separation from the airplane; pitch-retarding and stabilization devices are investigated in the current program of North American Aviation to attenuate aircrew accelerations during ejection. The reactions of helmets, oxygen masks, parachutes and ejection seats are studied. Methods of securing and recording data are reviewed.

2,442

Hegenwald, J.F., Jr. & E.A. [illegible], Jr. 1957 SLED TESTING THE EMERGENCY ESCAPE SYSTEM: THE HUMAN FACTOR
Jet Propulsion 27(9): 1025-1028, Sept. 1957

ABSTRACT. Tests were made to assess [illegible] items of ejection equipment and also, using instrumented dummies, to determine the forces on the human frame. The test vehicle was designed for [illegible] standard 2.2 ks solid propellant rocket motors and was run on the Edwards Air Force Base high-speed track.

2,443

Hegenwald, J.F., Jr. & S. Oishi 1957 HUMAN TOLERANCE TO ACCELERATIONS: A PRACTICAL TOOL FOR THE ENGINEER. (Paper, 28th Annua. Meeting of the Aero Medical Association, Denver, Colo., May 6, 1957)
Rept. No. NA-57-425, 6 May 1957. rev. 13 June 1957. ASTIA AD 256 384

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Hegenwald, J.F., Jr. & S. Oishi 1957 HUMAN TOLERANCE TO ACCELERATIONS: A PRACTICAL TOOL FOR THE ENGINEER.
(North American Aviation, Inc., Los Angeles, Calif)
Report No. NA-57-425, 6 May 1957. ASTIA AD 256 384

2,445

Hegenwald, J.F., Jr., J.F. Madden & P.R. Penrod 1959 X-15 RESEARCH AIRCRAFT EMERGENCY ESCAPE SYSTEM
Paper, Joint Meeting of the Flight Test Panel and the Aeromedical Panel of the Adivsory Group for Aeronautical Research and Development, Athens, Greece. 11-15 May 1959 (AGARD Rept. No. 243) ASTIA AD 256 386

ABSTRACT: An extensive survey of alternate escape system types was made. The results indicate conclusively that an open ejection seat in conjunction with a full pressure protective garment best satisfy X-15 emergency escape requirements. An evaluation of available ejection seats which had demonstrated a supersonic capability revealed that modifications required to meet the specific requirements of cockpit compatibility, acceptance of the pressure suit, and use at very high Mach numbers, would be equivalent to complete redesign. A seat tailored to the X-15 offered the most acceptable solution. The completed test program has demonstrated that the aerodynamic, mechanical, structural, propulsive, and survival aspects of X-15 emergency escape system similar in concept to that incorporated in the X-15 will best satisfy escape requirements for currently projected manner orbital vehicles. (Author)

2,446

Hegenwald, J. F., Jr., H. L. Neumann, & E. A. Murphy, Jr. 1960 AERIAL AND SLED TESTING OF THE B-70 AIRCREW ESCAPE CAPSULE. (Paper Annual Symposium of the Society of Experimental Test Pilots at Los Angeles, California, 6-8 October 1960) also (Paper, Physiological Training Officer Symposium, School of Aviation Medicine, Brooks AFB, Texas, 6-10 February 1961) (Human Factors Group, Los Angeles Division, North American Aviation, Inc.)

SUMMARY: The test program was arranged to examine mechanical components individually at first and then progressively within complete subsystems. Wind tunnel work was begun early so that the stabilization configuration could be developed in time for full-scale air drop testing.
Recovery parachute experiments initiated the hardware field test phase. Characteristics such as deployment sequence, opening shock, tendency toward twisted lines, oscillation and rate of descent were determined.
As the program proceeded, supplementary system tests were conducted. Elements of the capsule, the rocket catapult, recovery mechanisms, impact attenuator, ballistic devices, and actuators were evaluated for incorporation in the prototype configuration. These tests were accomplished both by equipment suppliers and by North American Aviation, Inc. in the laboratory and in the field. Included were centrifuge, functional, and ballistic breadboard experiments; flotation,

survival, impact, structural and fatigue testing.
Weighted shell air drops, high altitude and minimum velocity ejections have been completed. Major sled testing is scheduled near the end of the program. In the final of two series of sled tests, full-scale ejections of prototype capsules containing anthropomorphic dummies will be effected at air vehicle maximum equivalent airspeed. (AUTHOR)

2,447

Hegenwald, J.F., Jr. 1962 ENVIRONMENTAL ASPECTS OF THE B-70 MACH 3 ESCAPE CAPSULE
Aerospace Medicine 33(8): 951-957, Aug. 1962

ABSTRACT: The first encapsulated seat to demonstrate safe ejection throughout the speed spectrum from 90 knots to supersonic, including ground-level escape at these speeds, the B-70 capsule is entering the qualification phase of the test program. Suitable aerodynamically for very high Mach numbers, the capsule is capable of providing emergency pressure protection for space vehicle crews as well as furnishing intra-atmospheric escape for winged reentry spaceflight.

The aircrew emergency escape system of the B-70 air vehicle provides safe egress at performance levels as high as Mach 3.0 above 70,000 feet and as low as 90 knots at zero altitude. The capsule's influence upon normal and emergency flight operations is discussed. Oxygen and pressurization provisions, as well as crew positioning and restraint devices, are described. The acceleration environment through all escape phases is presented in conjunction with unique communications and survival features.

2,448

Heim, J.W. 1937 A LABORATORY FOR RESEARCH IN AVIATION MEDICINE.
J. Aviation Med. 8(2):75-80

ABSTRACT: Discusses the physiological research laboratory of the Air Corps Materiel Division, Wright Field, Dayton Ohio. Enumerates equipment and apparatus available for research in aviation medicine. Lists projects completed and projects active (in June, 1937). (CARI)

2,449

Heinrich, H.G. 1961 SOME RESEARCH EFFORTS RELATED TO PROBLEMS OF AERODYNAMIC DECELERATION
(Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TN-60-276; November 1961; ASTIA AD 272 404

ABSTRACT: The status of research efforts designed to explain physical phenomena associated with the operation of aerodynamic decelerators, in particular textile

type parachutes, is presented. A theoretical approach to calculate the velocity and pressure distribution in the turbulent wake of basic bodies of revolution is outlined and compared to actual test results. The concept of the effective porosity of textile materials is developed, and its influence upon the aerodynamic and opening characteristics of conventional textile parachute canopies is discussed. The results of research efforts to reduce parachute inflation time with a minor increase of opening force are presented. (Author)

2,450

Heim, J.W., G.A. Hallen beck & J.C. Glazier 1946 **RATES AND TIMES OF FREE FALL OF ANTHROPOMORPHIC DUMMIES AND OF MAN.**
(USAF, AMC, Aero Med. Lab., Wright Field, Ohio)
Memo Rept. TSEAA-696-100, 1 March 1946.

2,451

Heinecke 1943 CATAPULT SEAT WITH GUNPOWDER PROPULSION
(Messerschmitt AG., Projektbuero, Augsburg) April 1943; ASTIA ATI 32382

ABSTRACT: An investigation is conducted to see if the weight of a jettisonable seat with compressed air propulsion could be decreased by using gunpowder for propulsion. Calculations were made to determine the powder loading, force, speed and acceleration. Results of these computations are shown in a pressure diagram and schematic drawings. Tests were made with the Heinkel air-pressure-propulsed catapult seat weighing 19 kg. It was possibl using gun powder for propulsion, to reduce this weight to 5 kg.

2,452

Heinemann, E. H. 1947 HIGH SPEED AIRCRAFT DEVELOPMENTS.
(Paper, American Society of Mechanical Engineers, National Aviation Meeting, May 28, 1947)

2,453

Heinrich, H.G., T. Riabokin et al 1963 THEORETICAL PARACHUTE INVESTIGATIONS
(Aeronautical Systems Division, Wright Patterson AFB, Ohio) Project No. 6065; Task No. 60252; Progress Rept. 24; ASTIA AD 405 507

ABSTRACT: This is the twenty-fourth quarterly report covering the time from 1 December 1962 to 28 February 1963 on the study program on basic information of Aerodynamic Deceleration. As in preceding reporting periods, work during this reporting period has been pursued in accordance with the technical program, and is described in the following sections of this report.

2,454

Heldane, J.B.S. 1951 BIOLOGICAL PROBLEMS OF SPACE FLIGHT. BIS Journal 10:154-158

ABSTRACT: A report on an informal talk in which the speaker discussed how man would live in a spaceship and on another planet, and the kind of life to be expected on another planet.

2,455

Hellebrandt, F. A., & E. B. Franseen 1943 PHYSIOLOGICAL STUDY OF THE VERTICAL STANCE OF MAN. Physiol. Rev. 23:220-255

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Hellems, H.K. and H.R. Bierman 1946 CHARACTERISTICS OF FORWARD MOTION OF PERSONNEL IN AN F4U-1 COCKPIT. (Naval Med. Research Inst., Bethesda, Md.) Project X-630(7), 19 June 1946.

2,457

Hemingway, A. 1943 ADAPTATION TO FLYING MOTION BY AIRSICK AVIATION STUDENTS (School of Aviation Medicine, USAF Randolph AFB, Tex.) Rept. No. 170-4, Dec. 1943. ASTIA ATI 117 793

ABSTRACT: One hundred and ninety-eight (198) airsick aviation students who had completed ten (10) hours of dual instruction in college training detachments were given a motion sickness swing test and a survey was made of the incidence of airsickness.

It was found that there was a progressive decrease in the incidence of airsickness during the training period of this group. Eighty-four (84) per cent were sick on the first flight and ten and five tenths (10.5) per cent on the last flight. In order to separate the chronic airsick from those who become adapted to flying motion, it is recommended that information on airsickness be obtained by an airsickness record from the instructor in the College Training Detachment.

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Hemingway, A. 1943 EFFECT OF BARBITAL ON SWING SICKNESS (School of Aviation Medicine, USAF Randolph AFB, Texas) Rept. No. 104-1, January 1943.

2,459

Hemingway, A. 1943 MOTION SICKNESS HISTORY AND RESULTS OF THE SWING TEST OF ONE HUNDRED AND SEVEN AIRSICK ELIMINEES FROM FLIGHT TRAINING (School of Aviation Medicine, USAF Randolph AFB, Texas) Rept. No. 170-2, September 1943

2,460

Hemingway, A. 1943 MOTION SICKNESS AMONG AIR CREW PERSONNEL. (Com. Aviat. M., U.S. Nat. Res. Counc., Washington)

2,461

Hemingway, A. 1943 INCIDENCE OF SWING SICKNESS IN EIGHT CATEGORIES OF ARMY PERSONNEL. (Com. Aviat. M., U.S. Nat. Res. Counc., Washington)

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Hemingway, A. 1943 IMPROVEMENTS IN DESIGN AND CONSTRUCTION OF SWING FOR TESTING INDIVIDUALS SUSCEPTIBLE TO MOTION SICKNESS (School of Aviation Medicine, USAF Randolph AFB, Texas) Rept. No. 84-2, February 1943

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Hemingway, A. 1943 THE EFFECT OF ENVIRONMENTAL TEMPERATURE ON MOTION SICKNESS (School of Aviation Medicine,USAF Randolph AFB, Texas) Rept. No. 170-3, November 1943

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Hemingway, A. 1943 EFFECT OF VASANO ON SWING SICKNESS (School of Aviation Medicine, USAF Randolph AFB, Texas) Rept.No. 110-1, March 1943

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Hemingway, A. 1944 COLD SWEATING IN MOTION SICKNESS
Am. J. of Physiol. 141(2):165-171, 1 April 1944.

ABSTRACT: Cold sweating in man caused by motion involving changing linear and centrifugal accelerations has been studied by using a galvanometric device to indicate the onset of sweating. It has been found that the sweating occurs as a result of motion and when the mouth temperature is falling, There appears to be no useful physiological purpose in cold sweating and the mechanism is probably part of a primitive defense reaction.

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Hemingway, A. 1945 CARDIOVASCULAR CHANGES IN MOTION SICKNESS. J. Aviation Med. 16:417

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Hemingway, A. 1945 INCIDENCE OF AIRSICKNESS IN CADETS DURING THEIR FIRST TEN FLIGHTS (School of Aviation Medicine, USAF Randolph AFB, Texas) Rept. No. 170-5 January 1945

2,468

Hemingway, A. 1946 ENVIRONMENTAL TEMPERATURE AND SWING SICKNESS. J. Aviation Med., 17 : 86

2,469

Hendler, E. 1952 DESCRIPTION OF THE HG-1 CATAPULT. (Paper presented at Conference on "Problems of Emergency Escape in High Speed Flight", 29-30 Sept. 1952, at Wright-Patterson AFB, Ohio) (Aeronautical Medical Equipment Lab., Naval Air Experimental Station, Philadelphia, Pa.) ASTIA AD-14 359

ABSTRACT: The HG-1 catapult is well suited to the study of the effects of abrupt impulsive forces on both biological and structural materials. The HG-1 is a pneumatically energized, hydraulically controlled mechanism. It is capable of accelerating a total load of 3,000 pounds from zero velocity to 80 knots in a distance of about none and one-quarter feet. Pickups measuring force and displacement derivatives with respect to time are mounted on the car and test load; velocity coils and photo-cells transmit signals whenever portions of the car pass specific positions, so that a continuous record of car displacement with time is prepared. Safety is provided by the shielded areas available for close observation of the shots and by continual improvements in operating techniques and equipment modifications. Air pressures required for launching are dissipated during the course of the shot, so that no potential energy remains in the system once the shot is completed.

2,470

Hendler, E. 1955 LINEAR ACCELERATION AS A SURVIVAL HAZARD IN AVIATION. (Aeronautical Medical Equipment Lab., Naval Air Experimental Station, Philadelphia, Pa.) ASTIA AD-59 333.
See also J. Aviation Med. 26(6):495-502, Dec. 1955.

ABSTRACT: Tolerance to applied g loads depends on many factors relating to its manner of application. In testing equipment designed to provide crash

protection, a special catapult has been used, and some of its properties are described. Peak accelerations measured in dummies, supported in many positions by various kinds of protective equipment, are significantly higher than the average car accelerations measured in the same direction. Violent movements of unrestrained parts of the dummies occurred during the catapult tests, and equipment failure generally occurred at average levels below 30 g measured on the catapult car. Some findings relating to the measurements and distribution of loads in restraining gear are discussed.

2,471

Hendler, E. & L.J. SantaMaria 1961 RESPONSE OF SUBJECTS TO SOME CONDITIONS OF A SIMULATED ORBITAL FLIGHT PATTERN
Aerospace Medicine 32(2): 126-133

ABSTRACT: Some of the physiological responses of subjects wearing ventilated full pressure suits and exposed to pressure and thermal profiles characteristic of extreme conditions of orbital flight patterns were presented. No significant physiological stress was evidenced in subjects exposed to a modified thermal profile, except for the sweating response of one subject. Exposure of experienced subjects to long duration thermal loads simulating relatively severe post-landing and full thermal profiles resulted in premature test termination when ventilating air temperature was more than a few degrees above initial mean skin temperature. (Author)

2,472

Hendler, E. 1962 BIOMECHANICS OF IMPULSIVE FORCES
(Naval Air Material Ctr., Philadelphia, Pa.) April 1962

2,473

Hendricks, W. & W.M. Bogart 1957 THE DIESEL-POWERED BALLISTIC CENTRIFUGE
(Allegany Ballistics Lab., Hercules Powder Co.) Rept. no. ABL/X-17; Contract NOrd-16640; Aug. 1957; ASTIA AD-149 006

ABSTRACT: A centrifuge for testing rockets and their components is described. A 500-bhp diesel engine drives a large variable displacement pump which forces oil through 6-in.-diam pipes to drive 2 constant-displacement hydraulic motors. The motors are located in a pit in the center of the centrifuge enclosure. The booms of the centrifuge can be controlled at any desired speed up to 80 rpm. At 80 rpm, a rocket 20 ft from the center post of the device will be subjected to an acceleration of 43 g. The permissible load at the boom tip is governed by the allowable bending moment at the section where the knee brace joins the boom (290,000 lb in.) For this moment, the maximum load at the boom tip is 3000 lb.

2,474

Hendrickson, R.M. 1958 BIBLIOGRAPHY ON SPACE MEDICINE (Los Alamos Scientific Lab., New Mexico) March 7, 1958

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Henricsson, H. 1957 BIO-MECHANICS AND TRAUMA: A BRIEF GENERAL REVIEW OF CURRENT PROBLEMS. Svenska Lak.-Tidn. 54(18):1433-1448, May 1957

2,476

Henriksson, N.G., C. Fernandez, and R.I. Kohut 1960 THE CALORIC TEST IN THE CAT (School of Aviation Medicine, Brooks AFB, Texas) 61-13; Nov. 1960; ASTIA AD-254 369

ABSTRACT: A simple device for fixing both head and body of the cat was designed so that the nystagmic reaction to caloric stimulation could be investigated. Nystagmographic tracings, relatively free of artificats induced by movements, were obtained of both ordinary and derived nystagmus. In order to produce a caloric reaction in the cat, it was necessary to set the temperature of the irrigating water to, at least 10 C. either below or above the rectal temperature (38 C.). Repetitive caloric stimulation with both cold and hot water was conducted under various conditions and the results were described for each. The data suggested the most appropriate way for obtaining reliable results with the caloric test in the cat. (Author)

2,477

Henry, J.P., et al. 1949 ANIMAL STUDIES OF THE EFFECTS OF HIGH NEGATIVE ACCELERATION. (USAF, AMC, Engng. Div., Wright-Patterson AFB, Ohio) Rept. No. 1, Memo Rept. MCREXD 695-74N, 20 Jan. 1949.

2,478

Henry, J. P., O. H. Gauer, E. E. Martin, S. S. Kety, & K. Kramer 1949 FACTORS DETERMINING CEREBRAL OXYGEN SUPPLY DURING POSITIVE ACCELERATION. Fed. Proc. 8:73

ABSTRACT: Extraordinarily low mean cephalic arterial pressures of less than 20-30 mm. Hg (blackout) can be endured during positive accelerations lasting as long as 3 minutes without loss of consciousness. When compared with the effects of a comparable drop in pressure during hemorrhagic shock, there is an unexpected retention of mental performance and orientation. In order more clearly to define the mechanisms involved, radial arterial and cerebral venous pressures, and arterial and cerebral venous oxygen saturations were measured in man during acceleration. These parameters were measured two at a time using electrically

operated gauges for the pressures and a Kramer glass cuvette oximeter for the oxygen saturations. The fall in arterial pressure at head level induced by the acceleration was closely followed by a drop in jugular venous pressure. In spite of black-out (4.5 g) one subject still had 60 mm. Hg mean pressure differential across the brain. The venous pressure became less negative as arterial pressure rose during the cardiovascular response to the sharp fall in arterial pressure induced in the carotid sinus by the acceleration. Typical changes in venous oxygen content were from 10.5 vols. % resting to 7.5 vols. % at blackout. Thus arterial as well as venous oxygen content should be known to determine the oxygen supply of the brain during prolonged acceleration. The extent of the fall in cerebral venous oxygen content at blackout points to an inadequacy of cerebral oxygen supply.

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Henry, J. P. 1950 REPORT ON 1950 SYMPOSIUM ON SPACE MEDICINE. J. Space Flight., 2 :850

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Henry, J.P., J.L. Gamble, R.S. Shaw, O.H. Gauer, E.E. Martin, P.J. Maher, & D.G. Simons 1950 STUDIES OF THE PHYSIOLOGY OF NEGATIVE ACCELERATION. (USAF, AMC, Wright-Patterson AFB, Ohio) TR 5953, Oct. 1950

ABSTRACT: When headward centrifugal forces of 3 g or more last for more than 5 to 10 seconds, they give rise to alarming symptoms including hemorrhages into the soft tissues of the neck and head, confusion, and unconsciousness. Past work is analyzed and fresh experimental data presented to demonstrate that in spite of these symptoms, protection against brain hemorrhage is given by the closed box of the skull. This is so effective that unprotected animals of human proportions can be exposed to 15 negative g withour rupture of the blood vessels, and no case of cerebral hemorrhage has yet been demonstrated following negative acceleration uncomplicated by asphyxia or trauma to the head. It is suggested that the danger of cerebral hemorrhage has been over-estimated and that the risks of such an accident following exposure of a human to 5 g are vanishingly small.

Considerable protection against the mechanical and reflex effects of headward centrifugal force can be provided in the upright seated position by applying outer-pressure by means of a neck-sealing helmet. Evidence is presented which suggests that human tolerance to negative acceleration can be increased by this means in the seated posture to at least 5 g for 10 seconds.

2,481

Henry, J. P., O. H. Gauer, S. S. Kety and K. Kramer 1951 FACTORS MAINTAINING CEREBRAL CIRCULATION DURING GRAVITATIONAL STRESS.
J. Clin. Investigation 30(3):292-300, March 1951.

ABSTRACT: Lambert and Wood have shown that the systolic pressure at eye level during exposures to acceleration producing blackout is less than 20 mm. Hg, and they have observed that the pressure often falls temporarily to zero. Rossen, Kapat and Anderson have shown that if the blood supply to the human brain is suddenly interrupted, consciousness is lost in six seconds. The circulation should, theoretically, be halted by an acceleration reducing mean arterial pressure at head level to near zero values. In spite of this, maintenance of consciousness has been reported during a blackout lasting three minutes on the human centrifuge. A survey of clinical experiences with syncope also showed extremely low values. This suggests that compensatory factors are at work. Therefore, to study cerebral circulatory competence during exposure to gravitational fields, measurement was made of the cerebral venous and arterial oxygen saturation during acceleration.

The mean arterial blood pressure at head level fell in direct proportion to the acceleration, attaining 30 mm. Hg at about 4 g. However, the mean cerebral venous oxygen saturation stayed materially unchanged and in two of the three series actually rose slightly in the 2 to 3 g range. Some fall occurs at higher accelerations but never to the critical values expected. Fast records of the behavior of the venous oxygen content during acceleration shows the same picture. Some compensatory effect must cause this constancy, possibly either vasodilation reducing cerbral resistance or a fall in venous pressure increasing the force driving the blood through the capillary bed.

It seemed possible that as a result of acceleration a negative pressure might develop in the intracranial veins which continuously sustained cerebral blood flow (and venous oxygen saturation) by partially compensating for the marked fall in cerebral arterial pressure. Measurements were taken at the superior jugular bulb during both brief and prolonged accelerations. Pressures ranging from 20 to 60 mm. Hg below ambient were found. Brief accelerations of abrupt onset gave the most marked pressure falls. This at no time balanced arterial pressure fall.

There is also evidence that active cerebral vasodilatation may occur during prolonged exposure to gravitational stress in the erect posture. (J. of Aviation Med. 23(2):195-196, April, 1952)

2,482

Henry, J.P. 1955 PHYSIOLOGICAL LABORATORIES IN ROCKETS.
Astronautics 2:22-26
See also Bull. Med. Res. 10(3):2-4, 1956

ABSTRACT: Photos and descriptions of the equipment installation in an Aerobee rocket used for upper-air research with live monkeys and mice.

2,483

Henry, J.P. 1956 PHYSIOLOGICAL LABORATORIES IN ROCKETS. Bull. Med. Res. 10(3):2-4
See also Astronautics 2:22-26, 1955.

2,484

Henry, J.P.,G.A. Eckstrand, R.R. Hessberg, D.G. Simons, et al. 1957 HUMAN FACTORS RESEARCH AND DEVELOPMENT PROGRAM FOR A MANNED SATELLITE. (Air Research and Development Command, Baltimore, Md.) ARDC TR 57 160, Oct. 1957. ASTIA AD-136 410.

ABSTRACT: This report presents a brief summary of the "state-of-the-art" in human factors research and development in providing a functioning man in space flight. An estimate that man can now be sent out into space for two hours is based upon present knowledge of such factors as: habitable atmosphere; acceleration; weightlessness; thermal radiation; escape; isolation and confinement; presentation and processing of information; work place layout; crew skills; selection and training; and motivation. In the above factors, areas of the unknown are indicated and estimates of time needed to achieve significant progress are made.

2,485

Henry, J.P. 1958 SOME CORRELATIONS BETWEEN PSYCHOLOGIC AND PHYSIOLOGIC EVENTS IN AVIATION BIOLOGY. J. Aviation Med. 29(3):171-179

ABSTRACT: There is a new understanding of the role played in psychologic events such as attention, sleep and emotional responses by the reticular activating system and structures in the temporal lobe: the amygdala, hippocacampus and pyriform cortex. The "breakoff phenomenon" in which a sense of isolation is experienced by pilots flying alone at altitude may be related to the disturbances induced by sensory deprivation and these in turn to altered function of the temporal lobe structures. 'Freezing," due to intense emotion, and "fainting" are discussed in relation to the influence that various afferent impulses and changes in the internal environment may have on the reticular activating system and hypothalamus. The mechanism of attention is related to the integrating role of the central internuncial system and the occurrence of differential subcortical inhibition. (Author)

2,486

Henry, J.P. 1960 PROJECT MERCURY, STATUS OF THE ANIMAL TEST PROGRAM. (NASA Space Task Group, Langley Field, Va.)
NASA Project Mercury Working Paper No. 158.

ABSTRACT: Outlines the origin and purposes of the animal test program,

details of the Mercury capsule animal program underway at AMFL, HAFB, pre-launch facilities at Cape Canaveral, operational aspects, information anticipated from the animal flights, and future research possibilities of the program. Appendices contain the animal-monitoring and flight-data plans and list the personnel involved in the animal program.

2,487

Henry, J.P. & J.D. Mosely 1961 THE MERCURY ANIMAL PROGRAM
(Paper, IAS-ARS Joint Natl. Meeting, June 13-16, 1961, Los Angeles, Calif)
Paper no. 61-158-1852, 17 pp.

ABSTRACT: A report is presented on several aspects of the MR-2 flight. Included are the dynamic considerations and the physiological and psychological responses of the subject to flight stress.

2,488

Henry, J. P. & C. D. Wheelwright 1961 BIOINSTRUMENTATION IN MR-3 FLIGHT.
(Paper, Conference on Results of the First U.S. Manned Suborbital Space Flight, June 6, 1961, NASA, Washington, D.C.)

2,489

Hering, H. E. 1927 NERVOUS REGULATION OF BLOOD PRESSURE AND CAUSE OF SYNCOPE IN SUDDEN CHANGE OF POSTURE.
München Med. Wchnschr. 74:1611-1613, Sept. 23, 1927.

2,490

Hermans, T.G. and R.B. Loucks 1947 ANNOTATED BIBLIOGRAPHY ON THE PSYCHOLOGICAL ASPECTS OF ORIENTATION AS THEY RELATE TO AVIATION.
(Aero Med. Lab., Engng. Div., AMC, Wright-Patterson AFB, Ohio)
Memorandum Report No. TSEAA-694-16A, 1 Dec. 1947. ASTIA ATI 115012

ABSTRACT: The purpose of this report is to make available to engineers, aircraft instrument manufacturers, and research personnel, a comprehensive bibliography and abstracts of scientific reports on psychological aspects of human orientation problems. The studies provide some basic information relative to the design of heading, attitude and navigation instruments whose function is to provide orientation or position information.

2,491

Herner and Company, Washington, D. C. 1959 BASIC RESEARCH RESUMES; A Survey of Basic Research Activities in the Air Research and Development Command. (Air Force Research Div., Air Research & Development Command, U. S. Air Force) AFOSR TR 59-204; PB 161291; Dec. 1959; ASTIA AD-232 933

2,492

Herner and Co. 1960 BASIC RESEARCH RESUMES 1960. A SURVEY OF BASIC RESEARCH ACTIVITIES IN THE OFFICE OF AEROSPACE RESEARCH. (USAF ARDC, Washington, D.C.) AFOSR TR 925. ASTIA AD 268 900.

ABSTRACT: The purpose of this second Basic Research Resumes is to promote the broad accessibility of information about fundamental research projects supported by the Air Research and Development Command. The volume is a by-product of a research project whose purpose is the comparative study of indexing systems for scientific information. The subject index used is a working example of one means of organizing highly technical information for search and retrieval. It utilizes a system involving the permutation of key terms in phrases describing the content of documents, or, as in the present case, project outlines. The descriptive phrases, drawn directly from the texts of the project outlines, gives as specifically as possible the subject of the work done, and where applicable the method used. Since there, as a rule, are as many descriptive phases per project outline as there are major subjects discussed, there is an unusual depth and informativeness of index entry. The effectiveness and look-up flexibility of this form of entry are enhanced by the permutation of key terms within descriptive phrases. (Author)

2,493

Herner and Company 1961 LIST OF FAA AND CAA TECHNICAL DEVELOPMENT REPORTS AND CAA RESEARCH REPORTS. (Library Branch, Federal Aviation Agency, Washington, D.C.) Dec. 1961. ASTIA AD 270 023.

ABSTRACT: Attached are the lists of CAA technical reports that have been indexed arranged by series number with complete title given. There are 421 Technical Development Reports and 95 Research Reports. Also attached is the list of subject headings developed and assigned to the 516 reports listed. Requests for subject searches based on the subject heading list are welcomed by the FAA Library Branch.

2,494

Herrick, R. M., R. F. Gray, & J. L. Brown 1955 POST ACCELERATION EFFECTS ON THE DISCRIMINATORY CAPACITIES OF SMALL ANIMALS. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 319; 31 Dec. 1955

ABSTRACT: An experimental program has been planed in terms of which sensory capacities and a variety of behavioral indices may be measured in laboratory animals. These measures may afford an index of effects of both chronic and acute exposures to acceleration. Special programming and recording equipment has been procured for this work.

2,495

Herrick, R. M., J. L. Meyers and R. E. Burke 1957 DISCRIMINATIVE BEHAVIOR FOLLOWING REPEATED EXPOSURE TO NEGATIVE ACCELERATION
(Naval Air Development Center, Johnsville, Pa.) NADC-MA-5716, 26 Nov. 1957
ASTIA AD 156 852
See also J. Avia. Med. 29(5):343-349, May 1958.

ABSTRACT: Rats were trained to make a simple light-dark discirmination. On successive days the rats were exposed for a three-minute period to a given negative G, and, fifty-five minutes later, tested on the discrimination. After five days at a given negative G level, the negative G level was increased 1 G unit. This procedure was continued until death occurred. After training, but before exposure to negative G, the rats pressed a lever at a median rate of about sixty times per minute in the presence of the positive stimulus (light) and at a median rate of about three presses per minute in the presence of the negative stimulus (darkness). Following repeated exposure to negative G the lever-pressing rate in the presence of the positive stimulus decreased (e.g., to about forty-five times per minute by the time 5.5 G was reached) while the rate in the presence of the negative stimulus did not change. The data indicate that, although the rate at which the rats responded decreased somewhat as a function of exposure to negative G, the discriminative behavior remained relatively unimpaired until death occurred.

2,496

Herrick, R.M. & G.H. Kydd 1959 SIMULATED JUNO II ACCELERATION PATTERN
(Naval Air Development Center, Johnsville, Pa.) Appendix to NADC-MA-5913, 21 Sept. 1959.

2,497

Herrick, R.M., G.H. Kydd, & R.L. Fenichel 1959 BEHAVIORAL AND PHYSIOLOGICAL EFFECTS OF EXPOSURE TO A SIMULATED JUNO II ACCELERATION PATTERN
(Aviation Medical Acceleration Laboratory, Naval Air Development Center, Johnsville, Pa.) Rept. NADC-MA 5913, 21 Sept. 1959. ASTIA AD 230 005.

ABSTRACT: The purpose of the present experiment was to determine how exposure to a simulated acceleration pattern of the Juno II missile system

affected the subsequent behavior of rats. The findings of the experiment indicate that, within the limits of the simulation, exposure to the acceleration pattern will not detrimentally affect rats either physiologically or behaviorally. This means that in an analysis of the results of a biosatellite study designed to evaluate the influence of zero G upon behavior the fact that the rats were exposed to the Juno II acceleration pattern may be ignored. (Author)

2,498

Herrick, R. M. 1961 ACCURACY OF LEVER-DISPLACEMENT BEHAVIOR OF RATS FOLLOWING EXPOSURE TO POSITIVE ACCELERATIONS. Aerospace Medicine 32(9):844-848, Sept. 1961
See also (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-6111; ASTIA AD-256 261; 19 April 1961

ABSTRACT: Rats were trained to press a T-bar handle of a response lever through an arc of at least 23.62 degrees but no greater than 28.76 degrees (Lever Position 5). This behavior was evaluated immediately following five minutes exposure to each of the following positive G values: 2, 5, 10, 15, 20. The behavior was not influenced at the lower G values. At the higher G values, the lever-pressing rate decreased, but the percentage of lever-presses made to Position 5 remained the same. (AUTHOR)

2,499

Herrick, R.M. 1961 ACCURACY OF LEVER-DISPLACEMENT BEHAVIOR OF RATS FOLLOWING EXPOSURE TO POSITIVE ACCELERATIONS.
(USN Aviation Medical Acceleration Lab., Johnsville, Pa.)
WepTask R360FR102/2021/R01101001 (6006M), Subtask MR005.15 0002.16, Rept. 5, Rept. NADC MA 6111, April 1961. ASTIA AD 256 261.

ABSTRACT: To determine how well animals can perform a finely coordinated movement following exposure to positive acceleration, rats were trained to depress a response lever handle through an arc of at least 23.62 degrees but not greater than 28.76 degrees and then to release the lever handle. Then the lever-pressing behavior was evaluated immediately following exposure to positive acceleration levels of 2, 5, 6, 15, and 20 g on successive days. The response data were presented as percentage of lever-presses made to each lever position during a one-hour test period on a control day and on a day immediately following exposure. (Tufts)

2,500

Herrick, R. M. 1961 EFFECT OF EXPOSURE TO THE CALEB MISSILE ACCELERATION PATTERN ON THE SUBSEQUENT BEHAVIOR OF RATS. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-6112, 14 June 1961

2,501

Herrick, R.M. 1961 PRECISION OF A LEVER-DISPLACEMENT RESPONSE OF RATS FOLLOWING EXPOSURES TO POSITIVE G.
(Paper, 32nd Annual Meeting of the Aerospace Medical Association, Palmer House, Chicago, Illinois, April 24-27, 1961)

ABSTRACT: For a lever-press to an interval between 23.6° and 28.8° of arc (21 min to 25.5 min of arc), rats received a reward. A press to any other distance, i.e., a press between 0° to 23.5° or between 28.9° to 44.0°, was not rewarded. Rats were well trained in this task. Then, this behavior was evaluated immediately following 3 minute exposure to the higher G levels, all lever-pressing behavior stopped temporarily, then resumed at a subnormal rate. Of the total number of presses made during a daily test period, the percentage (about 60 per cent) made to the "correct" interval was the same on the pre-g control days and on the g days. (Aerospace Med. 32(3):234. Mar. 1961)

2,502

Herrick, R.M., & P. Karnow 1961 A DISPLACEMENT-SENSING CONSTANT-TORQUE RESPONSE LEVER DESIGNED FOR USE IN SATELLITES. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA 6105, 3 Apr. 1961. ASTIA AD 255 595.

ABSTRACT: This report describes an animal response lever mechanism which (a) senses the displacement of the lever resulting from each press, (b) requires a constant torque throughout the total excursion of the lever arm, and (c) maintains the same torque characteristics under G. Calibration devices and techniques developed to evaluate the lever mechanism indicate its usefulness as a tool for the study of the effects of acceleration--including zero G--on behavior. Sample data on (a) lever-pressing rate, (b) frequency-displacement distributions, (c) characteristics of individual responses, and (d) the order of occurrence of different responses indicate the variety of data obtainable and the depth of analysis possible with the response mechanism.

2,503

Herrick, R.M. 1962 LEVER DISPLACEMENT DURING CONTINUOUS REINFORCEMENT AND DURING A "DISCRIMINATION"
(Naval Air Development Center, Aviation Medical Acceleration Lab., Johnsville, Pa.) Rept. No. NADC-MA-6209, 23 July 1962. NASA N62-14832.

ABSTRACT: In order to evaluate the influence of zero g or above-normal g on motor behavior in an animal, the normal motor behavior is required as a basis for measurement. Measurement was taken by the displacement of the T-bar handle during continuous reinforcement and during a discrimination. Although decreased motivation reduced the rate of lever-pressing, it had negligible effects on the distance the lever was pressed.

2,504

Herrick, R. M., & J. S. Denelsbeck 1963 A SYSTEM FOR PROGRAMING EXPERIMENTS AND FOR RECORDING AND ANALYZING DATA AUTOMATICALLY. (Naval Air Development Center, Johnsville, Pa.) NADC-MA-6302; 20 Feb. 1963

ABSTRACT: An inexpensive system designed for use in complex operant conditioning experiments is described. Some of its key features are: removable plugboards, time sharing of components, recordings suitable for automatic analysis. Included are flow diagrams of the system and sample logic diagrams for programing experiments and for analyzing data. (AUTHOR)

2,505

Herrington, L. P., H. Lamport, & E. C. Hoff 1942 HUMAN CENTRIFUGE. (Report of the Yale Aeromedical Research Unit) 30 Oct. 1942

ABSTRACT: A relatively inexpensive, 20-foot radius human centrifuge is described as follows. The centrifuge is driven through a reduction gear by a DC motor receiving power from an AC activated motor generator. If the current fails or the maximum speed is exceeded, the brake stops the centrifuge. The speed is controlled electronically.
Radial acceleration is proportional to the square of the rate of rotation. The control keeps the constant rate of change of the electric current proportional to the square of the rate of rotation. (This is a modification of the electric tachometer where the voltage is proportional to the revolutions per minute). A direct reading of the electric accelerometer is thus produced.
A more elaborate device permits the duplication of the "g" effect of any air maneuver by means of a photo cell following a "g"-time curve (called programming). The centrifuge gives a radial acceleration of 14 "g" in 5 seconds for the average-wright subject. Manufactured by Frank Hrubitz & Co., Salem, Oregon. Safety factor 12x.

2,506

Herrmann, W., & A. H. Jones 1961 SURVEY OF HYPERVELOCITY IMPACT INFORMATION. (Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge, Mass.) Rept. No. 99-1 (Subcontracted to Lincoln Lab., Mass. Inst. of Tech., Contract AF 19(604)7400); ASTIA AD-267 289

ABSTRACT: In this volume information relating to cratering and penetration in metallic targets has been gathered. Impact of compact particles, microparticles, and rods at normal and oblique incidence on quasi-infinite targets and on thin targets, multiple spaced targets, and shielded targets is considered. Experimental data are presented in tabular and graphical form for ready references. Available theories and semi-empirical theories, as well as empirical correlation equations are summarized and compared with each other and with the experimental data. For normal impact on quasi-infinite targets 2 empirical correlation expressions are deduced which are more generally applicable than previous expressions. A qualitative description of the cratering process is given, and realistic regions of impact are defined. Recommendations for future experimental and theoretical work are made. (AUTHOR)

2,507

Hersey, I. 1959 SOVIET BIOLOGICAL EXPERIMENTS
Astronautics, 4(2): 31, 80-81 Feb., 1959
See also: J. Aviation Med., 29: 781-84, 1958

ABSTRACT: A discussion is presented of Russian biological experimentation in space flight, as reviewed by A.G. Kousnetzov, chief of the physiology department of the Soviet Air Force Scientific Research Experimental Institute of Aviation Medicine in Moscow, in a paper delivered at the Third European Congress of Aviation Medicine, Louvain, Belgium, in September 1958. Soviet investigations of the effects of space flight on the human organism have been in progress since 1949. In the initial phase, animals encapsulated in hermetically sealed cabins were rocket-flown to heights of 100-210 km. and then ejected for return to earth by parachute. In the second phase, the capsule was eliminated, and the animal (in a special high-altitude suit) was separated by catapult from the descending rocket (at heights of 75-85 km. and of 39-46 km.) and parachuted to earth. The third phase of the experiments culminated in animal-rocket launchings to a height of 473 km. No major physiologic changes that could be regarded as resulting from acceleration, catapult launchings, or parachute descent from any of the altitudes studied were observed in the animals. A biological experiment which met all the conditions of space flight was realized with the launching of Sputnik II carrying the dog, Laika. During the crucial period between launching and the time the satellite was placed in orbit, the animal was in such a position as to sustain transverse acceleration. Data about the condition and behavior of the animal were successfully transmitted and received. Included was information on the effects of acceleration upon the frequency of heart contractions; the effects of zero-G conditions and weightlessness; the position of the dog's body in space; changes in the functional state of the nervous system; and changes in blood circulation and breathing. No physiologic manifestations of the effects of cosmic radiation on the animal were discovered.

2,508

Hershgold, E.J. 1959 X-RAY EXAMINATION OF THE HUMAN SUBJECT DURING TRANSVERSE ACCELERATIONS.
(Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: Visualization of the thoracic and abdominal viscera by X-ray examination has been accomplished in five human subjects centrifuged in various vectors of transverse acceleration. At 6 G of right sideward acceleration, striking shift of the mediastinum to the left occurs, the heart resting against the chest wall. The right hemidiaphragm is displaced downward and stretched taut beneath over-expanded lung, while the left hemidiaphragm is elevated. The left lung is quite dense. Barium swallowed under these conditions reveals the upper gastrointestinal tract to be flattened against the left wall of the abdomen. Several of the subjects experienced aching abdominal pain. The ECG at this time shows shifting of the transition zone and slight counterclockwise rotation and left axis deviation. Lateral films taken during forward acceleration in both the upright and 25° forward bending postures demonstrate obliteration of the posterior mediastinum by the retrodisplaced heart, and upward displacement of the diaphragm somewhat more marked in the upright subject. Vascular markings are lost in the anterior portions of the lungs, and there is backward displacement of the trachea and bronchi. There is significant contraction of the thoracic cavity in both

the sagittal and anteroposterior diameters, with resulting decrease of the lung area in these planes. This dimunition must result in a decreased lung volume, which, together with the visible changes in lung perfusion, could well explain the dyspnea during this acceleration vector.
(J. Aviation Med. 30(3):187)

2,509

Hershgold, E.J. 1960 ROENTGENOGRAPHIC STUDY OF HUMAN SUBJECTS DURING TRANSVERSE ACCELERATIONS.
(Wright Air Development Division, Wright-Patterson AFB, Oh o)
WADD TN 60-209, Aug. 1960. ASTIA AD 243 888.

ABSTRACT: Chest and abdominal roentgenograms of human subjects undergoing forward acceleration at 6 and 12 g, and left and right sideward accelerations at 6 g, demonstrate the sensitivity of the pulmonary circulation to simulated increased gravity and the vulnerability of the mediastinal and abdominal organs to displacement in this state. (Author)

2,510

Hershgold, E. J. 1960 X-RAY EXAMINATION OF THE HUMAN SUBJECT DURING TRANSVERSE ACCELERATION.
Aerospace Medicine 31(3):213-219.

SUMMARY: Chest and abdominal roentgenograms of human subjects undergoing forward acceleration at 6 and 12 g, and left and right sideward accelerations at 6 g, demonstrate the sensitivity of the pulmonary circulation to simulated increased gravity and the vulnerability as the mediastinal and abdominal organs to displacement in this state. (Author)

2,511

Hershgold, E. J. and S. H. Steiner 1960 CARDIOVASCULAR CHANGES DURING ACCELERATION STRESS IN DOGS. J. Appl. Physiol. 15:1065-1068, Nov. 1960.

ABSTRACT: The cardiac output, blood pressure, and heart rate of dogs were measured, and stroke volume and peripheral resistance were calculated during acceleration on a human centrifuge in positive and transverse vectors. During positive (headward) acceleration, the cardiac output and stroke volume were reduced, and peripheral resistance was increased. In the transverse vectors, cardiac output was stable or increased, stroke volume was stable, and peripheral resistance was reduced. The results suggest that the circulatory disturbances associated with positive acceleration may limit tolerance to acceleration, and may be avoided in transverse acceleration. (AUTHORS)

2,512

Hershgold, E. J., S. H. Steiner & L. A. Sapirstein 1960 AN IMPROVED PROCEDURE FOR THE DETERMINATION OF CARDIAC OUTPUT BY A CONDUCTIVITY METHOD. J. Appl. Physiol. 15(6):1062-1064.

ABSTRACT: The applicability of the hematocrit dilution technique employing arterial blood conductivity changes to the determination of the cardiac output has been extended by (a) electronic damping of the detecting circuits, which permits greater amplification of the signal without increasing the variability of the base line that occurs during each cardiac cycle, and by (b) development of a solution isoosmolar and isoconductive with plasma that substitutes for autogenous plasma in the procedure. The preparation of the synthetic solution is described. It is shown that this solution gives results indistinguishable from those obtained with plasma. Values are given for the conductivity and osmolarity of dog plasma.

2,513

Hertzberg, H. T. E., Daniels, Gilbert S. 1950 THE CENTER OF GRAVITY OF A FULLY LOADED F-86 EJECTION SEAT IN THE EJECTION POSITION. (U. S. Air Force, Air Materiel Command, Wright Field, Ohio) Report No. MCREXD-45341-4-5: 14 March 1950

CONCLUSIONS: The c.g. of an F-86a Ejection Seat has been measured by suspension in two positions under full load. It has been measured by suspension in two positions under full load. It has been shown that the c.g. varies for each individual according to size, weight, and body build, and also for the position of the subject on the seat. Thus the c.g. of an individual may be thought of as an area rather than a point.

2,514

Hess, J.L. 1956 THE APPROXIMATION OF THE RESPONSE OF THE HUMAN TORSO TO LARGE RAPIDLY APPLIED UPWARD ACCELERATIONS BY THAT OF AN ELASTIC ROD AND COMPARISON WITH EJECTION SEAT DATA
(Douglas Aircraft Co., Inc., El Segundo, Calif.) Rept. No. ES 26472; 26 Nov. 1956; ASTIA AD 125 558

ABSTRACT: It has been noticed that when the human body is subjected to very rapidly applied accelerations, the accelerations at points of the body can be considerably larger than the maximum value of the applied acceleration. This paper considers the case when the acceleration is applied along the line of the spine from seat to head as in ejection from aircraft and attempts to approximate the motion of the human torso under these conditions by that of an idealized, one-dimensiona, visco-elastic structure. The simple case of a homogeneous elastic rod is discussed in detail and its predictions compared with ejection seat data. The extensions to more complicated visco-elastic structures are discussed. It is concluded that the elastic rod is a fairly good first approximation, but that it is not sufficiently exact to be used in making quantitative predictions. It is also concluded that more complicate structures will require more and better data for their evaluation. (Author)

2,515

Hess, J.L. 1956 STUDIES ON THE ACCELERATION OF A BODY FROM REST PART I. THE APPROXIMATE CONSTANCY OF VELOCITIES PRODUCED BY TIME-DEPENDENT ACCELERATIONS HAVING EQUAL MAXIMUMS AND OPERATING OVER EQUAL DISTANCES. (Douglas Aircraft Company, Inc., El Segundo, Calif.) ES 26463. 15 Nov. 1956. ASTIA AD 125560

ABSTRACT: By analytical calculations for two representative classes of accelerations, by a discussion of the reasonableness of the conclusions for more general accelerations, and by consideration of experimental data, it is shown that, if a body is accelerated from rest through a fixed distance by accelerations having the same maximum value, the final velocities will differ by very little, regardless of the shape of the acceleration versus-time curve. Conclusions with regard to ejection seat design are drawn from this fact. The result, however, has more general applicability.

2,516

Hess, J. L. 1958 STUDIES ON THE ACCELERATION OF A BODY FROM REST. PART II. THE DEPENDENCE OF THE DISTANCE TRAVELED AND THE VELOCITY ATTAINED ON THE SHAPE AND INITIAL VALUE OF THE ACCELERATION CURVE FOR CERTAIN FAMILIES OF VELOCITY DEPENDENT ACCELERATIONS.
(Douglas Aircraft Co., Inc., El Segundo, Calif.)
Rept. no. ES 26708, 15 Nov. 1958. ASTIA AD 207 213

ABSTRACT: The situation is considered in which a body is being accelerated from rest by forces that are functions of its velocity. The relation between distance traveled, velocity attained, initial acceleration, and the slope and curvature of the acceleration-versus-velocity curve is obtained for 2 families of velocity-dependent accelerations. The results are discussed and exhibited graphically. The distance traveled and velocity attained are seen to be insensitive to changes in the other quantities in many cases of interest. For one of the families of accelerations a simple formula relating distance to velocity is obtained. The results are applicable to any physical situation for which the acceleration of a body is a function of its velocity: the take-off of any type of aircraft, the acceleration of a boat or automobile, hydraulic acceleration, and fluid deceleration such as is used in connection with rocket sleds. (Author)

2,517

Hess, J. L. and C. F. Lombard 1958 THEORETICAL INVESTIGATIONS OF DYNAMIC RESPONSE OF MAN TO HIGH VERTICAL ACCELERATIONS.
J. of Aviation Medicine 29(1):66-75, January 1958.

ABSTRACT: This article employs the mathematical theory of deformity to determine the safety of higher ejection velocities in the design of upward-ejecting

jettisonable seats for future aircraft. Since the structural strength of the spine is the chief limiting factor, a homogeneous elastic rod was used as a mathematical model to represent the spinal column. Oscillograph records of ejection tests on human subjects were obtained, and the acceleration of the free end of the elastic rod was computed as a function of time, assuming the prescribed acceleration of the other end to be equal to the acceleration of the seat bucket as taken from the oscillograph. Comparisons of experimental and theoretical accelerations are shown in graphs and tables.

2,518

Hessberg, R.R., Jr. 1957 ACCELERATIVE FORCES ASSOCIATED WITH LEAVING AND RE-ENTERING THE EARTH'S GRAVITATIONAL FIELD
American Astronautical Society Proceedings, 3rd Annual Meeting, New York, December 6-7, 1956. Pp. 95-100
See also J. Astronautics 4:6-8, 1957.

ABSTRACT: Accelerative forces associated with leaving and re-entering the earth's gravitational field are considered from the escape, space flight and re-entry approach.

2,519

Hessberg, R.R. Jr. 1957 ACCELERATION FORCES ASSOCIATED WITH LEAVING AND RE-ENTERING THE EARTH'S GRAVITATIONAL FIELD J. Astronautics 4: 6-8

ABSTRACT: Discussion of human experiments under acceleration forces, and presentation of theoretical calculations for these forces.

2,520

Hetherington, A. W., U. C. Luft, L. E. Moses, S. S. Wilks, H. B. Hale, H. G. Clamann, D. W. Aiken, & R. W. Briggs 1951 THE CARDIOVASCULAR AND RESPIRATORY RESPONSES OF PERSONNEL SUDDENLY EXPOSED TO VERY LOW TEMPERATURE WINDBLAST (School of Aviation Medicine, Randolph Field, Texas) Project No. 21-23-028; July 1951; ATI-116 833'

ABSTRACT: Seventy-nine subjects dressed in standard intermediate-weight USAF flying clothing were exposed to a -65 degrees F. windblast traveling 115 to 125 mph for 3 mins. The free-fall situation was further reproduced in some by the simulation of tumbling and introduction of moderate hypoxia. Only 3 minor cases of superficial cold injury were produced, these being due to local inadequacies of insulation. Skin temperatures did not fall to dangerously low levels. Changes in respiratory and heart rates, ECG, and blood pressure were within physio-

logical limits, and no indications of dangerous reactions were elicited. Rewarming at 70 to 85 degrees F. restored comfort quickly. It was concluded that a free-falling flyer could drop from 50,000 ft. without suffering serious harm, provided no skin areas are exposed. (AUTHOR)

2,521

Hetherington, A.W. 1960 A SUMMARY OF THE INFORMATION RECEIVED ON THE SECOND SOVIET BIOSATELLITE -- 1960 LAMBDA 1/SPUTNIK V
(Air Research Development Command, Andrews AFB)

ABSTRACT: This compilation from numerous sources, most of them from Tass and/or Radio Moscow, covering interviews, press conferences, and background interpretive stories released during the period Aug. 19-27, 1960, reports the successful flight of the Arknik to a maximum altitude of 320 km. It traveled 700,000 km, or approximately twice the distance from the earth to the moon. Precision of the guidance and braking system enabled landing the satellite itself, after ejection of the capsule, to within abt. 10 km of the calculated point. The weight of the satellite ship amounted to 4,600 kg. The biological payload contained both animals and plants. The condition of the dogs after landing did not differ from the condition observed during ground operation. It was established experimentally for the first time that animals endure normally the physiological stresses involved in the spaceship's descent from orbit and its landing. Some apparent improvements of Sputnik V upon Sputnik II are listed in this report.

2,522

Hetharington, A. W. RECENT STUDIES OF HUMAN REQUIREMENTS IN HYPERSONIC ESCAPE. (Directorate of Life Sciences Hdq., Air Research and Development Command, Andrews AFB, Washington, D. C.

2,523

Hiatt, R.W. 1958 ORIENTABLE CENTRIFUGE AND RECORDING EQUIPMENT FOR USE WITH BIRDS AND SMALL MAMMALS.
(Office of Naval Research, London) Technical Rept. No. ONRL-36-58, 23 April 1958. ASTIA AD 159-591.

ABSTRACT: An excellently constructed, highly versatile, orientable centrifuge for studying effects of acceleration on birds and small mammals, together with associated equipment for recording physical parameters and biological effects of rotation, have been built at the laboratory of Physiology, University of Milan, Italy. Brief descriptions of these pieces of apparatus and a diagram of the orientable centrifuge are included in this report. Using this equipment

investigators in this laboratory recently were able to demonstrate what may prove to be important neurophysiological differences in cerebellar potentials during and following tangential and centripetal acceleration in homing vs. non-homing pigeons and migratory vs. non-homing pigeons and migratory vs. non-migratory doves. (Author)

2,524

Hiatt, E.P., S.D. Leverett, & S. Bondurant 1958 COMPARISON OF REFLEX CONSTRICTION IN LEG AND FOREARM VEINS.
Fed. Proc. 17(1):70, March 1958.

ABSTRACT: Simultaneous observations of pressure changes within isolated forearm (FVS) and saphenous venous segments (SVS) have been used to compare reflex venomotion under various conditions in the 2 areas. The following data are based on 41 observations of pressure change in 4 subjects. Following a standardized Valsalva maneuver, FVS pressure increased by a mean of 10 ± 5 (SD) mm Hg while SVS pressure increased by 13 ± 6. Following immersion of a contralateral extremity in ice water, FVS pressure increased by 8 ± 9 while SVS increased by 15 ± 17. During positive acceleration (foot to head) on the human centrifuge, FVS pressure increased by 13 ± 4 while SVS pressure increased by 17 ± 10 after 3 g was attained following each of the stimuli. The large standard deviations reflect the wide range of venoconstrictor activity. Maximum pressure change in the absence of a specific stimulus was 4 mm Hg. Reflex constriction of saphenous venous segments is qualitatively comparable to that observed and previously described in forearm venous segments. Because the saphenous veins appeared to be consistently of greater diameter than the forearm veins, a greater increase in tension of this vein wall is suggested by this study.

2,525

Hiatt, E.P. 1959 BIODYNAMICS OF SPACE FLIGHT
Astronautics, 4(2):24-25, 70-74, Feb. 1959.

ABSTRACT: Acceleration problems attendant to space flight are discussed. Centrifuge studies indicate that man, although limited in position and movement during flight, can withstand the acceleration necessary to enter and return from space. When a man is accelerated headward (positive acceleration), the inertial effect tends to displace every part of his body footward. The physiologic limit to acceleration in this position is caused by difficulties in the circulation of the blood. These difficulties are manifested, first as a dimming of vision, then visual failure (blackout), and finally unconsciousness. The G level at which blackout occurs varies with the rate of increase of acceleration, with the light intensity, and with the psycho-physiologic state of the individual, among other things. Generally, blackout occurs in less than a minute at 4 to 6 G, and subject would lose vision and perhaps consciousness during the boost phase. The wearing of anti-G suit to compress the lower part of the body could add another G-minute or so to his tolerance, but he would still be vulnerable in most rocket

flights. In footward, or caudad acceleration (negative G), the inertial effect exerted on the blood in the longitudinally arranged great blood vessels around the eyes and in the nasal and sinus areas may leak blood. The circulation to the brain is protected in that it is in a water-filled rigid container, but the voluntary tolerance to acceleration in the caudad direction is still limited, being less than half a minute at 2 G and only a few seconds at higher levels. The body position most favorable to resisting the effects of acceleration is that in which the G vector is across one of the transverse axes of the body. The inertial effect is across the columns of blood in the large blood vessels so that gross effects on the circulation do not appear as readily as they do when the vector is parallel to the long, longitudinal vessels of the body. The principal limiting factor in transverse G is respiratory. Above 6 G it is difficult to inspire, so that the duration of tolerance at higher levels is limited to the breathholding time, which is shortened under conditions of acceleration by the involuntary increase in muscle activity (including cardiac muscle) which occurs in this situation. Backward acceleration tolerances may be important for reentry. The chief factor in determining tolerance in this position is the restraint system. Unlike forward acceleration, backward acceleration tends to throw the subject from his seat, with a restraint suit distributing the inertial force over wide surfaces, and with multiple tiedown points combined with good head restraint, the tolerance to backward acceleration of a man seated upright closely approaches that of forward acceleration.

2,526

Hiatt, E. P. 1960 BIODYNAMICS OF SPACE FLIGHT
In (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) PROCEEDINGS OF WADC SPACE TECHNOLOGY LECTURE SERIES, VOLUME 1 TECHNICAL AREAS. WADC TR 59-732; ASTIA AD-235 424; pp. 137-143

ABSTRACT: Man's ability to tolerate the high accelerations anticipated in space flight will be determined in a large part by his position in the rocket vehicle. The acceleration pattern of the launch phase has a variety of sawtooth curves varying in neight, duration, and number of stages. Experiences on the large centrifuge have shown that if man is positioned properly he can tolerate exposure to 3 peaks of acceleration up to 12 g's and totaling more than 13.7 g-minutes. The best position for the subject is seated, facing forward, with knees flexed and the body trunk leaning slightly toward the direction of acceleration. When re-entering the atmosphere, re-entry attitude control becomes very critical. The steeper the re-entry angle the greater the forces which exceed the tolerance of man. The forward facing subject will be thrown forward into the restraints. The design of the restraints largely determines man's ability to tolerate such deceleration effects.
Respiration is the chief limiting factor in body positions transverse to the acceleration vector. Other factors involve pain, due to the displacement of body organs,

and abnormal circulatory effects. Human performance diminishes as the weight of the body parts are multiplied by the "g's" of acceleration. Centrifuge experiments, however, have indicated little loss or discrimination and judgment when using finger-tip controls. There will exist aberrant situations where superimposed accelerations will exceed the voluntary tolerance limits of man. It has been shown that subjects immersed in a tank of water can double their tolerance in terms of g-minutes without appreciable impairment of mobility. This method still has not solved either the respiration or body organ displacement problems. Man's present tolerance limits undoubtedly will be extended by improved support and restraint equipment. (AUTHOR)

2,527

Hiatt, E.P. 1961 PRINCIPLES OF SAFETY MONITORING OF HAZARDOUS RESEARCH ON ACCELERATION UTILIZING HUMAN SUBJECTS. In Reports on Human Acceleration (National Academy of Sciences, National Research Council, Washington, D.C.) Publication No. 901, pp. 1-5. Library of Congress Card 61-60055. ASTIA AD 266 077.

ABSTRACT: Since there is an increasing number of devices for studying the effects of various patterns of acceleration on man, the Acceleration Panel has endeavored to consolidate the general principles of human experimentation pertinent to experimental work with these devices. These are as follows: (1) There must be voluntary consent of the subject, who should be made to understand the hazards to which he is exposed. (2) The probable gain in knowledge shall justify the risk. (3) The experiment must be designed to limit hazard with adequate preparation, physiological measurement for medical monitoring, and provision for quick termination in the event of emergency. This principle covers the essence of safety monitoring and will be expanded with more rules. It would be good if definite limits in "G" units could be given for acceleration investigation, but this would vary with each experimental situation, not only with the pattern of acceleration but with the position, support and restraint of the subject, not to mention the variability in subjects. As a capstone to the rules for safety listed above, it must be said that medical monitoring of acceleration experiments involving human subjects must be tailored to each situation and involve the equivalent of good clinical judgment to a large degree.

2,528

Hiatt, E.P., J.P. Meehan, & R. Galambos 1961 REPORTS ON HUMAN ACCELERATION: SAFETY MONITORING, PHYSIOLOGIC ENDPOINTS, PSYCHOLOGICAL TESTING. (National Academy of Sciences, National Research Council, Washington, D.C.) Publication 901; Library of Congress Catalog Card No. 61-60055; ASTIA AD 266 077.

CONTENTS:

Hiatt, E.P., Principles of Safety Monitoring of Hazardous Research on Acceleration Utilizing Human Subjects;
Meehan, J.P., Subjective Endpoints in Acceleration Experiments;
Galambos, R., Psychological Testing of Subjects Undergoing Acceleration Stress.

2,529

Hickam, J. B. and W. W. Pryor 1951 CARDIAC OUTPUT IN POSTURAL HYPOTENSION. J. Clin. Invest. 30:401-405.

2,530

Hickey, J. L. and V. A. Stembridge 1958 OCCURRENCE OF PULMONARY FAT AND TISSUE EMBOLISM IN AIRCRAFT ACCIDENT FATALITIES
J. of Aviation Medicine 29(11):787-793, November 1958

ABSTRACT: The incidence of pulmonary fat and tissue embolism as reported in the literature is briefly reviewed. One hundred routine autopsy cases with gross lung tissue available from the files of the Armed Forces Institute of Pathology were examined for pulmonary fat and tissue embolism. In fifty hospital deaths only one instance of fat embolism was found. In fifty forensic pathology cases, eleven showed fat embolism and one bone marrow embolism. No other tissue embolism was noted in this random sample. In 236 cases of aircraft accident fatalities having gross lung tissue available for study, pulmonary fat embolism was found in 120 (50.8 per cent). Bone marrow embolism was noted in seventeen cases, cerebral tissue embolism in three cases and hepatic tissue embolism in two. The occurrence and mechanism of fat embolism in fatal decompression sickness is discussed and a case is presented. Several other cases of aircraft accident fatalities with pulmonary fat and tissue embolism are presented.

2,531

Highly, F.M., G.T. Critz, & E. Hendler 1963 DETERMINATION OF HUMAN TOLERANCE TO NEGATIVE IMPACT ACCELERATION. PHASE I.
(Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 29-May 2, 1963)

CONCLUSIONS: Human tolerance to tailward impact acceleration is an entity not to be confused with tolerance to prolonged tailward acceleration as the modalities are distinct: with impact, the effect is dependent upon structural strength and visceral shearing stress, whereas with prolonged acceleration, the effect is increasingly dependent upon relative fluid shift.

Voluntary tolerance to acceleration is well below the injury threshold and is influenced by several factors, both human and engineering. In the present study, an attempt was made to define voluntary tolerance by the use of a sled mounted on a platform, rail-directed and pulsed by a controllable hydropneumatic piston.

Favorable factors to the project included healthy human volunteers of above average physical fitness and motivation, adequate restraint capabilities, and a minor attenuation of g by sled angle. Monitoring of the subject by telemetered vectorcardiography and electroencephalography and by high-speed photography aided more conventional pre- and post-run physical examinations.

Unfavorable factors included an open seat angle which favored "submarining" under the torso assembly, a fixed rate of g build-up which increased the jolt out of proportion to the G increase, and a less than ideal two-pulse oscillation in the accelerator.

Under these conditions, a final impact tailward acceleration of 10.5 g with subject acceleration of 17 G, rate of g 8140, was successfully tolerated. (Author)

2,532

Hill, J.H. 1957 EVALUATION OF THE TORSO-HEAD RESTRAINT SYSTEM AND THE INTEGRATED HARNESS RESTRAINT SYSTEM UNDER CONDITIONS OF ACCELERATION (U.S. Naval Air Dev. Ctr., Johnsville, Pa.) Letter Rept. TED-ADC-AE-5209; Serial 2621; 2 April 1959

2,533

Hill, J.H. 1957 PILOT'S ABILITY TO ACTUATE COCKPIT CONTROLS UNDER G CONDITIONS (U.S. Naval Air Development Center, Johnsville, Pa.) Rept. Ted-ADC-AE-6303.1; NADC-MA-LR21, April 1, 1957.

ABSTRACT: The purpose of this study was to determine the degree to which the omnienvironment high altitude full pressure flying suit, as compared to the summer flight suit, impedes the motor performance of the wearer under G conditions. Actuation of ejection controls was used as the test of motor performance since it is a gross motor task and any limitations of the full pressure suit on performance would be readily apparent. The ejection seat was installed in the centrifuge and the subjects wearing the suits were subjected to five conditions of positive G, v.z., fluctuating--high (max 6.5), constant (3.0), constant full pressure suits: (a) did not allow sufficient flexion of the legs for use of stirrups, (b) permitted adequate flexibility of arm movement to pull the face curtain up to and including 3 G, but restricted arm movement to such a degree that the face curtain could not be reached by any subject at 5 G, (c) did not appear to restrict less extensive movements of arms and legs, and (d) did not reduce the lateral movement of the subject under fluctuating G conditions.

2,534

Hill, J. H. and J. L. Brown 1958 COMPARATIVE EVALUATION OF A STANDARD FACE-CURTAIN AND AN EXPERIMENTAL D-RING LOCATED ON THE SEAT FRONTAS MODES OF ACTUATING EJECTION DURING EXPOSURE TO ACCELERATION. (USN, Air Dev. Ctr., Johnsville, Pa.) Rept. TED-ADC-AE-5205, 5 May 1958.

ABSTRACT: A comparative evaluation is presented of a standard face curtain and an experimental D-ring located on the seat front as modes of actuating

ejection during exposure to acceleration. The results are presented graphically in two forms. The time measures for both the successful and the unsuccessful attempts to eject are considered together in one distribution. The harmonic mean reaction time (the time required to initiate the ejection procedure) are presented for the two ejection controls under each orientation as a function of the G level. The action times, however, are consistently shorter for the D-ring for all the orientations of acceleration. It may be concluded that for ease of access during exposure to sustained accelerations in the orientations which were investigated, an ejection control located on the front of the ejection seat is superior to the standard face curtain.

2,535

Hill, J. H., & M. G. Webb 1959 PILOT'S ABILITY TO ACTUATE EJECTION CONTROLS; FINAL REPORT CONCERNING, (Naval Air Development Ctr., Johnsville, Pa.) Rept. No. MA-8-952; Proj. TED ADC AE 5205(NM 15 01 12.3; ASTIA AD-257 520

ABSTRACT: The purpose of this study was first to determine the effect of acceleration on a pilot's ability to actuate the ejection controls of two makes of ejection seats, the McDonnell-Stanley seat equipped with an experimental torso-head restraint system and the Martin-Baker G-5 seat with the integrated harness restraint system. It was also an objective of the study to determine the degree to which the Mark V exposure flight suit and Mark IV (Goodrich) and the AX-83 (Arrowhead) lightweight full pressure flight suit impeded a pilot in the actuation of the ejection controls when compared to his performance while wearing the summer flight suit. The results indicate that a pilot, under conditions of acceleration may not be able to reach either the face curtain or the D-ring. Any encumberences such as an exposure suit or a full pressure suit will decrease the probability of his successful ejection. Failure of the canopy to jettison upon operation of ejection control and the subsequent requirement for use of the emergency actuation control will further decrease this probability if he is wearing an inflated full pressure suit. (ASTIA)

2,536

Hill, L. 1895 THE INFLUENCE OF THE FORCE OF GRAVITY ON THE CIRCULATION OF THE BLOOD. J. Physiol. (London), 15:15-53

2,537

Hill, L., & H. Barnard 1897 THE INFLUENCE OF THE FORCE OF GRAVITY ON THE CIRCULATION. PART II. J. Physiol. (London) 21:323-352

2,538

Hill, P.R. & E. Schnitzer 1962 ROTATING MANNED SPACE STATIONS. Astronautics, 7(9):15-18. Sept. 1962.

ABSTRACT: There are many potential uses of manned space stations, including the following: (1) gravity research, (2) launch-platform experiments, (3) space-systems environmental research, (4) communications, (5) earth observation, and (6) astronomical observation. This list shows that few applications involve a requirement for artificial gravity. Presented is a graph defining the rotational characteristics needed in conjunction with interpretation of physiological responses (comfort zone). Elementary forms (cross, rim, flywheel, cylinder, axial modules, in plane modules) considered for space stations are evaluated and diagrammed.

2,539

Hill, Thomas C. & Harvey E. Savely 1948 TESTS OF T-8 INDOCTRINATION CATAPULT (Air Materiel Command, Engineering Division, United States Air Force) Serial No. MCREXD-695-66K, November 2, 1948. ASTIA ATI 123 462

ABSTRACT: The Frankford Arsenal was requested to build a catauplt essentially identical with the T-2 catapult, but chambered to fire the M-28 cartridge and with the provisions for the shear pin eliminated. Two such catapults, designated type T-8, were delivered to Headquarters Air Materiel Command in 1948. To date, 40 ejections have been made with one catapult using the M-28 cartridge. The results are shown in Appendix I. After repeated use the velocity developed by the catapult will begin to decrease. This reduction in velocity is ascribed by Frankford Arsenal to wear on the intermediate tube, which does not affect the reliability or safety of the catapult. From the standpoint of training value it appears that a velocity of at least 44 ft. per second should be produced by the catapult. The performance of the T-8 catapult is essentially the same as that of the T-2 and as such is satisfactory for indoctrination of personnel on test towers.

2,540

Hill, T.C. and R.S. Shaw 1948 PROPOSED TUMBLING STUDIES. (Wright Field, Dayton, Ohio) AMC Memo Rept. MCREXD-695-66J 18 March 1948. ASTIA ATI 123 463

ABSTRACT: In pilot escape from very high speed aircraft by means of ejection seat or capsule, tumbling is likely to occur from eccentric loading of the ejecting force or aerodynamic instability of the ejected part. This report considers possible limiting factors in human tolerance to tumbling and outlines an experimental program for the study of these factors. In Appendix I, the possible disabilities from tumbling have been outlined and are considered under four main headings: (a) Vestibular symptoms (b) Injury from very high intra-

vascular pressures at the outside of the arc. (c) Unconsciousness from interference with cardiac functions. (d) Structural damage from radial acceleration. The theoretical relationship between rotational velocity and venous pressure in the head has been calculated in Appendix #2. Dangerous magnitudes of venous pressure as established by previous work on negative acceleration may be expected at rotational velocities of approximately 2 r.p.s. and above. (See Appendix #3). A program is outlined in Appendices #4 and #5 for studying on both vertical and horizontal centrifuges the effects of tumbling on the human body. These centrifuges are of short radius and so constructed that the center of gravity may be at, or near, the center of rotation.

2,541

Hillier, G.H. 1962 AIRCRAFT ACCIDENT RECORDING.
(Aeroplane and Armament Experimental Establishment, Gt. Britain)
Rept. No. AAEE/Tech/225, ASTIA AD-333 807

2,542

MOTION PICTURE
Hirsch, A. E. 1961 EFFECTS OF SHIP SHOCK MOTION ON HUMANS AND DUMMIES
(Motion Picture, Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Material Center, Philadelphia, Pa., June 14-15, 1961)

2,543

Hirsch, A.E. 1962 A COMPARISON OF THE RESPONSES OF MEN AND DUMMIES TO SHIP SHOCK MOTIONS.
In Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, pp. 185-190

ABSTRACT: Tests in which men are exposed to hazardous shock environments are prohibited. With the exception of a few documented cases of accidental exposures to injury-producing accelerations, the bulk of our knowledge of man's response to hazardous shock motions has been derived from dummy or animal work. This is a report on some preliminary findings from tests made to determine the validity of the use of anthropomorphic dummies to simulate the response of man to intense accelerations of short duration, such as those met by shipboard personnel during mine or torpedo attack.

2,544

Hirshfeld, C. F. 1932 DISTURBING EFFECTS OF HORIZONTAL ACCELERATION. (Electric Railway Presidents' Conference Committee, New York, N. Y.) Bulletin No. 3, 27 September 1932.

ABSTRACT: The purpose of the investigation was to discover the best form of acceleration curve for the rapid starting of a street car, that is, the form which would cause the least discomfort to standing passengers; and to determine the maximum acceleration thus attainable. The methods used, the results obtained and the conclusions that were reached are reported in the present bulletin.

2,545

Hiss, R. J., G. B. Smith, Jr., & L. E. Lamb 1960 PITFALLS IN INTERPRETING ELECTROCARDIOGRAPHIC CHANGES OCCURRING WHILE MONITORING STRESS PROCEDURES. Aerospace Med. 31:9 - 18 Jan., 1960

ABSTRACT: This report has served to emphasize the marked lability of the electrocardiogram under certain physiological stresses which do not in fact impose any major stress upon the cardiovascular system. The changes in the electrocardiogram frequently noted as a result of stresses are not dissimilar from those clinical changes noted in the electrocardiograms recorded in the recumbent position in individuals with myocardial disease. The significance of the electrocardiographic changes under simple stresses such as orthostasis, hyperventilation, and pressure breathing prior to utilizing the electrocardiogram as a monitoring tool during experimental stresses is discussed. The influence of decreased ambient pressure alone on the electrocardiogram in individuals demonstrating orthostatic changes at ground level has been reported. No significant difference was detected which could be attributed to decreased ambient pressure.

2,546

Hitchcock, F.A. 1956 PRESENT STATUS OF SPACE MEDICINE. J. Astronautics 3(?):41-42, 51-52.

ABSTRACT: In addition to suitable environment in cabin of space ships, there are certain unavoidable physiologic stresses which must be tolerated, including accelerative forces incident to take-off from earth, effects of gravity free state, hazards involved in exposure to cosmic radiation and possibility of collision between space ship and meteorite; from physiologic and medical standpoints there seems to be no insuperable obstacles to space flight.

2,547

Hitchcock, F. A. 1956 SOME CONSIDERATIONS IN REGARD TO THE PHYSIOLOGY OF SPACE FLIGHT. Astronautica Acta Wien 2(1):20-24.

ABSTRACT: The physiological stresses that will be encountered in space flight are considered. Exposure to barometric pressures lower than 47 mm Hg (63,000

feet) will produce all of the harmful effects that would occur in a vacuum. Therefore from a physiological viewpoint any flight above 63,000 feet may be considered as space flight. In such flights sealed-cabins provided with an air conditioned artificial atmosphere must be used. While compressed, liquid or chemical oxygen might be satifactory for flights of short duration the biological method of providing such atmospheres is probably the best. Thermal stresses accelerative forces and cosmic radiation are some of the factors which must be considered. The physiological responses of living animals to a vacuum are unsurmountable.

2,548

Hitchcock, F.A. 1959 SPACE MEDICINE.
Modern Med., 27(18):210-218, 222, 226-228, 18 Sept. 1959.

ABSTRACT: A brief historical survey of early research of space medicine in the United States is presented. The engineer and the physiologist will both have an important function in the development of space travel. The engineer must develop three distinct types of space craft, all of which will be different in structure and function. The physiologist must concentrate his efforts on the types of stress that passengers and crew will experience. These stresses include: excessive acceleration, weightlessness, extreme heat, explosive decompression, supply problems, and composition and pressure of atmosphere.

2,549

Hixson, W. C., C. T. Paludan, & S. W. Downs, Jr. 1960 PRIMATE BIO-INSTRUMENTATION FOR TWO JUPITER BALLISTIC FLIGHTS. IRE Trans. Med. Elect. ME-7:318

ABSTRACT: A description is given of the bioinstrumentation phase of 2 related Army Jupiter ballistic missile flights (BioFlight 1, Dec. 13, 1958, and BioFlight 2, May 28, 1959) involving squirrel monkey passengers (Old Reliable and Baker, respectively), one of which (Baker) was recovered alive and in good physical condition. These flights marked the initial entry into space and successful return of a primate under ballistic flight conditions comparable to those to be encountered by man. The relationship of the instrumentation program to the biocapsule design in terms of the telemetered measurements is described. An outline is presented of the signal conditioning circuits and associated transducers used for the in-flight telemetry recording of the primate's electrocardiogram, respiration rate, chest sounds, and axilla body temperature. Instrumentation related to the recording of the ambient temperature and pressure of the biocapsule, flash temperatures, and cosmic-ray-particle tracks is also described. Data illustrations include: an excerpt from the raw telemetry record received during the free-fall portion of the Old Reliable flight, selected segments from the simultaneously occurring electrocardiogram and respiration rate signals received during the prelaunch, launch, postbooster cutoff, and free-fall periods for each animal, the

respiration signal during the Baker flight shown continuously from the prelaunch thru the postbooster cutoff phases to demonstrate the reliability of this measuring technique. Except for the temporary 60-second loss of the respiration-rate signal on the Old Reliable flight, all devices performed as desired for the entire telemetered flight-data period. In the case of the Baker flight, the physiological and environmental measurement channels were still in operating condition when tested aboard the recovery vessel.

2,550

Hixson, W. C., & J. I. Niven 1961 APPLICATION OF THE SYSTEM TRANSFER FUNCTION CONCEPT TO A MATHEMATICAL DESCRIPTION OF THE LABYRINTH. I. STEADY-STATE NYSTAGMUS RESPONSE TO SEMICIRCULAR CANAL STIMULATION BY ANGULAR ACCELERATION. (U.S. Naval School of Aviation Medicine, Pensacola, Fla. & the National Aeronautics and Space Administration) Joint Rept. MR005.13-6001; Subtask 1; Rept. No. 57; and NASA Order No. R-1; ASTIA AD-262 787

ABSTRACT: Existing theoretical formulations for the description of vestibular function are directed toward defining the physical characteristics of the cupula-endolymph system. A more comprehensive format capable of defining the dynamic behavior or performance characteristics would be desirable. The interpretive advantages offered by the application of the system transfer function concept to the description of the human cupula-nystagmus response to angular acceleration are discussed. A specific mathematical formulation has been developed for this concept with particular emphasis being given to the damping ratio and to the undamped characteristic angular frequency parameters which have been utilized so effectively in the control and servomechanisms areas to describe the performance of complex systems. The theoretical considerations involved in the use of the frequency response technique to analyze steady-state nystagmus response to sinusoidal rotation are outlined along with a demonstration of an actual experimental procedure which can be used to quantify these relationships. (AUTHOR)

2,551

Hixson, W. C., & J. I. Niven 1962 FREQUENCY RESPONSE OF THE HUMAN SEMICIRCULAR CANALS. II. NYSTAGMUS PHASE SHIFT AS A MEASURE OF NONLINEARITIES. (Naval School of Aviation Medicine, Pensacola, Fla.) Project MR005.13-6001 Subtask 1, Rept. No. 73; NASA Order No. R-37, 26 July 1962

ABSTRACT: The existence of nonlinearities in the steady-state response of the oculovestibular system to sinusoidal angular acceleration is demonstrated by evaluation of corneo-retinal potential recordings obtained at rotation frequencies of 0.02 to 0.20 cps with peak acceleration levels ranging from 10 to 80 deg/sec^2. The experimental and theoretical considerations involved in using the nystagmus transition technique to study these nonlinearities are discussed and an illustrative application of their quantification is presented. (AUTHOR)

2,552

Hodell, C.K. & A.H. Rosner 1957 EJECTION SEAT TESTS CONDUCTED ON THE 10,000 FOOT AERODYNAMIC RESEARCH TRACK AT EDWARDS AIR FORCE BASE (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 52-63; Nov. 1957. ASTIA AD 142 103

ABSTRACT: Eight ejection seat tests were conducted on the 10,000 ft. track from Dec. 1949 to July 1950 to analyze the resultant trajectories of the ejection seat and the acceleration forces imposed upon a dummy subject. The cockpit mockup was designed to simulate the forward cockpit opening of the XF-89 airplane with canopy removed. Instrumentation in the test carriage consisted of a complete telemetering recording system which transmitted intelligence via a mobile transmitter to receiving and recording equipment at a fixed station and a carriage motion recording system from which carriage velocity was obtained. Results indicate that ejection accelerations were not accurately determined because acceleration rocket burnout occurred at or near station of seat ejection, and the test vehicle porpoised because of clearance between vehicle slippers and railhead. The elastic structure of ejection seat and test vehicle, and stretching of harness assembly which held dummy in ejection seat also prevented accurate measurements. The deceleration forces imposed on the vehicle and seat were of such high magnitudes that in-flight seat trajectories could not be simulated. The seat should be ejected in a state of zero acceleration.

2,553

Hodge, J.D., C.C. Kraft, Jr., C.W. Mathews and S.A. Sjoberg 1962 OPERATION REQUIREMENTS AND PLANS. In Results of the First U.S. Manned Orbital Space Flight, February 20, 1962 NASA, Manned Spacecraft Ctr., Pp. 1-3

2,554

Hodgson, V.R., L.M. Patrick & H.R. Lissner 1963 EXPERIMENTAL RESPONSE OF THE SEATED HUMAN CADAVER TO ACCELERATION AND JERK WITH AND WITHOUT SEAT CUSHIONS. (Biomechanics Research Center, Wayne State University) June 1963.

ABSTRACT: This paper describes tests conducted on three cadavers in the seated position and accelerated in the caudocephalid direction, with 18 G jerk acceleration and jerk amplitudes to 2600 G's per second. Spring seats were used to observe effect of cushions. Experiments were conducted on a 120' vertical accelerator mounted in an elevator shaft. Strain gages were mounted on various vertebrae and accelerometers attached to the seat, and on crest of ilium, sternum and head. Each cadaver was restrained with head, arm, leg, shoulder and seat belts. The objective was to determine the effect of a jerk and cushion noticed on the response of a cadaver at various levels of acceleration, on the response of the human cadaver as a spring mass system, and on strain in the vertebral column. A number of conclusions were made; among these that no cushion is better than any cushion; jerk causes overshoot of strain or acceleration of increase almost linearly up to a maximum value dependent upon the mean acceleration, the degree of overshoot of acceleration on the body increases in seventy with distance from seat, and this overshoot is most severe and critical in some locations in the posterior parts of the vertebrae due to process interference during caudocephalid loading of the vertebral column. (CARI)

2,555

Hoekje, J. W. 1957 DOFL PROGRAM CENTRIFUGE
(Diamond Ordance Fuze Labs., Washington, D. C.) DOFL rept. no. TR-420
15 Jan. 1957, ASTIA AD 119 558

ABSTRACT: The ultralow-g centrifuge, designed and built in 1952 at NBS, was modified to provide a program centrifuge capable of generating a specific series of acceleration vs time (g vs t) function. To use the centrifuge, the required demand curve (g vs t) is replotted to derive the shape of the mask for the curve follower. This replotting includes the application of such correction and scaling factors as are required to convert a g vs t function into a proper centrifuge excitation vs time function. These corrections include conversion of acceleration to rounds/minute and compensation for motor hystersis The mask is then inserted into the curve follower which generates an electrical signal in proportion to the shape of the mask. This signal is fed into the cathode follower used to isolate the curve tracer from the dc amplifier. The signal from the cathode follower is amplified by the dc amplifier and then used to excite the generator which drives the centrifuge motor. Adequate instrumentation of the centrifuge is provided by a slip-ring assembly which provides 72 circuits. Preliminary tests indicate that a given g vs t function can be reproduced within 5% of the mask. The centrifuge is being used to test fuzes under development and is completely satisfactory.

2,556

Hoff, E. C., & J. F. Fulton 1942 BIBLIOGRAPHY OF AVIATION MEDICINE
(Menasha, Wisconsin: George Banta Publishing Co., 1942)

2,557

Hoff, P. M., E. C. Hoff, & J. F. Fulton 1944 A BIBLIOGRAPHY OF AVIATION MEDICINE
Supplement (Menasha, Wisconsin: George Banta Publishing Co., 1944)

2,558

Hoff, Wilhelm 1922 ANALYSIS OF STRESS IN GERMAN AIRPLANES.
(National Advisory Committee for Aeronautics, Washington, D. C.)
NACA Rept. No. 143

2,559

Hoffman, D.H. 1961 TRI-AXIAL AIRLINE SEAT LIMITS ACCELERATION
Aviation Week July 24, 1961. Pp. 95-100.

ABSTRACT: New airline transport seat that responds like a shock absorber to ground impacts has been designed to protect passengers from injury or death in survivable accidents. The "tri-axial acceleration seat" uses controlled

movement to dampen the peak g forces imposed on a passenger during sudden stops. The rearward facing seat, contoured to furnish protection on three sides, also would distribute impact g forces over a passenger's entire body, sparing skeletal joints and vital organs from unendurable pressures.

To obtain such resistance, the new seat would: (1) Automatically place reclining passengers in a more upright position to boost their acceleration tolerance. (2) Move with respect to the fuselage so as to absorb peak accelerations. (3) Consist of a metal shell foundation suspended from the cabin ceiling and attached to the cabin floor.

2,560

Hoffman, E.L., S.M. Stubbs and J.R. McGehee 1961 EFFECT OF A LOAD-ALLEVIATING STRUCTURE ON THE LANDING BEHAVIOR OF A REENTRY-CAPSULE MODEL. (National Aeronautics and Space Administration, Washington, D.C.) NASA TN D-811

ABSTRACT: A 1/6-scale dynamic model of a reentry capsule, with a compliable structure of aluminum-alloy legs to reduce impact loads in a simulated parachute landing, has been tested to determine behavior and accelerations during landings on concrete, sand, and water. Several combinations of flight paths and contact attitudes were investigated. Models were also tested with 1/4.1-scale and full-scale rectangular aluminum-alloy legs to evaluate the scaling characteristics of a compliable metal structure. A method is shown for calculating the landing accelerations for the 1/4.1-scale and full-scale leg tests at a 90° (vertical) flight-path angle and 0° contact attitude.

2,561

Hogland, R., & J. Thale 1958 RECOVERY FROM A SATELLITE ORBIT. (Presented at the ARS Semi-annual meeting, Los Angeles une 9-12, 1958) ARS Preprint 650-58

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Hoke, H. 1943 MEASUREMENTS OF UNDERCARRIAGE STRESSES DURING LANDING AND TAXYING
(Lilienthal Gesellschaft, Report No. 169, 1943, pp. 28-37)
R.A.E. Translation No. 278, ASTIA AD 266614

2,563

Holcomb, G. A. 1960 APPLICATION OF BASIC HUMAN ENGINEERING PRINCIPLES TO A COCKPIT DESIGN. Aerospace Medicine 31:674-677

Cockpit design has changed little since World War II, despite the existence of theoretic and experimental human engineering data which if utilized, would have provided the criteria for improved cockpit design. One of the major obstacles to achieving a satisfying cockpit organization has been the unilateral design of individual control boxes without regard to the boxes placed beside it in the cockpit. Task and link analysis techniques were extensively used to best locate the controls in the cockpit relative to each other and their operation. Use of vertical or horizontal lines of alignment made figure-ground organization easier than other alignment schemes. It tended to expose more of the panel to the viewer. Controls were grouped according to function and usage. Secondary coding concepts dealing with the size and shape of the control were established. Electroluminescence or printed circuit lighting was specified to effect the removal of all lamp housings on panels to relieve clutter.

2,564

Holcomb, G. A. 1960 HUMAN EXPERIMENTS TO DETERMINE HUMAN TOLERANCE TO LANDING IMPACT IN CAPSULE SYSTEMS. (Paper, Fifth Symposium on Ballistic Missile and Space Technology, University of Southern California, 31 August, 1960.)
(Stanley Aviation Corp., Denver, Colo.) 3 Aug. 1960.

ABSTRACT: Capsule systems in general will probably impact on a planet's surface at velocities of 25 ft/sec. to 30 ft/sec. Present human tolerance to acceleration allowables in their present form are not considered adequate to guide the designer in the design of landing impact hardware. The reasons for the inadequacy and the various areas of conflicts, ambiguities and voids in methodology are discussed. Human tests of landing systems are required in the absence of usable allowables. Experimental drop data using the B-58 Capsule are presented, but the data are considered of interest subjectively rather than quantitatively since repeatability is doubtful due to instrumentation inadequacy and positioning techniques. Correlation of these data with most human tolerance allowables are not possible. Human test data has proven the acceptability of the B-58 Capsule Landing system during vertical impact conditions.

2,565

Holcomb, Galen A., M. Huheey, et al 1960 INVESTIGATIONS TO DETERMINE HUMAN TOLERANCE TO SHORT DURATION ACCELERATIONS.
(Stanley Aviation Corp., Denver, Colo.) Rept. No. 1217, Nov. 1960

2,566

Holcomb, Galen A. 1961 B-58 CAPSULE DROP TESTS TO DETERMINE LOAD FACTORS PRODUCED ON VARIOUS SOILS
(Stanley Aviat. Corp., Denver, Colorado) Rept. No. 1318; June 1961.

2,567

Holcomb, G.A. 1961 INVESTIGATIONS TO DETERMINE HUMAN TOLERANCE TO ABRUPT ACCELERATION IN CAPSULE SYSTEMS.
(Paper, 32nd Annual Meeting, Aerospace Medical Association, 24-27 April 1961, Chicago, Ill.)

ABSTRACT: Landing impact effects are one of the major physiological problems of capsule systems in general, whether they be atmospheric or space vehicles. Published human tolerance allowables are basically unusable when evaluating the accelerations produced by impact with the earth's surface, since the accelerations measured on a human subject, in most cases, are of shorter duration and higher rates-of-onset than the allowables describe. Approximately 150 human experiments were undertaken to determine tolerability. Subjects were dropped on concrete, dirt and sand from heights ranging from 9'9" to 12"0" at drift velocities up to 23 mph, while strapped in a production type escape capsule. Accelerations up to 83 G's were recorded on the subject's sternum. (Aerospace Medicine 32(3):234-235, Mar. 1961)

2,568

Holcomb, G.A. & M. Huheey 1961 INVESTIGATION TO DETERMINE HUMAN TOLERANCE TO ABRUPT ACCELERATION IN CAPSULE SYSTEMS.
(Stanley Aviation Corporation, Denver, Colo., April 1961)

2,569

Holcomb, G. A. and M. Huheey 1961 A MINIMAL COMPRESSION FRACTURE OF T-3 AS A RESULT OF IMPACT.
(Presented to the Symposium on Impact Acceleration Stress, San Antonio, Nov. 1961)
(Stanley Aviation Corp., Denver, Colo.) Nov. 1961

2,570

Holcomb, G. A. 1961 IMPACT STUDIES OF THE UNITED STATES AEROSPACE INDUSTRY
(Paper, Symposium On Impact Acceleration Stress, Brooks Air Force Base, San Antonio, Texas, November 27-29, 1961)
(Stanley Aviation Corp., Denver, Colo.)

ABSTRACT: Aerospace Industry has engaged extensively in analytical studies of impact acceleration stress and sparingly in experimental studies. In most cases

studies were the result of the need to evaluate a definite system rather than a desire to engage in basic research since the present published tolerance to impact acceleration allowables are limited in their use to the designer.

The most significant contributions have been the development of mathematical models and human tolerance to acceleration computers by dynamicists, and experimental data using biological specimens derived from capsule ground landing system tests. These developments are discussed in detail in this paper.

As a result of analytical and experimental studies accomplished by Aerospace Industry and industry's chronic problems in designing to present published human tolerance to acceleration allowables, the following recommendations are made: (1) new methods of determining body response be evolved based on mathematical techniques, (2) experimentations of the future be correlated to the mathematical approaches provided by dynamic studies, and (3) new experiments be accomplished to provide extremely abrupt impact acceleration data dealing with both single pulses and pulses superimposed on sustained accelerations.

2,571

Holcomb, G.A. 1962 IMPACT STUDIES OF THE UNITED STATES AEROSPACE INDUSTRY In Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, pp. 83-119

ABSTRACT: A survey of impact studies of the United States aerospace industry indicated the following needs: (1) Further animal studies and experiments, including a comprehensive study of comparative anatomy and tissue strength, to obtain valid endpoint data without the use of human subjects. Present human endpoint data in the impact regime is too sparse to be of statistical significance. (2) Studies to determine tolerance to complex accelerations, including abrupt pulses super-imposed on sustained acceleration. (3) Intensive analytical studies to evolve usable mathematical techniques in order to facilitate design and reduce long, costly test-programs.

2,572

Holcomb, G. A. 1962 ABRUPT IMPACT ACCELERATION STRESS - DO WE KNOW MAN'S LIMITATIONS? (Paper, 33rd Annual Meeting of the Aerospace Medical Assoc., 9-12 April 1962, Atlantic City, N. J.)

ABSTRACT: Until the advent of space and capsule systems, man has been returned to earth after egress from a prime flight vehicle by means of a personal parachute. Touchdown velocities by this means are 18-20 FPS and man is able to use

his legs to attenuate impact. However, space or atmospheric capsules, which retain man inside until impact on the earth, climinate these "shock absorbers." To assess this configuration in terms of human tolerability, over 150 biological impact tests have been performed using subjects placed in a supine position inside a capsule system and subjected to impact on various surfaces including hard dirt, water, and concrete. Human, black bear, and chimpanzee subjects were used. The implications from these experiments, together with an analysis of other data, are that man can probably tolerate impact velocities of 40 FPS or higher when in a supine position and properly harnessed. Biological experiments have also shown accelerations of over 90 G's (as recorded on the capsule) to be tolerable. Further implications are that the design of capsule landing systems may possibly be simplified to take greater advantage of man's tolerance, thus increasing the payload. (Aerospace Medicine 33(3):363, March 1962)

2,573

Holcomb, G. A. 1962 B-58 CAPSULE DROP TESTS FROM STANLEY MONORAIL (Stanley Aviation Corp., Denver, Colo.) No. 1376, 10 May 1962

2,574

Holcomb, G.A. & M. Huheey 1962 A MINIMAL COMPRESSION FRACTURE OF T-3 AS A RESULT OF IMPACT.
In Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, pp. 191-194

ABSTRACT: A 22-year old male subject performed four drop tests. There were two water drops and two dirt drops. The only effects from the water drops were two small non-tender bruises on the right thigh and right groin. The medical examination after the first dirt drop was negative throughout. However, x-rays of the dorsal spine AP and lateral established the fact that the subject suffered a compression fracture of the D-3 with loss in height of the centrum amounting to about 4mm. Several possibilities of the cause of the fracture are stated.

2,575

Holden, G.R., J.R. Smith, & H.A. Smedal 1961 PHYSIOLOGICAL INSTRUMENTATION SYSTEMS FOR MEASURING PILOT RESPONSE TO STRESS AT HIGH G AND ZERO G. (Paper, 32nd Annual Meeting, Aerospace Medical Assoc., 24-27 April 1961, Chicago, Ill.)

ABSTRACT: An airborne physiological instrument system reported in NASA TN D-351 has been modified and additional tests have been made in the University of Southern California and AMAL centrifuges and in an F-104B airplane. These tests covered various levels of acceleration from zero to 8 g. The measure-

ments made were, in part: ECG, blood pressure, pulse wave, respiration rate and volume, and carbon dioxide content of expired air. The data from a three-lead electrocardiograph were recorded, using a unique balance transistor amplifier. Systolic and diastolic blood pressures were measured using an automatic sequencing occluding arm cuff and microphone stethoscope. Pulse wave on the wrist was obtained with a vasochromograph and a.c. amplifier. Several methods were used to measure respiration rate, and respiration volume was measured with a wedge spirometer. The expired air was analyzed for CO_2 content with a very much modified Bechman LB-1 gas analyzer. The quanitative effects of short term periods of zero g on pilot control performance were determined by measuring the tracking accuracy, the equivalent analytical transfer function and the physiological condition of a subject in the rear seat of an F-104B airplane being flown in a 60-80 second zero g trajectory. A tracking task played back from a tape recorder was presented to the subject on an oscilloscope. The subject used a sidearm controller to attempt to wipe out his tracking error. A small airborne analog computer computed the simulated airplane's response to the control motion and changed the tracking display accordingly. The experiment was repeated and thus affords a direct comparison with a study of pilot control behavior previously conducted on ground-based simulator and centrifuge. (J. Aerospace Med. 32(3):235, March 1961)

2,576

Holleman, E.C., N.S. Armstrong and W.H. Andrews 1960 UTILIZATION OF THE PILOT IN THE LAUNCH AND INJECTION OF A MULTISTAGE ORBITED VEHICLE. (Paper presented at IAS 28th annual meeting, 25-27 Jan 1960, New York) Preprint no. 60-16

ABSTRACT: The capacity of human pilots to control the launch of typical multistage vehicles was investigated under varying conditions of vehicle damping and stability by fixed-base and centrifuge simulators. The control task was found to be well within the capability of human pilots at accelerations up to 15 g. With a good support system the prime physiologic effect of the acceleration environment was a loss in peripheral vision. The effect was not serious below 9 g, and was confined within control limits at accelerations of 12-14 g by prebreathing of 100 per cent oxygen. Use of the pressure suit had little detrimental effect on performance. It is suggested that full pilot control of space vehicles throughout the launching procedure would provide the most advantageous condition for effective response to emergency situations.

2,577

Holling, H.E. 1950 TRAVEL SICKNESS
Practitioner, 164: 276

2,578

Hollis, J. H., G. E. Rice, & R. D. Engstrand 1960 EFFECTS OF ACCELERATION FORCES ON MAZE BEHAVIOR OF THE WHITE RAT. Psychol. Rept. 6:185-186

2,579

Hollister, N. R., R. Friede, et al. 1958 BIOPHYSICS OF CONCUSSION. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 58-193; ASTIA AD-203 385

ABSTRACT: Methods were developed for effecting a reproducible experimental concussion. Three principal factors thought to cause concussion were studied: (1) rapid deceleration, (2) total force imparted to the skull, and (3) stretch of the cervical region. A test drop rig was developed and instrumentation was used to measure the various force vectors. The following conclusions were drawn: (1) total force applied to the skull is not a factor in concussion under the test conditions; (2) acceleration concussion is not a factor under the test conditions; and (3) stretch of the cat's neck or some unknown factor, which can be altered by applying a muscle-tetanizing current, accounts for the concussion produced. Neurohistopathological studies were carried out and discussed. (AUTHOR)

2,580

Holme, T. 1961 [HORIZONTAL-ROTOR CENTRIFUGE CONSTRUCTION REPORT]

SEE Karolinska Institutet

2,581

Holmes, B. 1962 MANNED SPACE FLIGHT. AIBS Bulletin 12(5):56-59, Oct. 1962.

ABSTRACT: Four National Aeronautics and Space Administration programs, Mercury one-day missions, Gemini, and Apollo, are discussed together with expected problem areas. The final phases of the Mercury program (orbital flight of short duration) are intended to amplify and expand the basic data obtained during the Glenn and Carpenter flights. The one-day missions program will extend the time of weightlessness and allow further assessment of the physiological effects of this phenomenon. This extension is of prime importance since during the lunar mission the astronauts will be weightless for some five days. The Gemini program will extend capability to orbital flight for two men for approximately 10 days. Aims of this program are to develop rendezvous techniques and gain further insight on the effect of prolonged weightlessness. The fourth major program, Project Apollo, will be the logical culmination of the previous three programs. It is aimed at landing men on the Moon and returning them to Earth. The problems raised by these programs are not insurmountable, and many of them can be recognized far enough in advance to perform the research and development necessary to solve them.

2,582

Holsopple, J.Q., 1923 SOME EFFECTS OF DURATION AND DIRECTION OF ROTATION ON POST-ROTATION NYSTAGMUS. J. Comp. Psychol. 3: 85-100

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Holsopple, J. Q. 1924 AN EXPLANATION FOR THE UNEQUAL REDUCTION IN POST-ROTATION NYSTAGMUS FOLLOWING ROTATION PRACTICE IN ONLY ONE DIRECTION. J. Comp. Psychol. 4:185-193

2,584

Holsopple, J. Q. 1929 SPACE AND THE NON-AUDITORY LABYRINTH. In The Foundation of Experimental Psychology (Worchester, Mass.: Clark Univ. Press). 414-433.

ABSTRACT: There is a perception of space which cannot be explained in terms of sensory data without using the vestibule. In normal life vestibular experience seems dependent upon spatial factors, but it is not necessarily any more so than any other experience. The characteristics of the perceptions which follow vestibular stimulation are practically unknown. The stimulus for the receptor is an angular acceleration around any one of the bodily axes. The receptor mechanism consists of the vestibule and the semi-circular canals. Their stimulation results in changes of tonicity of antagonistic muscles, which shows itself especially in connection with nystagmus and past-pointing, but is general as shown by nausea and inability to balance oneself. Practice will modify the vestibular response. Some of the difficulties and possibilities in vestibular research are enumerated.

2,585

Holt, J.P. 1942 THE EFFECT OF CENTRIFUGAL FORCE ON THE CAROTID BLOOD PRESSURE OF DOGS AND THE USE OF A WATER SUIT IN MODIFYING THIS EFFECT. (National Research Council, Committee on Aviation Medicine, Washington, D.C.) CAM No. 63, 11 Aug. 1942.

ABSTRACT: Normal healthy dogs with a resting blood pressure of 150-160 mm Hg were placed under sodium barbital anaesthesia, their tracheas cannulated, the carotid arteries exposed and blood pressure recorded directly. They were placed on a 7.15 ft. radius centrifuge and subjected to various values of "g" of from 30 seconds to 10 minutes.

Between 4.28 and 5.63 "g", if the dogs were centrifuged unprotected, in an empty plethysmograph, or in a loose canvas suit, blood pressure fell 98% of its original value. If the dogs were protected by a water filled plethysmograph or a canvas suit containing a water filled abdominal bladder and tubes down the hind legs, blood pressure fell only 44% at the same value of "g".

2,586

Holtermann, H. 1956 GEDANKEN ZUR SEEKRANKHEIT UND ERFAHRUNGEN MIT EINIGEN NEUEREN BEHANDLUNGSMETHODEN. (REFLECTIONS ON SEA-SICKNESS AND EXPERIENCES WITH SOME NEW THREATMENT METHODS) Münchener medizinische Wochenschrift (München) 98(7):229-231, 17 Feb. 1956

ABSTRACT: A report is given on susceptibility to seasickness, the incidence of which is estimated at 90%. Habituation to the conditions at sea does not develop in 5-10% of the subjects. The symptoms generally occur in a certain sequence. There appear to be two different kinds of seasickness: (1) the well-known form with nausea and vomiting, and (2) instead of these symptoms a severe headache. Both kinds are attributed to differential irritability of the cerebral nuclei. The etiological causes of seasickness are outlined and fear is considered an important factor. Several therapeutic measures are discussed. Administration of Nestargel was tried as a supplementary medication. Its effects are based on its thickening action on the stomach contents. After its administration vomiting was reduced. Megaphen has been effective in cases confined to bed. The beneficial effect of Benadon (vitamin B_6) was confirmed, particularly when administered by suppositories. Its harmlessness and lack of side-effects are emphasized. (AUTHOR)

2,587

Hood, J.D., & C.R. Pfaltz 1954 OBSERVATIONS UPON THE EFFECTS OF REPEATED STIMULATION UPON ROTATIONAL AND CALORIC NYSTAGMUS. J. Physiol. 124:130-144

ABSTRACT: Nystagmic responses in rabbits subjected to repeated angular accelerations of low intensity ($5^o/sec.^2$ for a period of 10 sec. followed by a period of rotation at constant velocity for 60 sec.) underwent a marked decline which was dependent upon the number of stimuli applied. This response decline (R.D.) phenomenon was unaccomparied by any change in the latent period of the nystagmic response. The mechanism of the R.D. phenomenon is thought to be allied with habituation, wherein innate responses of the central nervous system to certain relatively simple stimuli, especially those of potential value as warnings of danger, wane as the stimuli continue for a long period without unfavorable results. The nystagmic responses to repeated monaural caloric stimuli (a flow of water at temperature of 25^o C. for 10 sec. into the ear) did not undergo any significant decline, and the physiological independence of responses to rotational and caloric stimuli is discussed.

2,588

Hook, R.E., A.M. Adair and J.W. Spretnak 1960 AN INVESTIGATION OF THE CENTRIFUGAL FORCE LOADING METHOD OF CREEP TESTING (Wright Air Development Center, Wright-Patterson Air Force Base, Ohio) WADC TR-59-779, Proj. 7021, Task 70627, March 1960, ASTIA AD 236657

ABSTRACT: A centrifugal force loading creep testing machine was designed, constructed, and tested. Creep data were obtained for electrolytic tough-pitch copper and evaluated. Binary Ni-Al alloys demonstrate the usefulness of

this machine for obtaining relative creep strength data.

The data on copper reveals that the specimen grain size has a bearing on the degree of dispersion. A smaller degree of dispersion was associated with a smaller grain size. Heat-treated and prepared identically, specimens from different rods exhibited a significant variation in creep behavior. This variation was attributed to small differences in metallurgical structure, probably due to prior thermal and mechanical history.

Tests on binary Ni-Al alloys revealed significant creep strength differences. Considerable scatter of the data for each alloy did not affect the determination of the relative creep strengths.

The centrifugal force loading method of creep testing provides an inexpensive evaluation of relative creep strengths of materials.

2,589

Hooker, D.R. 1924 THE PHYSIOLOGICAL EFFECTS OF AIR CONCUSSION Amer. J. Physiol. 67:219-274.

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Hooker, G.V., M.H. Duffner, A.S. Dann & D.C. Yates 1961 AIR FORCE SCIENTIFIC RESEARCH BIBLIOGRAPHY 1950 - 1956. VOLUME I.
(USAF Office of Scientific Research, Washington, D.C.)
AFOSR 700, ASTIA AD 265 450.

ABSTRACT: This bibliography includes abstracts of technical notes, technical reports, journal articles, books, symposium proceedings, and monographs produced and published by scientists supported in whole or in part by the Air Force Office of Scientific Research for the period 1954 through 1956, plus earlier reports back through 1950. These abstracts are multidisciplinary covering physics, chemistry, engineering sciences (subserving mechanics and propulsion), life sciences (biological, behavioral), and mathematics. The arrangement provides a rough subject grouping with the detailed subject index leading into clusters of like reports. Several indices are included. (Tufts)

2,591

Hoover, G.N. & F.R. Johanson 1960 PROBLEMS IN INSTRUMENTATION FOR DYNAMIC SUBJECTS
Proc. National Electronics Conf. 16: 659-671, 1960

2,592

Horak, J. 1960 RECENT DEVELOPMENTS IN AVIATION MEDICINE
Abstract: South African Medical J. (Cape Town) 34(28):582, 9 July 1960

ABSTRACT: A summary is given of a paper presented at the Staff Scientific Meeting of the South African Institute for Medical Research, held at Johannesburg, on March 8, 1960. The paper dealt with three important factors affecting space flight: (1) the physical environment of space, (2) speed and space vehicles in relation to linear, angular, and radial acceleration; and (3) distances space ships will travel over and away from the earth. The medical problems of space flight were discussed, including weightlessness, spatial disorientation, and the "break-off" phenomenon, and devices to preserve the normal physiological environment were outlined. (South African Medical J. (Cape Town) 34(28):582, 9 July 1960)

2,593

Horak, J. 1960 SPACE MEDICINE.
South African Med. J. (Cape Town) 34(53):1117-1122, 31 Dec. 1960

ABSTRACT: Current space travel may be classified as being in a phase of global space-equivalent flight, as defined by the combined factors of the physiological and mechanical properties of the space environment, the speeds attained in space flight, and the distances rockets travel over and away from the earth. The attendant medical problems are basically those of high altitude flight as we know it today, and most of the problems involved in true space flight are encountered in the stage of global space-equivalent flight.

2,594

Horn, 1818 BESCHREIBUNG DER IN DER IRRENANSTALT DES KÖNIGLICHEN CHARITEKRANKENHAUSES ZU BERLIN GEBRÄUCHLICHEN DREHMASCHINEN, IHRER WIRKUND UND ANWENDUNG BEI GEISTESKRANKEN (DESCRIPTION OF THE ROTATION MACHINE USED IN THE INSANE ASSYLUM OF THE ROYAL CHARITY HOSPITAL IN BERLIN, ITS WORKING AND USE WITH MENTALLY ILL.
Nasses Z. Psych. Aertze 1:219-230

ABSTRACT: At the beginning of the 19th century, in the psychiatric clinic of the Charite Hospital in Berlin, a centrifuge of quite large dimensions and efficiency was used in the treatment of patients suffering from mental disease. Its diameter was aprox. 13.12 ft. and at 40-50 rpm it produced up to 5 g at the periphery. Patients being tested on this machine were observed and physcians recorded for the first time the marked effects of centrifugal forces on circulation and respiration (changes in respir ation, heart rate, and blood distribution).

2,595

Horowitz, N.H. 1962 BIOLOGY IN SPACE
Federation Proceedings, 21(4, part I): 687-691. July-Aug. 1962

ABSTRACT: Biology is involved in the national space program in three principal areas: (1) in the man-in-space effort; (2) in the investigation of the biological effects of the space environment; and (3) in the search for extraterrestrial life. Mars, and possibly Venus, is sufficiently similar to the Earth to provide a test of the idea that life arises wherever conditions exist for the synthesis and evolution of organic compounds. Experiments (ultraviolet and infrared spectroscopy of surface atmospheres, landing vehicle experiments with television photography, microscopy, etc.) currently considered for investigating the biology of Mars are discussed. Sterilization of all spacecraft landing on the Moon or planets and the possibility of back-contamination are reviewed, along with the evidence for possible life in meteorites.

2,596

Horvath, S.M. and W.B. Shelley 1946 EXPERIMENTAL STUDY OF AIR BLAST INJURIES
Bull. U.S. Army Med. Dept. 6:761-770

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Hosken, Bobbie 1959 ENGINEERING PSYCHOLOGY BRANCH BIBLIOGRAPHY
(U.S. Naval Research Laboratory, Washington, D.C.)August 1959. ASTIA AD 226398

ABSTRACT: This bibliography is a revision to date of the bibliography compiled by Daniel Fallon, July 1957. All unclassified reports issued by the Engineering Psychology Branch between its founding on October 1, 1945, and the present are listed in chronological order.

2,598

Houbolt, J.C. & S.A. Batterson 1960 SOME LANDING STUDIES PERTINENT TO GLIDER-REENTRY VEHICLES (Langley Research Center, Langley Station,Va.)
NASA Technical Note D-448, Aug. 1960, N62-71022. ASTIA AD 241 615

ABSTRACT: The results presented may serve as guidelines for consideration of landing problems of glider-reentry configurations. The effect of the initial conditions of sinking velocity, angle of attack, and pitch rate on impact severity and the effect of locating the rear gear in various positions are discussed. Some information in included regarding the influence of landing-gear location on effective masses. Preliminary experimental results on the slide-out phase of landing include sliding and rolling friction coefficients that have been determined from tests of various skids and all-metal wheels.

2,599

Howard, L.P. 1962 THE ORIGIN OF BLACK-OUT.
In Armand Mercier, ed. Visual Problems In Aviation Medicine
(New York: The Macmillan Company, 1962) Pp. 71-77

ABSTRACT: This paper presents the results of a number of approaches to the problem of the origin and site of black-out. During tests it was found that subjects undergoing accelerations well above their black-out thresholds can perceive light if the stimulus is sufficiently strong. The apparent brightless of successive stimuli decreases, and vision is finally lost. The time-course of the phenomena, the conditions under which they occur, point to a reserve of function in the anaemic retina. The decrement and final loss of vision under these conditions is due to a failure of transmission of nervous impulses. The direct pupillary reflex may outlast vision. There is no detectable difference between pressure blindness and the black-out of acceleration. The site of the disturbance of function is within the retina but beyond the point where visual and reflex pathways diverge.

2,600

Howard, P., & G. H. Byford 1956 THRESHOLD DETERMINATION TECHNIQUES ON THE HUMAN CENTRIFUGE. (RAF Institute of Aviation Medicine, Farnborough, England) FPRC Memo 75, Sept. 1956

ABSTRACT: In an endeavour to find a more satisfactory solution to the problem of determining g thresholds, experiments with several visual methods have been carried out in this laboratory; e.g. colour vision, and brightness or contrast discrimination, and one which appears to offer considerable promise is briefly described in this interim report.

In the experiments carried out so far, it appears that the loss of a central target lamp, at an intensity of between 0.2 and 0.8 log. units above the visual threshold, provides a more satisfactory measurement of g threshold than any other system so far tried.

The two important practical differences between the peripheral lights system and that suggested here are (a) the end-point is considerably more clear-cut, and (b) the threshold determined is some 0.5 to 1.5 g below that obtained by other methods, resulting in increased safety and in decreased strain on the subject. The lamp intensity can be so chosen that if, after the disappearance of the target, the goggles are lifted, vision is normal - a convincing demonstration that loss of central vision can be employed with safety.

2,601

Howard, P. 1957 THE TECHNIQUE OF THRESHOLD DETERMINATION ON THE HUMAN CENTRIFUGE. (Communication to the Second European Congress of Aviation Medicine, Stockholm.)

2,602

Howard, P. and J.S. Garrow 1958 CHANGE IN VASCULAR RESISTANCE OF THE FOREARM AND HAND DURING RADIAL ACCELERATION.
J. Physiol. 143:83P-84P

ABSTRACT: Measurements of blood flow in the forearm have been made on the human centrifuge using the mercury-in-rubber strain gauge method or Whitney (1949). Vascular resistance has been estimated by the arterial 'run-off' method recently reported (Hayter & Sharpey-Schafer, 1958). During radial acceleration, blood flow through the forearm segment diminishes out of proportion to the fall in arterial blood pressure, and the 'run-off' index rises. The vascular resistance in the hand also increases.

2,603

Howard, P. 1959 CHANGES IN THE CARDIAC OUTPUT DURING POSITIVE RADIAL ACCELERATION.
(Paper, Proceedings of the Physiological Society, Physiology Institute, Newport Road, Cardiff, 17-18 April 1959).

ABSTRACT: It is known that positive radial acceleration (centrifugal force acting in the head-to-foot direction) produces profound changes in the dynamics of the circulation. The output of the heart is likely to be affected by these changes but hitherto no experimental confirmation of this assumption has been presented.

The direct Fick method was used to determine the cardiac output in two subjects. A polythene catheter was inserted into the right atrium via an antecubital vein; its position being confirmed by examination of the pressure wave form. The subject lay supine on the end of the human centrifuge, with the legs extended. Gas and blood samples were analysed by the Haldane and Van Slyke methods, respectively, and from the results the oxygen consumption and cardiac output were calculated.

At 2 g the output was reduced to approximately 68% of the resting value, and at 2.4 g it fell to about 60%. Because of the concomitant increase in heart rate the changes in stroke volume were greater still. In both cases the oxygen consumption rose by about one-third during the exposure.

These results may be compared with those obtained after tipping from the horizontal to the erect posture (equivalent to a radial acceleration of 1 g) which produces an average decrease of cardiac output of 25%. (J. Physiol. (London) 147(Pt. 2): 49-50P, 2 Sept. 1959)

2,604

Howard, P. 1959 CHANGES IN PERIPHERAL VASCULAR RESISTANCE DURING RADIAL ACCELERATION. (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: Simultaneous measurements of arterial blood pressure and of blood flow through a forearm segment have been used to calculate the peripheral vascular resistance during exposure to 2G and 3G on the human centrifuge. Vasoconstriction has been demonstrated with subsequent vasodilation when the stress is removed. The method used has some disadvantages. It requires a long exposure to the acceleration (5-10 minutes), and cannot be employed in studies of negative G. A simple method of assessing changes in vasomotor tone, depending upon the rate of decline of pressure in an occluded artery, has been used to extend the work. It has been found that the vasoconstriction increases progressively up to 8 G, which was the highest value employed. With negative G, a decrease in vascular resistance occurs, which is likewise proportional to the level of acceleration. (J. Aviation Med. 30(3):188, March 1959)

2,605

Howard, P. 1959 PHYSIOLOGICAL RESEARCH ON THE HUMAN CENTRIFUGE. (RAF, Institute of Aviation Medicine, Farnborough, England; North Atlantic Treaty Organization, Advisory Group for Aeronautical Research & Development; Aero-Medical Panel, Aachen, Germany) Sept. 1959

2,606

Howard, P. and M. K. Browne 1959 SOME OBSERVATIONS ON THE EEG DURING CENTRIFUGAL ACCELERATION.
(International EEG Congress, Marseilles, 1959)

2,607

Howard, P. and F. Latham 1959 MECHANISMS OF INJURY DURING WHOLE BODY DECELERATION.
(RAF Institute of Aviation Medicine, Farnborough) FPRC Memo. 100

2,608

Howard, P. and C. P. McEvedy 1959 THE EEG AND BLACKOUT.
(IVth European Congress of Aviation Med., Rome, 1959)

2,609

Howard, P. and M. K. Browne 1960 A STUDY OF UNCONSCIOUSNESS ON THE HUMAN CENTRIFUGE.
Proc. Roy. Soc. Med. 53:99-100, Feb. 1960.

2,610

Howard, P. 1961 PHYSIOLOGICAL PROBLEMS OF SPACE FLIGHT.
New Scientist (London) 10(231):106-108. April 1961.

ABSTRACT: This is a presentation of the problems of acceleration, deceleration, and weightlessness during space flight. Centrifuge studies have been the source of most acceleration studies. Controlled parabolic flight studies in which the weightless state was sustained for about forty seconds have yielded information on feeding, drinking and excreting waste products during weightlessness and the effects of the weightless state on the nervous system. Because deceleration and acceleration have the same properties, the same precautions must be taken to avoid exceeding the limits of tolerance. Deceleration limits during re-entry is discussed.

2,611

Howard, P. 1963 ACCELERATION RESEARCH AND AEROSPACE MEDICINE.
Med. J. Aust. 1:425-427, 23 March 1963.

2,612

Howard, I. P. & W. P. Templeton 1963 A CRITICAL NOTE ON THE USE OF THE HUMAN CENTRIFUGE.
Amer. J. Physiol. 76:150-152, March 1963.

2,613

Howarth, C. I. 1956 THE TIME COURSE OF PRESSURE BLINDNESS.
(RAF, Institute of Aviation Medicine, Farnborough) FPRC No. 968;
ASTIA AD-112 721

ABSTRACT: When pressure is applied to the eyeball in excess of 120 mm. Hg, vision decreases progressively from the periphery of the visual field until finally the eye becomes blind. Three possible causes of the restriction of peripheral vision during retinal ischaemia are suggested: the higher sensitivity of the fovea; a possible storeage of oxygen in the macular pigment; and the greater effectiveness of a minimal blood flow around the optic disc and along the course of the main retinal arteries. It has been shown that the last area of the retina to remain active during ischaemia lies between the fovea and the optic disc so that no one of these can be the single explanation of the form of the restricted visual field. Since foveal vision is not so insensitive to ischaemia as has been assumed, it is suggested that it may provide the most sensitive tests of aircrew g thresholds. (AUTHOR)

2,614

Howe, J. T. 1962 THEORY OF HIGH-SPEED-IMPACT ATTENUATION BY GAS BAGS. (National Aeronautics and Space Administration, Washington, D. C.) Technical note D-1298, April 1962. ASTIA AD 274 588.

ABSTRACT: A theory is developed for the one-dimensional motion of a cylindrical gas bag used as an impact cushion. The effect of shock waves in the gas as well as stress in the bag skin is considered. The applicability of the theory to landings both in an atmosphere and on the moon is discussed and the regime of validity of the theory is presented. The use of a series expansion for computing shock-wave properties in the analysis, the strong shock approximation, and the exact shock relations are compared and discussed. The regime of physical parameters for which both the wave model and the series expansion are valid is presented. The method of application of the theory to impact problems is outlined. (Author)

2,615

Howlett, J.G. 1942 SWING TEST FOLLOW-UPS. (National Research Council, Canada) Report #C-2879, 27 August 1942

ABSTRACT: A preliminary report is made of the follow-up between incidence of airsickness and incidence of swing sickness in aircrew.

2,616

Howlett, J.G., T.E.M. Wardill and J.R. Brett 1943 THE EFFECT OF POSITION ON THE INCIDENCE OF SWING SICKNESS. (National Research Council, Canada) Report #C-2507, 5 April 1943

ABSTRACT: Under the conditions of these experiments, regardless of position of the body, if the head is placed so that the G changes occur in a direction perpendicular to the plane of the lines joining each external auditory meatus to the lateral canthus of the eye on the same side the sickness incidence is considerable. When the G changes occur in a direction parallel to this plane the sickness incidence is greatly reduced. When the G changes occur in a direction parallel to this plane the sickness incidence is greatly reduced. When the G changes act parallel to this plane and when the head rests on the middle of the occiput, or is rotated forty-five or ninety degrees from this position, the sickness incidence is even lower than when the head rests on the middle of the forehead or is rotated forty-five degrees to either side.

2,617

Howlett, J.G., T.E.M. Wardill and J.R. Brett 1943 THE EFFECT OF POSITION ON THE INCIDENCE OF SWING SICKNESS. (National Research Council, Canada) Report #C-2508, 7 May 1943

ABSTRACT: The incidence of sickness on the swing was low when subjects were swung through an angle of 60°, in the supine position with the head resting on the middle of the occiput and with the reference plane perpendicular to the swing base. When the resultant force was perpendicular to the reference plane but through the head in an inferior superior direction the incidence of sickness was significantly lower than when acting in the superior inferior direction.

2,618

Howlett, J.G. and J.R. Brett 1943 A SPECULATION ON THE MECHANISM OF UTRICULAR RESPONSE TO STIMULATION IN MOTION SICKNESS. (National Research Council, Canada) Report C-2509, 7 May 1943

ABSTRACT: Reference is made to MacNally and Stuart who attributed motion sickness to vertical linear acceleration and their effect on the utricle on basis of the anatomy of this organ described by Quix. The speculation is advanced that only the vertical position will allow acceleration to act on the otolith to stimulate the macula in the utricle.

2,619

Howlett, J.G., et al., 1945 THE EFFECT OF POSITION ON THE INCIDENCE OF SWING SICKNESS. (National Research Council, Canada) Report for No. 6 Medical Selection Board, April 1945.

2,620

Howlett, J.G. 1957 MOTION SICKNESS. Canadian Med. Assoc. Jour. (Toronto), 76(10): 871-873. May 15, 1957

ABSTRACT: Different types of motion sickness are reviewed with suggestion that susceptibility may be specific to the type of motion. Although adaptation usually occurs, it will not protect against another type of motion. The mechanism for production of motion sickness seems to be a central nervous system response to linear acceleration stimulating the semicircular canals. Evidence from ablation studies in dogs are concerned in the genesis of motion sickness. Treatment is largely prophylactic by means of Benadryl, Dramamine, Phenergan, Artane (benzhexol), hyoscine hydrobromide, or Mosidol (thiobarbituric acid compound)

2,621

Hoyer, S. 1959 THE ANALYTICAL MECHANICS OF RATE OF ONSET, (Air Research & Development Command, Holloman AFB, N.Mex.) AFMDC-TN-59-26, October 1959

ABSTRACT: The system consists of a mass connected by a linear spring to a moving frame. It also includes the effect of a Newtonian dashpot connected to; oppose relative motion between the mass and the frame. The force in the coupling spring is determined as a function of the motion of the frame and depends on the acceleration of the frame, and on higher derivatives of the position of the frame with respect to time. We are particularly interested in the effect on spring force of the rate of onset of acceleration of the frame.

2,622

Hubach, J.C. 1932 GEVAREN VAN HET VLIEGEN MET SNELLE VLIEGTUIGEN (Dangers of Flying in Fast Airplanes from Medical Viewpoint) Geneesk. Tijdschr. Ned. -Ind. (Jakarta) 72: 98-105

2,623

Huber, J., & P. Garsaux 1956 LES PROBLEMES MÉDICAUX CAUSÉS PAR LA NAVIGATION AÉRIENNE (MEDICAL PROBLEMS CAUSED BY FLIGHT) Bulletin de l'Académie nationale de médecine (Paris) 140(3-4):37-38, 24 Jan. 1956

ABSTRACT: Mention is made of French and international associations, composed of physicians, physiologists and hygienists, concerned with the study and control of the problems arising from flight. Major problems deal with the effects of accelerations, the effects of altitude, climate and time changes, and flight disorders. Formulation of regulations for the required physical aptitudes of flight candidates, and determination of the maximum flying time for flight personnel are also considered.

2,624

Huckabay, James D. 1960 A STUDY OF THE PLASTIC DEFORMATION OF A SINGLE-DEGREE-OF-FREEDOM SYSTEM SUBJECTED TO IMPULSIVE LOADING (The University of Texas, Structural Mechanics Research Laboratory, for Quartermaster Research and Engineering Command) Contract DA 19-129-QM-1383

ABSTRACT: As a third step in an effort to establish criteria of damage susceptibility for complex systems subjected to impact loading, the effects of the individual parameters influencing the final permanent deformation of a single-degree-of-freedom system are studied.

An extensive dimensional analysis of the problem was made, and the insight thus provided was used as a guide in making the experimental study. Final permanent deformations resulting from impacts having a range of pulse durations

and peak accelerations were observed. The results are presented in graphical form.

Peak acceleration appears to have an important influence on the permanent deformation. The individual effects of time ratio and impulse could not be isolated experimentally, and the effect produced by combined changes in these two factors is not clear.

2,625

Huelke, D. F. 1961 MECHANISMS INVOLVED IN THE PRODUCTION OF MANDIBULAR FRACTURES. A Study with the "Stresscoat" Technique. I.--Symphyseal Impacts. Jr. Dent. Resch. 40:1042-1056.

2,626

Huelke, Donald F. 1962 BIOMECHANICAL STUDIES ON THE BONES OF THE FACE (Panel Discussion)
(In: Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, pp. 131-134)

ABSTRACT: Until recently no serious investigations on the facial bones, with regard to their mode of fracturing, has been carried out. Our preliminary investigations reveal that the bones of the face, like those elsewhere in the body, fracture due to tensile failure and in specific, fractures of the lower jaw usually occur in the area of impact and at the narrow, neck of the mandible. In our studies we are using non-destructive testing methods -- Stresscoat and strain gages, and destructive testings involving fracture producing impacts, strain gages, and high speed cinematography on individual bones and intact heads.

Further research into the problem of mid-face fractures needs to be carried out and a program into the biomechanics of skin and soft itssue should be initiated. The fracturing characteristics of skin, soft tissue, and bones, their level of energy absorption and dissipation need to be studied. Only these data can give the needed information for design specifications for protection of the individual exposed to a variety of impacts.

2,627

Hughes, Gordon & Clive D. Leedham 1962 NOTES ON TEST SLED MEASUREMENTS AT THE HOLLOMAN TRACK
(Air Force Office of Scientific Research, United States Air Force)
AFOSR/DRA-62-1, January 1962, ASTIA AD 276108

ABSTRACT: The quality of seeing at the Holloman track, being basic to all optical measurement methods to be described, has been measured. An analysis of possible optical systems for yaw, pitch, and roll measurement is reported. Based on this analysis, one optical measurement method is proposed for each

attitude component. The analysis of space time data for test package vibrations is discussed in terms of the spacing of velocity measuring points along the track. A method is proposed to measure test package velocity rather than sled velocity relative to the track.

2,628

Huheey, M., & C. F. Simmons 1960 INVESTIGATIONS TO DETERMINE HUMAN TOLERANCE TO SHORT DURATION ACCELERATIONS. (Stanley Aviation Corp., Denver, Colo.) Doc. No. 1217; Contract No. AF 33(600)36200; 2 Nov. 1960

2,629

Huizinga, E., & P. van der Meulen 1951 VESTIBULAR ROTATORY AND OPTOKINETIC REACTIONS IN THE PIGEON. Ann. Otol. Rhinol. Laryngol. 60:927-947

2,630

Hulk, J., & L. B. W. Jongkees 1948 TURNING TEST WITH SMALL REGULABLE STIMULI. II. THE NORMAL CUPULOGRAM. J. Laryng. and Otol. 62:70-75

2,631

Human Factors Research, Inc., Los Angeles, Calif. 1956 A STUDY OF THE CRASHES DURING LANDING OF TWO INSTRUMENTED F6F DRONE AIRCRAFT. (Human Factors Research, Inc., Los Angeles, Calif.) Technical Rept. No. 2 on "Measurement of Forces Affecting Human Bodies in Aircraft Accidents"; Subcontract to Management & Marketing Research Corp., Contract Nonr-152700; ASTIA AD-93 352;

ABSTRACT: Research was undertaken for developing a method of recording deceleration forces in airplane crashes. Self-actuating accelerometers were mounted in the seats of two F6F drone aircraft prior to take off. Upon stimulation with a force of 8 g or more, the accelerometer starts and records the force patterns for 8 sec. Two airplanes which were crashed during landing struck the runway nose down at approximately the same angle. Results indicated that the method was feasible. Records showed that the application of g force varied with respect to time; successive peak g's occurred at a frequency of 35 to 45 c. Although both crashes were survivable crashes (cockpit area remained intact), the g forces were of such a magnitude that a pilot would have been injured. The g forces which were recorded in the vertical and horizontal body axes were approximately equal (55.5 and 52 g and 32.1 and 48 g, respectively). Seats and protective devices should be designed for absorbing repeated shocks and for withstanding high, short-duration peak loads rather than only static loads. (ASTIA)

2,632

Human Factors Research, Inc., Los Angeles, Calif. 1956 A STUDY OF THE CRASHES OF FOUR INSTRUMENTED F6F DRONE AIRCRAFT. (Human Factors Research, Inc., Los Angeles, Calif.) Technical Rept. No. 3 on "Measurement of Forces Affecting Human Bodies in Aircraft Accidents"; Subcontract to Management & Marketing Research Corp., Contract Nonr-152700; ASTIA AD-93 351

ABSTRACT: Accelerometer recordings were analyzed for 4 crashes. In 2 cases, the aircraft ran out of fuel and were crash landed on the desert, one with wheels up (no.3) and the other with wheels down (no. 4). Of the other 2 crashes, one nonsurvivable crash into a mountain ridge (no.5) occurred when aircraft control was lost, and one (no. 6) occurred on takeoff. Results of crashes 3, 4, and 6 showed that the forces in the vertical body axes exceeded those in the longitudinal axes; in crash 6, these forces approached human tolerance limits. The records of crash 3 indicated some evidence of an oscillatory application of crash forces. The records of crashes 3 and 4 showed that both the g forces which were developed and the damage to the aircraft were greater in the wheels-down crash. (ASTIA)

2,633

Hume, Robert, ed. 1962 IMPACT ACCELERATION STRESS: PROCEEDINGS OF A SYMPOSIUM WITH A COMPREHENSIVE CHRONOLOGICAL BIBLIOGRAPHY. (National Academy of Sciences, Washington, D.C.) NAS-NRC/Pub-977

ABSTRACT: This publication contains thirty-two papers presented at the Symposium on Impact Acceleration Stress held at Brooks Air Force Base, San Antonio, Texas, November 27-29, 1961.

2,634

Humphries, J. 1957 SOME IDEAS IN ASTRONAUTICS
Aeronautics, 35:41-42, Jan. 1957.

ABSTRACT: Summaries of papers presented at the 1956 Congress of the IAF in Rome. The papers were concerned with solar power for propulsion, biological hazards of space flight, and effects of weightlessness.

2,635

Hunter, H. N., R. W. Lawton, R. Crosbie, & M. Lipkin 1952 HUMAN TOLERANCE TO COMBINED ACCELERATIONS; INVESTIGATION OF PHASE I. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-L5207; 3 Dec. 1952

2,636

Hunter, H. N., R. W. Lawton, R. Crosbie, & M. Lipkin 1953 HUMAN TOLERANCE TO COMPLEX ACCELERATIONS; INVESTIGATION OF PHASE II - PRELIMINARY STUDIES ON PRIMATES SUBJECTED TO MAXIMUM SIMPLE ACCELERATIVE LOADS. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5301, 22 May 1953

2,637

Hunter, H. N., R. W. Lawton, R. Crosbie, & M. Lipkin 1953 SOME OBSERVATIONS ON HUMAN TOLERANCE TO EXPOSURES TO 15 TRANSVERSE G. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5305; 30 July 1953
See also J. Avia. Med. 26:298-303, 1955

2,638

Hunter, H.N. & M. Weiss 1953 PILOT'S ABILITY TO SIMULATE AN EMERGENCY ESCAPE WITH VARIOUS TYPES OF EJECTION SEATS WHILE SUBJECTED TO A FLUCTUATING ACCELERATION
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR1, Nov. 3, 1953. Proj. No. TED ADC AE 6303. ASTIA AD 54 281

ABSTRACT: To determine some of the difficulties a pilot experiences in operating an ejection seat under emergency conditions, three types of ejection seats, i.e., Air Force "arm rest" upward, Air Force "D-Ring" downward, and Navy "face curtain" upward were installed, respectively, in the ANAL centrifuge and tests were conducted wherein pilots were requested to execute ejection procedures under fluctuating G conditions. To simulate an aircraft in an uncontrolled condition, positive G was varied from 1.5 to 6.5 G at a rate of 8 G per second while the subject pitched and/or rolled through a maximum angle of 36°. One of the major faults found in all seats was the difficulty subjects had in retracting their feet into the stirrups. Other problems encountered were the failure to properly operate the face curtain, fouling of the arm rest, and the straining to reach the "D-Ring". Factors affecting the efficient use of the equipment were the clothing worn and training and practice effects.

2,639

Hunter, H. N., R. W. Lawton, R. Crosbie, & M. Lipkin 1954 HUMAN TOLERANCE TO HIGH POSITIVE G APPLIED AT A RATE OF 5 TO 10 G PER SECOND; PHASE IV - HUMAN TOLERANCE TO 15 POSITIVE G. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5302
See also J. Avia. Med. 28:50-66, 1954

2,640

Hunter, H. N., R. W. Lawton, R. Crosbie, & M. Lipkin 1954 SOME EFFECTS OF CYCLIC ACCELERATION IN RHESUS MONKEYS. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5404
See also J. Avia. Med. 25:594-599, 1954

2,641

Hunter, H.N., R.W. Lawton, R. Crosbie, & M. Lipkin 1954 SOME EFFECTS OF CYCLIC ACCELERATION IN RHESUS MONKEYS. J. Aviation Med. 25(6):594-599
See also (Naval) Air Development Center, Johnsville, Pa.) NADC-MA5404, 1954.

ABSTRACT: In this study, eighteen rhesus monkeys (Macaca mulatta) were subjected to acceleration forces of either 25 G or 35 G, which were combined with 30 to 150 rotations per minute. Two monkeys were accelerated to 25 and 35 G, then allowed to decelerate while being rotated at 110 turns per minute. All animals were sacrificed with intravenous Nembutal within one to six hours after exposure.

Post-mortem examination revealed tissue damage in internal organs of all animals exposed to this type of acceleration. The damage could be grouped in thre categories: (1) vascular congestion, edema, and hemorrhage; (2) formation of hyaline thrombi, and (3) separation of parenchymal liver cells.

A comparison is made with rhesus monkeys unexposed to acceleration, and with others exposed to positive and negative acceleration of 40 G. It is suggested that the above-mentioned effects of cyclic acceleration are the result of more profound changes than can be accounted for on the basis of intravascular pressure rise due to the acceleration forces. It is recommended that the possible implications of these studies to the man in high performance aircraft be given further study. (Author)

2,642

Hunter, H.N. & H.S. Weiss 1954 PILOT'S ABILITY TO ACTUATE F9F-6 EJECTION SEAT CONTROLS UNDER FLUCTUATING G CONDITIONS
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR3, Sept. 16, 1954
ASTIA AD 70 757

ABSTRACT: The pilots were requested to execute the maneuvers required in an F9F-6 ejection sequence upon receipt of a signal during an acceleration stress pattern. All parts of the seat that were involved with the ejection sequence and the pre-ejection lever were fitted with microswitches and wired to recoders so that the time required to complete all maneuvers could be determined. The acceleration pattern [illegible] the positive G from 1.5 to 7.0 at 5 [illegible] while the subject pitched or rolled to a maximum of 70°. The maximum acceleration rate of change of roll was 5.8 rad/sec^2 and the maximum acceleration rate of change of pitch was 4.5 rad/sec^2. The average time for each maneuver under conditions which included all test conditions of an emergency escape were: 3.22 sec-feet retraction; 1.77 sec pre-ejection movement, and 1.71 sec face curtain actuation.

2,643

Hunter, H.N. 1955 DEVELOPMENT OF SUPINE SEAT AND RELATED COMPONENTS
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR13; 30 Nov. 1955

ABSTRACT: It had previously been reported that pilots could control an F7F-2N aircraft through turns and dives while supinated 85° from the vertical. The

supine position of 65° was investigated using the human centrifuge with the head upright to increase forward visibility. With 65° supination, straining and a Z-2 anti-blackout suit, the tolerance for all pilots tested (regardless of unprotected G tolerance) can be raised to acceleration stress conditions up to 7 G for 30 seconds.

2,644

Hunter, H. 1955 EFFECTS OF G-FORCES ON AIRCRAFT OXYGEN SYSTEMS; EVALUATION OF (Naval Air Development Ctr., Johnsville. Pa.) Project TED ADC AE-5100; 31 Dec. 1955

ABSTRACT: Equipment was exposed to maximums of 15 G for extended periods in each direction and had no effect on the oxygen system. The entire oxygen system was exposed to acceleration stress for a period of four months on the centrifuge and still performed satisfactorily.

2,645

Hunter, H. 1955 EFFECTS OF G-FORCES ON AIRCRAFT OXYGEN SYSTEMS; FINAL REPORT ON EVALUATION OF. (Naval Air Development Ctr., Johnsville, Pa.) Letter NADC-MA-3 ser 9686 of 1 Sept. 1955

2,646

Hunter, H. 1955 PILOT'S ABILITY TO ACTUATE COCKPIT CONTROLS UNDER G CONDITIONS U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR11 August 24, 1955

ABSTRACT: Tests were conducted at AMAL to ascertain the relative accessability of controls in a fighter plane's cockpit when the pilot is under acceleration stress. As a result of these tests, the ejection seat controls of the F9F-6 were found to be easily accessible to the pilot wearing full flight gear and under fluctuating acceleration stress (1.5 to 7 G). Flight clothing required for operation over cold water increases the time of actuation of controls from 10 to 99 percent, depending on the type of maneuver executed.

2,647

Hunter, H. 1955 PILOT'S ABILITY TO ACTUATE F9F-6 EJECTION SEAT CONTROLS UNDER FLUCTUATING G CONDITIONS
(Naval Air Development Center, Johnsville, Pa.) PROJECT TED ADC AE-6303.1, 31 Dec. 1955

ABSTRACT: All available ejection systems (Navy, face curtain, upward; Air Force, arm rest, upward; and Air Force, "D" ring, downward) were evaluated by exposing

Air and Navy pilots in full flight gear to fluctuating G. For upward ejections both the arm rests and face curtains were accessible to the pilot and the time required to actuate each under simulated uncontrolled flight conditions was approximately the same. In each system the most time-consuming maneuver was placing the feet on the stirrups. For downward ejections the "D" ring was easily accessible. However, the supports to hold the feet down during ejection never operated properly.

2,648

Hunter, H., & C. F. Gell 1955 INFLIGHT PHYSIOLOGICAL AND PSYCHOLOGICAL REACTIONS TO THE SUPINE POSITION. PHASE II. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 300, TED ADC AE-6300; 31 December 1955

ABSTRACT: It was determined that 65 degrees supination is the maximum angle which can be provided in a fighter cockpit without sacrificing the single control system, pilot vision and escape possibility. At this angle, all subjects tested requiring protection withstood 7 G for 30 seconds with the aid of a Z-2 anti-blackout suit plus straining. This acceleration stress was withstood without peripheral light loss and with little or no discomfort.

2,649

Hunter, H., A. Greco, E. Kephart, & J. W. Taylor 1955 EFFECTS OF SUDDEN AND DYNAMIC LOADS APPLIED TO RIGID AND ELASTIC TEST SPECIMENS AND ANIMALS. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 106 300; 31 Dec. 1955

ABSTRACT: A device for measuring deflections or deformations under sudden loads is a Statham Accelerometer. It is a mass suspended between two springs, and, as the load increases, the mass is displaced and the displacement can be recorded on an oscilloscope. The limitation of the rate at which the magnitude of the applied load is measured is dependent upon the natural frequency of the accelerometer. However, our data indicate that when a sudden load is delivered to the accelerometer by releasing the latter suddenly into a G field, the natural frequency of the gage is not the same under load as it is under one G.

2,650

Hunter, H.N. 1956 ANTI-BLACKOUT EQUIPMENT, DETERMINATION OF LIMITATIONS OF EQUIPMENT AND PERSONNEL
(U.S. Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-LR14; 3 Feb. 1956

ABSTRACT: Investigations were carried out using the AMAL centrifuge to determine the maximum anti-blackout protection provided by the Z-2, Z-3, and AF-N anti-blackout suits, the full pressure half suit, and the supine positions with the

upper limit of acceleration stress tolerated for 30 seconds. The results indicated that the Z-2 and Z-3 suits and proposed AF-N suits are approximately equal in efficiency. The full pressure half suit caused such discomfort in the range of 5 to 7 psi that the subjects ended the runs even though peripheral lights were still visible. The supine position alone does not offer any more protection than that of either the Z-2 suit plus straining or the full pressure half suit until the angle of supination is at least 77°.

2,651

Hunter, P.A. and M.W. Fetner 1963 MANEUVER ACCELERATIONS EXPERIENCED DURING ROUTINE OPERATIONS OF A COMMERCIAL TURBOJET TRANSPORT AIRPLANE. (National Aeronautics and Space Administration, Washington) Technical Note D-1801, May 1963

ABSTRACT: The incremental maneuver normal accelerations collected during routine commercial operations of a four-engine turbojet transport have been evaluated. Frequency distributions of positive and negative accelerations by flight condition are presented.

2,652

Hunter, S. 1958 CORRELATION OF HEART-BRAIN DISTANCE AND OF SITTING HEIGHT AGAINST POSITIVE ACCELERATION THRESHOLDS
(Institute of Aviation Medicine, RAF, Farnborough) FPRC No. 1048; April 1958; ASTIA AD 201 165

ABSTRACT: It is generally accepted that the hydrostatic pressure exerted by the arterial column of blood between the heart and the brain is proportional to its length measured in the direction of the applied force. For brevity, this length has been called the heart-brain distance. The purpose of this pilot experiment was to find out if any simple relationship existed under positive acceleration (g) between (1) the heart-brain distance and the black-out threshold, and (2) the sitting height and the black-out threshold. Accordingly, 10 unprotected experienced subjects from the Institute of Aviation Medicine carried out a total of 674 runs on the human centrifuge at Farnborough. The correlation coefficient for the heart-brain distance against the positive g threshold value was found to be -0.77. This leads to the deduction that, with a 99 percentage of certainty, the heart-brain distance is inversely related to the threshold. When the sitting height was correlated against positive threshold, the coefficient was +0.01. No simple functional relationship seems to exist between these two variables. (Author)

2,653

Hurt, G.J., Jr. 1963 ROUGH-AIR EFFECT ON CREW PERFORMANCE DURING A SIMULATED LOW-ALTITUDE HIGH-SPEED SURVEILLANCE MISSION. (NASA, Wash., D.C.) NASA TN D-1924, August 1963

ABSTRACT: Test subjects were exposed to several levels of simulated gust intensity. The root mean square of the normal acceleration ranged from 0.16g for the lowest level to 0.95g for the highest level of response simulated. The simulated gust intensities and vehicle response levels were in excess of the accepted human comfort level. It was found that the observer would be disrupted but not stopped in the performance of the assigned tasks.

2,654

Hyde, A. S. 1961 THE EFFECT OF BACK ANGLE AND MOLDED SUPPORT UPON INTRA-PULMONARY PRESSURE DURING FORWARD ($+G_x$) ACCELERATIONS. (Paper, 32nd Annual Meeting, Aerospace Medical Assoc., 24-27 April 1961, Chicago, Ill.)

ABSTRACT: Static intra-pulmonary pressures were recorded at accelerations from 2 to 16 G_x in live (curarized and dead dogs and monkeys during forward inclinations of 5 degrees increments from 0 degrees to 45 degrees. The pressures primarily reflect shifts of the diaphragm due to acceleratory forces. The influence of staged evisceration and staged molded support systems were studied. Essentially null displacement occurred between 10 degrees and 15 degrees of forward inclination. Above and below these angles diaphragmatic displacement was proportional to acceleration and relatively uninfluenced by molded support systems. Staged evisceration clearly established the literal dependency of diaphragmatic movement upon the presence of the liver. (Aerospace Med. 32(3):235, March 1961)

2,655

Hyde, A.S. 1961 THE PHYSIOLOGICAL EFFECTS OF ACCELERATION ON RESPIRATION AND PROTECTIVE MEASURES
In Bergeret, P., ed., Bio-Assay Techniques for Human Centrifuges and Physiological Effects of Acceleration. (London, New York, Paris: Pergamon Press, 1961) AGARDograph 48. Pp. 101-106.

ABSTRACT: Recent, current, and near future experiments defining respiratory physiology during forward ($+a_x$) acceleration are presented and reviewed. Areas where more work is needed have been noted.

2,656

Hyde, A.S. 1962 THE EFFECT OF BACK ANGLE, MOLDED SUPPORTS, AND STAGED EVISCERATION UPON INTRAPULMONARY PRESSURES IN DOGS AND A MONKEY DURING FORWARD ($+G_x$) ACCELERATION. (6570th Aerospace Medical Research Labs., Aerospace Medical Div., Air Force Systems Command, Wright-Patterson AFB, Ohio) Report No. AMRL-TDR-62-106, Sept. 1962. ASTIA AD 289 337.

ABSTRACT: Static intrapulmonary pressures were recorded at accelerations from +2 to 16 G_x in live (curarized) and dead dogs and a monkey during forward inclinations of 5° increments from 0° to 45°. The pressures primarily reflect shifts of the diaphragm due to acceleratory forces. The influence of staged evisceration and staged molded support systems were also studied. Essentially null displacement occurred between 10° and 15° of forward inclination. Above and below these angles, diaphragmatic displacement was proportional to acceleration and relatively uninfluenced by molded support systems. Staged evisceration clearly established the literal dependency of diaphragmatic movement upon the presence of the liver.

2,657

Hyde, A.S., N.S. Cherniack, E.F. Lindberg & D. Whately 1962 SOME CARDIO-RESPIRATORY RESPONSES OF FLYING AND NON-FLYING PERSONNEL TO DIFFERENT VECTORS OF ACCELERATION WITH CORRELATION OF THESE RESPONSES TO OTHER VARIABLES. (Biomedical Lab., Aerospace Medical Div., Wright-Patterson AFB, Ohio) AMRL TDR 62 151, Dec. 1962. ASTIA AD 410 162.

ABSTRACT: The cardiovascular and respiratory responses of test pilots are compared with the AMRL centrifuge panel members during headward (+GZ) and forward (+Gx) accelerations. Vital capacity decreased in all subjects with increasing forward acceleration. No significant difference existed between the cardiorespiratory performance of test pilots and that of the nonrated personnel that constitute the AMRL centrifuge panel. No correlation was noted between blackout and pulse rate, but correlation did exist between resting control and + 5Gz pulse rates. An extensive number of anthropometric measurements, indices of physical fitness, and measurements made during other stress did not correlate with tolerance to headward (+ Gz) acceleration or with respiratory performance during + Gz and +Gx acceleration. (Author)

2,658

Hyde, A. S., J. Pines & I. Saito 1962 THE EFFECTS OF GAS COMPOSITION AND ACCELERATION VECTOR UPON LUNG VOLUMES.
(Paper, 33rd Annual Meeting of the Aerospace Medical Association, 9-12 April 1962, Atlantic City, N.J.)

ABSTRACT: The effect on lung volumes of breathing air versus breathing 100% O_2 was investigated at ambient pressures on the human centrifuge facility of the Aerospace Medical Laboratory. The vecotrs of acceleration of interest were

"positive G" (+3.0 -3.5 G_z) and "forward acceleration" (+6.0 G_x), each for three minutes. The combinations of these events and of the use of anti-G suits upon lung volumes are discussed in terms of weighted casuality with regard to the severe (greater than 50%) reductions in vital capacity noted after accelerations when anti-G suits, 100% O_2 and acceleration were present. (Aerospace Med. 33(3): 339, March 1962)

2,659

Hyde, A. S. 1963 MAN-RATED CENTRIFUGES: A NATIONAL SURVEY WITH DESIGN CONSIDERATIONS AND RECOMMENDATIONS FOR FUTURE DEVICES. (6570th Aerospace Medical Research Laboratories, Aerospace Medical Division, Wright-Patterson AFB, Ohio)
September 1963 AMRL Memorandum B-55

SUMMARY:

A. It has been the thesis of this memorandum-report that the need for man-rated centrifuges will continue to increase, that more devices of this type will be proposed and built within the next decade, and that performance (and cost) of these devices will also continue to increase.

B. Categories of use of man-rated centrifuges have been presented and compared to our national capabilities; our capabilities were found to be less than our needs.

C. In order to transmit experience gained by the author in establishing specifications for man-rated centrifuges, information was offered relating to major trade-offs that influence final design configuration, cost and usefulness of these devices.

2,660

Hyde, A., J. Pines and I Saito 1963 ATELECTASIS FOLLOWING ACCELERATION: A STUDY OF CAUSALITY.
Aerospace Medicine 32(2): 150-157, February 1963.

ABSTRACT: The effect on lung volumes (VC, TVC, IC, ER, TV) was determined for various combinations of G vector, gas composition, wearing of anti-G suit, and simulation of restrictive aspects of ventilation during acceleration.

Following +6 G_x for three minutes, severe decrease in vital capacity (-40 per cent) was found only after 100 per cent O_2 was breathed. This decrease occurred primarily because the inspiratory capacity diminished. There was no change in the post-run expiratory capacity.

Simulation of the accelerative force "loading" the chest and abdomen, as reproduced by lead-shot weights, did not alter lung volumes even when 100 per cent O_2 was breathed.

Positive pressure breathing (2 mm Hg per G) during +6 G_x accelerations for three minutes while breathing 100 per cent O_2 did not prevent any of the post-run loss of vital capacity.

For the condition of +3.0 to 3.5 G_z acceleration of three minutes duration, significant post-run loss of vital capacity occurred only when the anti-G suit was used and 100 per cent O_2 was breathed. Anti-G suit inflation while breathing 100 per cent O_2 at +1 G_z was without effect on post-run lung volumes.

Loss of vital capacity following the conditions cited in 5 above occurred even when pre-run (control) and post-run vital capacities were measured with the anti-G suit inflated to 3.0 to 3.5 p.s.i.g. This infers that the post +3 G_z and 100 per cent O_2 loss was not limited to lung tissue directly compressed by inflation of the anti-G suit, but was in addition to it.

Suggested mechanisms which may be responsible for these phenomena are discussed.

ACCELERATION

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2,661

IGY Satellite Panel 1958 IGY SATELLITE PANEL PROPOSES NATIONAL SPACE FLIGHT PROGRAM. Astronautics, 3:132, May 1958.

ABSTRACT: Recommendations for a five-year program costing about $150 million annually include projects "centering on biological experiments crucial to the eventual attainment of space flight; investigations of lunar gravity or mass, magnetic field and atmosphere; planetary and interplanetary probes; determination of the astronomical unit (A.U.) now estimination of planetary masses and their effects of the path of nearby space vehicles; and observation of an instrumented re-entry body as it plunged into the planet's atmosphere."

2,662

Il'in, N. 1960 THE SHIP-SATELLITE SPEAKS
Krasnaya zvezda P. 3; 18 May 1960

2,663

Iljin, N.A. & K.F. Levitzkaja 1940 INVESTIGATION OF THE INFLUENCE OF THE INCREASED GRAVITATION UPON THE ORGANISM I. CHANGE OF WEIGHT OF THE BODY
Bull. Biol. exp. U.R.S.S. (Moscow) 9: 200-203

2,664

Ingram, W.T. 1957 ENVIRONMENTAL PROBLEMS CONNECTED WITH SPACE SHIP OCCUPANCY. In The Proceedings of the 3rd Annual Meeting of The Society of the American Astronautical Society, New York.

2,665

Inman, V. T., and J. B. de C.M. Saunders 1947 ANATOMICROPHYSIOLOGICAL ASPECTS OF INJURIES TO THE INTERVERTEBRAL DISC.
Journ. Bone Joint Surg. 29:461, 1947.

2,666

Institute of the Aerospace Sciences 1961 PROCEEDINGS OF THE IAS AEROSPACE SUPPORT AND OPERATIONS MEETING. (Unclassified Papers.) (Sponsored by the Instit. of Aerospace Sciences, Inc., New York; Assisted by OAS Aerospace Technology on Support, Orlando, Fla., 4-6 Dec. 1961.)

2,667

Institute of Environmental Sciences 1961 1961 PROCEEDINGS OF THE INSTITUTE OF ENVIRONMENTAL SCIENCES NATIONAL MEETING, APRIL 5, 6, 7, 1961, WASHINGTON, D. C. (Mt. Prospect, Illinois: Institute of Environmental Sciences, P. O. Box 191)

ABSTRACT: The 1961 Proceedings of the Institute of Environmental Sciences include the 84 technical presentations given during the eighteen sessions of the 1961 National Meeting. These papers represent a big area in advancement of the state of the art of the environmental sciences. The following subjects were discussed: Philosophy of Environmental Testing; Environmental Criteria and Specifications; Simulation Methods for Normal Environments; Environmental Measurements; Ground Environment Effects; Marine Environments; Mobility; The Thermal Environment; Special Test Facility Problems; Environments of Space; Space Environments Simulation; Life Sciences and Space; Special Space Problems; Spacecraft Problems; Space Facilities; Shock and Vibration Problems; Vibration Excitation Problems; Acoustics and Dynamics; Supplemental Papers.

2,668

MOTION PICTURE

Institute of Transportation and Traffic Engineering 1958 IMPACT. (16 mm documentary film, Department of Visual Communication, Univ. Extension, Univ. of California, Los Angeles 24, California) 1958

2,669

International Astronautical Federation 1954 SPACE FLIGHT PROBLEMS: BEING A COMPLETE COLLECTION OF ALL LECTURES HELD AT THE 4TH ASTRONAUTICAL CONGRESS, ZURICH 1953 (Biel, Switzerland: Switzerland, Laubscher & Cie., 1954)

2,670

Ioan, C.S. 1963 PARACHUTING AT SUPERSONIC SPEEDS
(Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio) Trans. No. FTD-TT-6201307; 20 February 1963; ASTIA AD 298 777
Original Source: Stiinta Si Technica (Rumania) 1:14-16, 1962

ABSTRACT: Under conditions encountered while traveling at supersonic speeds, the need to ensure that the pilot and the entire crew will be rescued if an

accident should occur during a flight at supersonic speed, i.e., the development of new methods and devices for ejection and parachuting at high speeds and altitudes, has become one of the most important problems to be solved by the builders of new supersonic airplanes. The main obstacles which had to be surmounted in designing ejection devices were acceleration, shock waves, and aerodynamic heating. The newest ejection methods and devices used at supersonic speeds are the "encapsulated seats" or ejectable "hermetically-sealed cabins." Another new type of ejection method is the sectional plane.

2,671

Isakov, P. K. 1956 SKOROSTI, USKORENIYA PEREGRUZKI (VELOCITIES, ACCELERATIONS, OVERLOADS) (Voyenizdat, 1956)

2,672

Isakov, P.K. 1957 FIZIOLOGICHESKIE REAKSII CHELOVEKA PRI DEISTVII RADIAL'NYKH USKORENII (Physiological Reactions of Man Under the Influence of Radial Accelerations)
Voyenno-meditsinskiy Zhurnal (Moscow) 6: 65-72. June 1957.

ABSTRACT: Certain physiological effects of radial acceleration are discussed which are of a practical significance in aviation. The phenomenon of grayout and blackout under positive acceleration is well known; it is caused by a reduction of the retinal and cerebral circulations due to the redistribution of the blood in the body. Repeated exposure to acceleration may result in a certain degree of adaptation which manifests itself in increased tolerance of the intensity or duration of acceleration. Compensatory mechanisms, which tend to counteract the shifting of the blood, are chiefly of a muscular nature (increased tonus) and may be demonstrated in the electromyogram. Such reactions occur even in anticipation of acceleration. The duration and accuracy of hand movements during acceleration was also studied, as well as the oxygen consumption before, during, and after acceleration with and without the use of anit-g devices.

2,673

Isakov, P. K. 1957 PHYSIOLOGICAL REACTIONS OF MAN DURING RADIAL ACCELERATION
(Trans. of Voyenno-Meditsinkiy Zhurnal (USSR) (6):65-72, 1957)
(SLA Translations Center, Chicago, Ill.) 59-11118
(Air Technical Intelligence Ctr., Wright-Patterson AFB, Ohio, Rept. No. ATIC-Ik-1606-58, 1957)

ABSTRACT: Findings are presented in regard to various physical reactions in the organism under the effect of acceleration, with and without anti-g devices.

2,674

Isakov, P. K. 1958 LIFE IN SPUTNIK.
Astronautics, 3(2):38-39, 49-50

ABSTRACT: Problems involved in keeping living organisms in space-examined by Soviet biologist, preventing escape of gases from liquids in organisms by combination of two methods-namely maintaining necessary barometric pressure in chamber and use of specially designed clothing or space suits. Solar and cosmic radiation studied; effects of acceleration on organisms of animals and humans.

2,675

Isakov, P. K. 1958 ON LAUNCHING A SINGLE-STAGE GEOPHYSICAL ROCKET TO AN ALTITUDE OF 450 KM ON AUGUST 27, 1958.
Kr. Zvezda (USSR) 2 Sept. 1958.
(Air Technical Intelligence Ctr., Wright-Patterson AFB, Ohio)
Rept. No. IR-1612-58, 1958.

ABSTRACT: This paper discusses the flights of dogs in non-hermetic chambers up to altitudes of 110 km, and in hermetically sealed cabins to an altitude of 212 km.

2,676

Isakov, P.K. 1958 PROBLEMS OF RETURN TO EARTH FROM SPACE OF SATELLITE CREWS, Krasnaya Zvezda (USSR) p.3, July 1958

ABSTRACT: The work of Soviet scientists has shown that up to altitudes of about 200 km above sea level it is possible to ensure viability. Living beings after the containers in which they are placed, become detached from the rocket. The problems of reducing the speed of re-entry, overcoming the heat barrier, and overcoming acceleration and deceleration harmful to the living being are touched on briefly.

2,677

Isakov, P. K., & V. B. Malkin 1958 VOPROSY MEDITSINY PRI MEZHPLANETNYKH POLETAKH (MEDICAL PROBLEMS IN INTERPLANETARY FLIGHTS). Med. rabot. No. 7, p. 4; 24 Jan. 1958

SUMMARY: A review of a volume of 23 translations into Russian from the foreign literature. Articles translated are by Armstrong, Haber, Strughold, von Beckh, Gaspa, Ballinger, Schaeffer, etc.

2,678

Isakov, P. K. 1960 ASSAULT ON SPACE
Trud. p. 4; 21 May 1960.

2,679

Istvan, K., & C. Endre 1957 KISERLETI GYORSULASOS AGYRAZKODASHAN LETREJOTT EKG-ELTERESEK (ELECTROCARDIOGRAPHIC CHANGES IN ACCELERATION INDUCED BRAIN CONCUSSIONS) Ideggyogyaszati Szemle (Hungary) 10(3):87-96, July 1957

2,680

Iuganov, E. M., I. I. Kasian & V. I. Iazdovskii 1960 O MYSCHECHNOM TONUSE V USLOVIIAKH NEVESOMOSIT (Muscle Tone During Conditions of Weightlessness) Izvest. Akad. Nauk SSSR, Ser. Biol. (Moscow) 25(4):601-606, July-Aug. 1960. (In Russian, with English summary).

ABSTRACT: The nature and degree of change in the eye muscle tone of a rabbit was investigated during various gravitational conditions, rocket flights (with acceleration up to 6.5 g and a state of weightlessness for 5 minutes), and laboratory conditions using a centrifuge. During weightlessness in the rocket flight the vertical displacement of the eyeball suggested a decrease of the tonic tension of the eye muscles. During various gravitational states, the oculogravic and agravic illusion is apparently caused by vertical displacement of tne eyes, brought about by reflex stimuli from the otolith apparatus.

2,681

Ivanov, D. 1959 VYSOTNYY POLET (High Altitude Flight)
(Trans. of Bol'shaya Meditsinskaya Entsiklopediya (USSR) 6:137-142, 1958). (SLA Translation Center, Chicago, Ill.) 59-18449

2,682

Ivanov, K. V., M. V. Zhukov & M. G. Molchanova 1962 EFFECT OF THE EXERTION OF ACCELERATION SIMULTANEOUSLY WITH IRRADIATION ON THE COURSE OF RADIATION SICKNESS IN ANIMALS.
Pat. Fiziol. Eksp. Ter. 6:74-75, Sep.-Oct. 1962 (Russian)

2,683

Ivanov, K. V., M. V. Zhukov & M. G. Molchanova 1963 THE EFFECT OF ACCELERATIONS CREATED AT THE MOMENT OF IRRADIATION OF ANIMALS ON THE COURSE OF ACUTE RADIATION SICKNESS.
(Joint Publications Research Service, Washington, D.C.)
Transl. from Patol. Fiziol. i Eksperim. Terapiya (Moscow) 6(5):74-75, Sept.-Oct. 1962.

ABSTRACT: The characteristics of the general reaction of an organism to the combined action of radial accelerations, produced by rotating animals in a centrifuge and irradiation by penetrating radiations, were investigated. The experiments were performed on 44 male rats weighing 110-grams to 120 grams. Results indicated that acceleration produced at the moment of irradiation did not aggrevate radiation sickness. The experimental animals died no earlier than those irradiated without rotation.

2,684

Izosimov, G. V. and A. N. Razumeev 1962 STUDIES ON CHANGES IN THE BIO-ELECTRICAL ACTIVITY OF THE CEREBRAL CORTEX UNDER THE INFLUENCE OF PROLONGED TRANSVERSE OVERLOAD.
In Izv. Akad. Nauk. SSSR (Biol) 4:621-626, July-August, 1962 (Russian).

ACCELERATION

J

2,685

Jackson, C. B., Jr., W. K. Douglas, et al 1961 RESULTS OF PREFLIGHT AND POST FLIGHT MEDICAL EXAMINATIONS. (Proc. Conf. on Results of the First U. S. Manned Suborbital Space Flight, NASA, Nat. Inst. Health, and Nat. Acad. Sci.) Pp. 31-36. 6 June 1961.

2,686

Jacobius, A. J. & M. J. Wilkins 1956 AVIATION MEDICINE: AN ANNOTATED BIBLIOGRAPHY, VOL. I, 1952 LITERATURE.
(Technical Information Division, Library of Congress, Washington, D.C.) Nov. 1956. Library of Congress Cat. Card No. 56-60078. PB No. 121543. ASTIA AD 108 861

ABSTRACT: The first annual cumulation of the bibliography on the subject prepared at the Library of Congress under plans to include all available published book and periodical literature and unclassified reports issued from 1951 to 1956. Author and subject indexes are provided.

2,687

Jacobius, A.J., R. Kenk, L.D. Davis, E.G. Koines, K. Pappajohn et. al 1957 AEROSPACE MEDICINE AND BIOLOGY: AN ANNOTATED BIBLIOGRAPHY. VOLUME VI, 1957 LITERATURE. (Library of Congress. Science and Technology Div., Washington, D.C.)

ABSTRACT: This sixth volume of the series contains 1567 abstracts and follows the preceding volume in all aspects, including format and type of indexes. Only minor modifications were made in the subject-category breakdown which was initiated in Volume V. New areas of interest that emerged while work was in progress received special consideration. The project is sponsored by the National Aeronautics and Space Administration, the Air Force, and the Federal Aviation Agency. (Aerospace Medicine 34(8):769, Aug. 1963)

2,688

Jacobius, A. J. 1959 BIBLIOGRAPHIC CONTROL OF AVIATION AND SPACE MEDICAL LITERATURE.
Aerospace Med. 30(7):507-512.

SUMMARY: This paper discusses briefly the scope, purpose, and organization of aviation and space medicine bibliographies, outlines their historic development, and lists their most representative products. Enough has been said recently about the urgent need for intensification of this country's research efforts, particularly in the astronautical sciences, that to belabor this point further would be tantamount to expressing a truism. The paper attempts to show at what tremendous rate aerospace medicine and its literature have grown throughout the last decades. There is little doubt that this trend will persist for some time to come. While the maze of scientific source materials is deepening daily, the need for bibliographic guidance becomes increasingly compelling. Bibliographers and researches alike should accept the challenge and spare no efforts to promote and improve methods and techniques of bibliographic coverage and documentation.

2,689

Jacobius, A. J., M. J. Wilkins, L. Kassianoff, R. B. Slie & S. L. Whitehead 1959 AVIATION MEDICINE: AN ANNOTATED BIBLIOGRAPHY, VOL. II, 1953 LITERATURE. (Aerospace Medical Association, St. Paul, Minn.) Library of Congress Cat. Card No. 56-60078; ASTIA AD 297 740.

ABSTRACT: The second volume on the subject, considerably increased in size. Subject coverage: (1) history and general aspects of aviation medicine, (2) aviation physiology, (3) pathology and pharmacology of aviation, (4) aviation psychology, (5) preventive medicine and sanitation, (6) special problems in high altitude and space flight, and (7) miscellaneous problems.

2,690

Jacobius, A. J. et.al. 1960 AEROSPACE MEDICINE AND BIOLOGY: AN ANNOTATED BIBLIOGRAPHY, VOLUME III, 1954 LITERATURE.
(Library of Congress, Science and Technol. Div., Washington, D.C.) Library of Congress Cat. Card No. 56-60078; PB 171 029. ASTIA AD 248 102

ABSTRACT: This bibliography, which was prepared under the sponsorship of the National Aeronautics and Space Administration, of the Advanced Research Project Agency, and of the Defence Research Board of Canada, is the third in a series which is scheduled to be brought up to date under an accelerated program within two and one half years. It comprises comprehensively the monographic, periodical, and report literatures, both domestic and foreign, of the year 1954. The bibliography is arranged alphabetically by authors and contains 1368 abstracts. It includes a secondary author, a corporate author, and a detailed and thoroughly cross-referenced subject index. The indexes, cumulated for Volumes I-III, contain close to 4000 entries. The bibliography covers all subject fields pertinent to

aviation and space medicine, particularly the following: physiology, biology, psychology, pathology, pharmacology, toxicology, sanitation, human and operational aspects, engineering, extraterrestrial environments, nutrition, survival and rescue, personnel problems, and accident prevention.

2,691

Jacobius, A. J., R. Kenk, et al 1961 AEROSPACE MEDICINE AND BIOLOGY, AN ANNOTATED BIBLIOGRAPHY, (FORMERLY AVIATION MEDICINE), VOL. IV, 1955 LITERATURE.
(Technical Information Div., Library of Congress, Washington, D. C., 1961)
Library of Congress Cat. Card No. 56-60078. ASTIA AD 258 191

ABSTRACT: This volume continues the effort made in earlier volumes. The series appears indispensable for literature search in the field of aerospace medicine.

2,692

Jacobius, A. S. et al 1962 AEROSPACE MEDICINE AND BIOLOGY: AN ANNOTATED BIBLIOGRAPHY, VOLUME V, 1956 LITERATURE.
(Library of Congress, Science and Technology Div., Washington, D.C.)
Library of Congress Cat. Card No. 56-60078. ASTIA AD 274 064

ABSTRACT: Abstracts are arranged by subject catagories for greater convenience to the reader desirous to gaing information on broad subject matters by quick direct perusal.

2,693

Jacobius, A.J. 1962 INTERNATIONAL EXCHANGE OF BIOASTRONAUTICS INFORMATION.
(Library of Congress, Science and Technology Division, Washington, D.C., presented at the Symposium on Bioastronautics Information Exchange, 12th International Astronautical Congress, October 1-7, 1961)
See also Aerospace Med. 33(2):131-137, Feb. 1962.

ABSTRACT: The spectacular development of the life sciences in space during the last decade as part of the overall space research effort is reflected in an equally dramatic expansion of bioastronautics literature. Because the trend is worldwide, the individual scientist, harassed by the increasing complexity and growth of his subject field, finds himself faced by added linguistic obstacles and dismayed by alien disciplines and practices. The dilemma does certainly not stem from a lack of services intended to control the explosive influx of bioastronautics information and to bridge language barriers. Quite to the contrary, the problem we face today is not one of "too little," it is one of "too much." This paper is intended to survey and evaluate briefly the situation in terms of existing domestic and international information facilities, with the view of identifying and formulating possible ways of improvement.

2,694

Jacobius, A. J., R. Kenk, L. D. Davis et al 1963 AEROSPACE MEDICINE AND BIOLOGY (FORMERLY AVIATION MEDICINE): AN ANNOTATED BIBLIOGRAPHY, VOL. VI, 1957 LITERATURE.
(Science & Technology Division, The Library of Congress, Washington, D. C.)
Congress Catalog Card No. 56-60078. ASTIA AD 402 638

2,695

Jacobs, H. I. 1959 STUDY OF HUMAN TOLERANCE TO COMPLEX TRANSVERSE G.
(Convair Division of General Dynamics Corp., San Diego, Calif.)
Convair Rept. ZG-003, June 1959.

2,696

Jacobs, H. L. and E. Burgess, Ed. 1960 ADVANCES IN THE ASTRONAUTICAL SCIENCES, VOLUME 6 (AAS Sixth Annual Meeting, New York, Proceedings, 18-21 Jan. 1960.)
(New York: Macmillan, 1961)

CONTENTS include:
White, S., D. D. Flickinger, T. V. Helvey, A. Mayo and B. Rowen, "Panel Discussion: Man in Space, When?", pp. 37-69, 22 figs,. 5 tbls.

2,697

Jäger, M. 1956 BEI 2400 KM/ST: AUSSTEIGEN ...? (AT 2400 KM./HR.: EXIT...?)
Flug-Revue (Stuttgart) 1956(12):18-20, Dec. 22, 1956

ABSTRACT: American research and experiences with ejection at high altitudes and supersonic speeds are briefly described. It is recognized that the progressively increasing speeds and higher altitudes exceed the protection offered by further development of the ejection seat. Instead, the new safety design concept consists of a completely enclosed ejection capsule encompassing the pilot and the cockpit.

2,698

Jager, M. 1959 DAS GEFAHRLICHE G (THE DANGEROUS G)
Flug-Revue (Stuttgart), (2): 22-25, Feb. 1959 (In German)

ABSTRACT: The physiologic effects of G forces, and human G-tolerance limits are reviewed, and protective measures and current experiments, such as tests in water immersion chambers, are discussed. Complete enclosure of the pilot in water in a pressurized chamber has been suggested for future space flights.

Centrifugal experiments showed that, although the subject had full freedom of arm and leg motion, the physiologic effects of gravity in water resembled those observed when pressure suits were worn. Since the heart and lungs were still in an air environment, they did not receive the full protection given to the rest of the body. Within a short period of time, the subject experienced pain in the thoracic region. It has been suggested to fill the lungs with water in which oxygen has been dissolved.

2,699

Jasper, H. H., A. Cipriani & E. Lotspeich 1942 STUDIES ON THE MECHANISM OF BLACK-OUT.
(National Research Council, Canada) C-2085, 26 Jan. 1942.

ABSTRACT: Studies were made on cats and macasus Rhesus monkeys and this preliminary report describes the technique of operating the animal centrifuge, observations on the effects of positive "G" on the spontaneous electrical activity of the cortex, its extinction by positive "G", the effect of the position of the animal relative to the direction of "G". The effect of positive "G" on the electrical response of the occipital cortex to light stimulation.

2,700

Jasper, H. H. & A. Cipriani 1942 DESCRIPTION OF ANIMAL CENTRIFUGE MONTREAL NEUROLOGICAL INSTITUTE.
(National Research Council, Canada) C-2086, Jan. 1942.

ABSTRACT: This report describes the animal centrifuge used at Montreal Neurological Institute for studying the physiological effects of acceleration on animals.

2,701

Jasper, H. 1942 NRC REPORT ON PROJECT A.M. 14 ON SUBJECTING ANIMALS TO CENTRIFUGAL FORCE
(National Research Council, Canada) C-2168, May 16, 1942.

ABSTRACT: This is a preliminary report discussing the results obtained on experiments on cats and Macacus. Rhesus monkeys subjected to forces between 3 and 12 G and studying the electroencephalogram, retinal potentials, electrocardiograms, intercranial pressure and moving pictures of cerebral vessels as viewed through a glass window screwed in the skull.

2,702

Jasper, H.H. 1942 REPORT TO THE NATIONAL RESEARCH COUNCIL ON PROJECT A.M. 14. RESEARCH ON POSITIVE FORCES OF ACCELERATION. Proc. Assoc. Comm. Aviation Med. Research, NRCC, Appendix I. 16 May 1942

2,703

Jasper, H., A. Cipriani & E. Lotspeich 1942 PHYSIOLOGICAL STUDIES ON THE EFFECT OF POSITIVE ACCELERATION IN CATS AND MONKEYS. (National Research Council, Canada) Rept. C-2225; 28 Sept. 1942.

ABSTRACT: The effect of acceleration on blood pressure was studied by means of a T cannula in the carotid artery and its fall in relation to time of onset of acceleration has been described. The intracranial pressure was noted to fall with the onset of positive "G" down to a negative pressure of 150 mm of mercury. Complete extinction of the b wave in the electroretinogram was noted to precede the extinction of the electrical activity of the cortex at low levels of acceleration while at higher levels the electrical activity of the brain is extinguished first. Changes in occipital cortical response to light stimulation were also noted in relation to electroretinogram and electroencephalogram. The electroencephalograms showed an excitatory phase followed by depression with delta waves and finally extinction of all activity. Hydraulic suit protection was found to protect monkeys up to 10 "G". Moving pictures of cerebral vessels during positive acceleration showed blanching of the cortical surface but never complete emptying of the larger vessels. No difference in G tolerance could be seen in animals acclimatized to high altitude, and no effect of adrenal cortical extract and of pretreatment with desoxycorticosterone upon G tolerance could be found.

2,704

Jasper, H. H., B. F. Jones, F. D. Chapman, A. Cipriani & R. E. Mitchell 1942 THE EFFECT OF REPEATED EXPOSURE TO LOW ATMOSPHERIC PRESSURE UPON TOLERANCE TO POSITIVE ACCELERATION IN MONKEYS. (National Research Council, Canada) C-2237, 17 Nov. 1942.

ABSTRACT: Macaca mulatta monkeys acclimatized to high altitude in decompression chambers were tested on the animals centrifuge and their tolerance to G recorded by means of electro-encephalograms, retinograms and clinical observations. Animals acclimatized to high altitudes were found to have a greater G tolerance than the controlled animal as measured by these criteria. The results of administration of desoxycorticosterone were equivocal.

2,705

Jasper, H. H., M. Clinton, Jr., A Cipriani & G. W. Thorn 1942 THE EFFECT OF DESOXYCORTICOSTERONE ACETATE AND ADRENAL CORTICAL EXTRACT UPON G TOLERANCE IN MONKEYS.
(National Research Council, Canada) Rept. C-2244, 10 Dec. 1942.

ABSTRACT: In eleven Macaca mulatta monkeys, tolerance to positive acceleration between 3.0 and 6.9 "g" was not appreciably altered by adrenal cortical extract or by pretreatment with desoxycorticosterone acetate as measured by threshold of extinction of the EEG.

Recovery time of brain potentials was accelerated 21% by adrenal cortical extract administered the night before exposure and 48% by four days pretreatment with desoxycorticosterone acetate.

2,706

Jasper, H. H. & A. Cipriani 1943 PHYSIOLOGICAL STUDIES OF ACCELERATION.
(National Research Council, Canada) C-2348.

ABSTRACT: The work accomplished during the fiscal year 1942-1943 under N.R.C. grand A M 14 is the subject of this paper. The work is divided into five principal headings: (a) Improvements in Instrumentation and Technique; (b) Fundamental Investigations of Basic Physiology of Acceleration; (c) Accessory Studies which took Precedence because of Apparent Promise or Urgency; (d) Motion Picture Presentation of the Physiology of Acceleration from Animal Studied: (e) Additional Activities of Research Fellow.

2,707

Jasper, H. H., & A. J. Cipriana April 1943 PHYSIOLOGICAL AND PATHOLOGICAL CHANGES IN UNANESTHETIZED MONKEYS SUBJECTED TO POSITIVE ACCELERATION WITH AND WITHOUT HYDRAULIC PROTECTION. (Executive of the Associate Committee on Aviation Medical Research, Nat'l. Research Council of Canada, Twenty-first meeting, 8 April 1943) Rept. No. CAM 26:49

2,708

Jasper, H. H., A. Battista, & R. H. Noble 1943 RELIABILITY OF THE SWING TEST OF MOTION SICKNESS. (National Research Council, Canada) Rept. No. C4038

2,709

Jaulmes, C., & A. Benitte 1956 LE MAL DES TRANSPORTS (TRAVEL SICKNESS) Revue medicale francaise (Paris) 37(6):321-330, June 1956

ABSTRACT: A brief review is presented of motion sickness, its clinical aspects, frequency, susceptibility of persons, and etiology. The etiological factor necessary for motion sickness is stimulation of the non-auditory labyrinth (caused by angular movements and change of head position around a vertical axis in an airplane). Consideration is given to nervous centers (vomiting center, chemoreceptor zone) and to psychological and visual factors related to motion sickness. Breathing exercises, oxygen inhalation, cotton ear plugs, and nutritional factors are mentioned as preventive measures. Drug treatment is advocated using belladonna alkaloids, barbiturates, synthetic antihistaminics, and pheonothiazine and derivatives.

2,710

Jefferson, G. DISCUSSION OF SPINAL INJURIES. Proc. Roy. Soc. Med. 21:21, 1928.

2,711

Jensen, L.K. 1961 EVALUATION OF ACCELEROMETER SERVOS WITH UNKNOWN NONLINEAR ELEMENTS. (Space Technology Labs., Inc., Los Angeles) Rept no. STL/TN-61-0000- 19004, ASTIA AD- 256 907, January 1961

ABSTRACT: Only two general methods of obtaining accelerations greater than one g are available in the laboratory, namely, by centrifuge and by vibration. This paper discusses the response of accelerometers containing feedback servos to vibrational input acceleration. It is shown that under certain conditions, the linearity of the steady-state accelerometer response can be determined by measuring the rectification error observed during vibration. (Author)

2,712

Jensen, R.E. & R.D. Squires 1959 NADC BIOLOGICAL INSTRUMENTATION SYMPOSIUM OF 10 DEC. 1958; THIRD LETTER REPORT CONCERNING (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR95 Oct. 7, 1959

ABSTRACT: This report gives details concerning the assemblage of a prototype airborne instrumentation package and a supporting ground installation for the monitoring, recording, and analysis of the cabin environmental conditions and physiological status of the pilot in high performance aircraft, space vehicles, and their ground simulation counterparts, e.g., centrifuges, angular accelerators, ejection seat towers, etc. Equipment will conform to IRIG standards to assure compatibility of readout with existing equipment at other installations.

2,713

Jensen, R., J.J. Gordon, et al. 1960 NADC BIOLOGICAL INSTRUMENTATION SYMPOSIUM OF 10 DECEMBER 1958; SEVENTH LETTER REPORT CONCERNING (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-L6021 July 12, 1960 ASTIA AD 242 449

ABSTRACT: This is a preliminary report of tests carried out on the AMAL bioinstrumentation package during which six channels were transmitted on an assigned frequency of 232.4 megacycles from the package mounted in the AMAL centrifuge gondola to the AMAL monitoring and recording system.

2,714

Jensen, R., J. J. Gordon, et al. 1960 NADC BIOLOGICAL INSTRUMENTATION SYMPOSIUM OF 10 DECEMBER 1958 (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-L6018; ASTIA AD-242 448

ABSTRACT: A summary is given of the investigations carried out on three types of respiration sensor systems which have been developed and evaluated at the Aviation Medical Acceleration Laboratory (AMAL). A classical method for measuring respiratory excursions was a chest strap for measurement of changes in chest circumference. The measurement of a pressure differential across a pilot's mask with a constant resistance to flow has been used as a measurement of respiratory gas flow. In order to study respiration when a mask is not used, in particular when a full pressure suit is worn, a thermistor device was mounted on a standard boom microphone to measure temperature at that point. (AUTHOR)

2,715

Jensen, R. E., J. J. Gordon, R. D. Squires, & W. Sipple 1961 CHANGES IN THE HUMAN ELECTROENCEPHALOGRAPH (EEG) DURING POSITIVE ACCELERATION. (Paper, 32nd Annual Meeting, Aerospace Medical Association, 24-27 April 1961, Chicago, Ill.)

ABSTRACT: The occipital EEG was recorded on magnetic tape during 75 centrifuge runs on fifteen human subjects while exposed to positive acceleration sufficient to produce blackout lasting from 2 to 22 seconds. A performance task and change in EEG electrode impedance were also recorded. Motion pictures were made of subject's face during runs. The EEG was separated into 18 continuously recorded component frequencies using sharply tuned filters. The data thus obtained showed increase in amplitude of beta frequencies so long as the subject was able to resist cerebral hypertension. As he failed to compensate there were varying degrees of shift toward increased amplitude in the lower frequencies. A marked beta-delta shift during acceleration with appearance of high amplitude delta and loss of beta indicated imminent loss of consciousness. (Aerospace Medicine 32(3):235, March 1961)

2,716

Jessen, Richard H. 1963 A METHOD OF NUMERICALLY EVALUATING THE ERRORS RESULTING FROM MEASUREMENT OF SPECIFIC SHOCK IMPULSES BY ACCELEROMETERS DUE TO THE FREQUENCY RESPONSE CHARACTERISTICS OF THE ACCELEROMETER (University of Wyoming, Laramie, Wyoming) ASTIA AD 401 818

ABSTRACT: Vibration and shock have become important fields of mechanical engineering with the advent of high speed aircraft and missiles. Vibration can be defined in terms of displacement, velocity, and acceleration while shock is generally defined as a change in velocity which gives rise to high accelerations. Factors such as mounting techniques, temperature effects, acoustical effects, calibration errors, and frequency response all affect the accuracy of the recorded environmental data. The effect of the frequency response upon the accuracy of the acceleration data will be the main factor discussed in this paper. The input to be considered in this paper will be a shock rather than a vibration input. This paper will present a method of calculating the error of a crystal accelerometer due to its frequency response being less than unity in the low frequency range. The inputs considered will be the three types of shock pulses.

2,717

Jez, J. 1960 PRZYCZYNY I MECHANISM URAZÓW W CZASIE SKOKÓW ZE SPADOCHRONEM (CAUSES AND MECHANISM OF INJURIES DURING PARACHUTE JUMPING) Lekarz Wojskowy (Warszawa) 36(10): 992-999. (In Polish, with French summary)

2,718

Jilek L, & S. Trojan 1960 [EFFECT OF THE RESISTANCE TO POSITIVE ACCELERATION IN RATS] Cesk Fysiol. 9:20-1, January 1960

2,719

Jilek, L., J. Fischer and S. Trojan 1962 HIGHER NERVOUS ACTIVITY CHANGES UNDER THE INFLUENCE OF POSITIVE ACCELERATION IN RATS OF VARIOUS AGES. In Activ. Nerv. Sup. (Praha) 4:128-129, 1962 (Cz).

2,720

Jilek, L. and S. Trojan 1962 CHANGES IN THE RESISTANCE AGAINST ACCELERATION STRESS AFTER INTERVENTION ON THE CENTRAL NERVOUS SYSTEM IN ONTOGENESIS IN RATS. In Sborn. Lek. 64:57-60, Feb. 1962 (Cz).

2,721

Jobes, H. W. 1942 HUMAN CENTRIFUGE OF THE AERO MEDICAL UNIT AT THE MAYO CLINIC'S AERO MEDICAL LABORATORY.
(USAF, Wright-Patterson AFB, Ohio) Memo Report EXP-M-49-698-5. 24 Aug. 1942.

ABSTRACT: The superstructure and driving mechanism of the inertia-type centrifuge at Mayo Clinic is described. The superstructure is judged to be quite satisfactory in operation but the clutching and braking mechanism gives a somewhat non-linear acceleration to the centrifuge, partly because of manual control.

2,722

Joekes, A. M. 1947 AIRSICKNESS
(RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. No. 475; Oct. 1947. ASTIA ATI 206 860.

ABSTRACT: (1) 254 air-gunners in training have been subjected to the swing test. The incidence of swing sickness was 19.7%, corresponding closely to the incidence in other populations of the R.A.F. The subsequent flying experience of these air-gunners is being followed. (2) A comparison of the results of the swing test with the incidence of airsickness and with past flying experience suggests that the single swing test is of little help in pre-selecting air crew to prevent wastage due to airsickness. (3) A number of those that were swing sick have been tested for adaptation on the swing. Of the original number of air-gunners tested 1.7% failed to adapt; a further 1.1% showed only slight adaptation. (4) The percentage figure for failure to adapt swing sickness approximates to the higher figure for failure to adapt to airsickness. Whether these two manifestations run a parallel course can only be decided by following the subsequent flying experience of these air-gunners. It is suggested that a group of men suspended from flying duries on account of persistent sickness, not primarily due to psychological causes, should be tested for adaptation to swing sickness.

2,723

Joffe, M. and F. A. Hitchcock 1948 STUDIES ON DECELERATION.
Federation Proc., 7:62.

In order to investigate the physiological effects of rapid, severe decceleration it is first necessary to know the strength of the structural components affected and their resistance to deceleration forces. The literature on the subject is nil. Thoraces of normal human individuals were obtained and the physical properties of the ribs investigated by means of the Olsen Universal Lever Type Testing machine which applied an anterior posterior compression to the rib to the point of destruction. All ribs tested broke in the anterior third at an average value of about 15 lbs. Curves of load vs distortion were drawn, and calculations of total energy absorbed were made.. All ribs absorbed energy in the range of 10-100 inch pounds. Obviously the thorax can absorb more energy, up to 1000 foot lbs. or more, and we conclude that

the bony structures contribute little to the total strength. Bone ash determinations made on fat free, dry bone showed no variation correlating with strength. The strength of the intact human thorax by means of simulated decelerations is being observed by means of the fluoroscope. Changes in the viscera are also observed and animal experiments to determine changes in cardiology (pressure and E.K.G.) with similar constriction of the thorax and abdomen are under way.

2,724

Joffe, M and F. A. Hitchock 1949 CAUSE OF INJURY IN RAPID DECELERATION Federation Proceedings 8:1.

ABSTRACT: Experiments have been carried out on cadavers and anesthetized dogs to determine the effects of rapid deceleration. Accelerations was accomplished by falling weights attached by a steel cable to the lower extremity of the test body. Rapid deceleration was produced by a safety harness attached around the waist and connected by means of a tail line to the cross member of a T-shaped channel iron frame. The G forces produced were recorded photographically from vacuum tube type accelerometers. The decelerative forces were less than those expected from calculation, which was probably due to the lack of rigidity in the tube attachments. It was observed that there was no damping effect of tissues on the transmission of forces from the belt to the heart.

Seven dogs were subjected to multiple decelerations. Serial electrocardiograms were made on all dogs over a period ranging up to 9 days or until death. Autopsies were performed at death. Results of serial electrocardiograms on dogs showed inversions or other abnormalities of the T-wave in one or more of the 3 standard leads. X-ray heart shadow in one case, autopsy in all 7 cases, showed a dilatation of the heart with thinning of the right ventricular wall. Four of 7 dogs also showed pulmonary, hepatic or renal vascular engorgement. The findings pointed to a condition of right heart failure—the traumatic heart injury syndrome.

2,725

Joffe, M. H. 1949 ANATOMICAL AND PHYSIOLOGICAL FACTORS INVOLVED IN TOLERANCE TO RAPID DECELERATION.
(PhD Diss., University of Ohio, Columbus, Ohio, 1949)

SUMMARY: 1. Human ribs tested as isolated units have been shown to be relatively weak structures (average strength 21.8 lbs.—range 7 to 40 lbs.) but capable of undergoing a considerable amount of distortion before breaking (22.6% average—range 12.9 to 34.9%). The total energy absorbed before breakage was also quite small (average of 22.1 inch-pounds — range 0.5 to 58 inch-pounds).

2. Two experiments on halves of thoraxes with ribs and intercostal muscles intact but with the extrinxic musculature removed were subjected to forces causing an average distrotion of 36% (34 and 38%). Since with this degree of

distortion the sternum and vertebral column were in contact, the limit of bending was not reached and no breakage occurred.

3. Application of forces to thoraxes by means of a constricting belt went as high as 1540 pounds or 12.65 lbs/sq. in with no evident damage to the structure. Changes in diameters were evident but accurate measurement of them was not possible.

4. Under no conditions was the costal arch damaged — either when isolated or in situ. Distortion greater than 90° was seen in all cases without damage.

5. Electronic registration of the forces of acceleration and deceleration were unsatisfactory because of the inadequate instrumentation available. Calculation showed tremendously higher forces evolved than were readable on the oscillographic tracing. Calculation gave about 17.5 g (5593 lbs.) while the electronic tubes in this instance showed almost no change.

6. Serial electrocardiographic tracings associated with periods up to nine days after the experiment showed marked changes in the T-wave diagnostic of myocardial damage. Voltage changes in the Q-wave and QRS complex were also evident. Deviation from the preexperimental electrical axis was as much as -30° (from a normal of +75°).

7. All autopsies, and one case of pre- and postexperimental x-ray heart shadows, showed a marked dilatation of the right ventricle associated with the signs of congestive heart failure. Venous congestion in the lungs, liver and kidneys was present. Myocardial hyperemia and torn fibers were evident at the microscopic examination of the material.

8. We have reproduced all the findings reported in the literature relative to the syndrome of cardiac trauma, but with a different experimental basis and a specific traumatizing factor in mind — the injury resulting from the use of the industrial safety belt. (Author)

2,726

Johnson, B.H. 1961 WIND TUNNEL TESTING EXPERIENCE WITH SEVERAL MODELS OF HIGH-SPEED ROCKET TESTS SLED (Arnold Engineering Development Center, Arnold AFB, Tenn.) AEDC TN 61-28, Contract AF 40(600)800, Proj. 6876; March 1961; ASTIA AD-253 458

ABSTRACT: A series of wind tunnel tests of a number of rocket sled models and representative generalized bodies in the presence of ground planes was conducted at the Arnold Center. The purpose of these tests was to determine the design parameters which are of importance in the aerodynamic design of high-speed rocket sleds. The tests were performed mostly in the Mach number range from 0.6 to 1.4, but some data were obtained at Mach numbers as high as 4.0. Three-component force data are presented for all models. Test results indicated that the major portions of aerodynamic loads acting on a high-speed rocket sled are generated by the undercarriage components. The Mach number range in which the greatest loads occurred was from 0.8 to as high as 3.0 depending on the sled configuration. (Author)

2,727

Johnson, C. C. 1953 PROJECT PHYSIOLOGY OF ROCKET FLIGHT MX NO. 1450-R (Holloman Air Development Ctr., Holloman AFB, N. Mex.) Rept. No. HDT 319.1/27; ASTIA AD-5981; 24 Mar. 1953

2,728

Johnson, C., & G. R. Wendt 1955 STUDIES OF MOTION SICKNESS. XVII. The Effects of Temperature, Posture, and Wave Frequency upon Sickness Rate. J. Psychol. 39:423-433

2,729

Johnson, G.E., J. Serrano, & E.Z. Levy 1959 APPLICATION OF SKIN RESISTANCE IN PSYCHOPHYSIOLOGICAL STUDIES. (Wright Air Development Center, Aerospace Medical Lab., Wright-Patterson AFB, Ohio) WADC TR 59-688, Dec. 1959.

ABSTRACT: The usefulness of measuring changes in skin resistance as a device to detect the impairment of consciousness in personnel whose work requires maximum alertness was investigated during isolation, in flight, under acceleration, under the influence of drugs, and other conditions. These experiments have determined that the use of skin resistance for monitoring of consciousness is promising, however, further studies are necessary before this method may be used as an operational tool. The effects of temperature and environmental changes must be eliminated, and the patterns of skin resistance must have better quantification.

2,730

Johnson, L. L. 1959 STUDY TO DETERMINE METHODS OF SIMULATING G EFFECTS. (Wrignt Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TN 58-314; ASTIA AD 233 045; Supplement 1; Aug. 1959

ABSTRACT: An experimental variable-area inflatable seat and shoulder harness with the necessary pneumatic actuators for the simulation of G force was fabricated. A special pneumatic controller was developed. The fabrication of the system and the subsequent testing is briefly outlined. The seat is described and illustrated by 9 photographs. It is concluded that the system concept is feasible and that the simulated reactions and effects are quite accurate and realistic. (AUTHOR)

2,731

Johnson, L.L. 1959 STUDY TO DETERMINE METHODS OF SIMULATING g EFFECTS, SUPPLEMENT 1. (Armour Research Foundation, Chicago, Ill.)
Suppl. 1 to WADC TN 58-314, ASTIA AD-211 849.
Aug. 1959. ASTIA AD 233 045.

ABSTRACT: An experimental variable-area inflatable seat and shoulder harness with the necessary pneumatic actuators for the simulation of g force was fabricated. A special pneumatic controller was developed. The fabrication of the system and the subsequent testing is briefly outlined. The seat is described and illustrated by 9 photographs. It is concluded that the system concept is feasible and that the simulated reaction and effects are quite accurate and realistic. (Author)

2,732

Johnson, Philip 1954 AN EVALUATION OF THE CHARACTERISTICS OF THE HIGH IMPACT SHOCK MACHINE FOR ELECTRONIC DEVICES (Evans Signal Lab., Belmar, N.J.)
20 January 1954

ABSTRACT: The impact time duration varies with angle of hammer fall with a five pound load on the shock table; the time duration varies between 0.4 and 0.6 milliseconds. Therefore, the response (transmission) of any fixed mechanical system will change with the hammer angle. Low frequency systems convert a larger portion of the impact energy into vibratory energy than high frequency systems excited by the same impact. A calibration procedure has been formulated.

2,733

Johnson, R.A. 1959 MODEL 16 AUTOMATIC BLOOD PRESSURE MEASURING INSTRUMENT. (Systems Research Labs., Inc., Dayton, Ohio)
Research rept. no. 16-4F, WADC TR 59-429, ASTIA AD-235 421

ABSTRACT: An Automatic Blood Pressure Measuring System for detecting and measuring the arterial diastolic and systolic pressures of a human has been developed. The purpose of this system is to provide physiological information about an individual while he is being subjected to varying conditions of environment and stress. The system is unique in that it uses transistor logic for performing the program functions. It is housed in a compact, portable case and is equipped with a carrying handle. The range of operation is from 10 to 200 mm, of mercury and the measurement can be automatically repeated at intervals varying from 1 to 15 minutes. (Author)

2,734

Johnson, R.M. 1960 EFFECTS OF ENVIRONMENTAL STRESS ON ADRENAL-THYROID RELATIONSHIPS
(Colorado A. and M. College, Fort Collins, Colorado) Contract AF 33(616)-7258; Project 7163(805); WADD, MD.

ABSTRACT: In establishing parameters and criteria for a habitable atmosphere or personal protective equipment for use in orbital flight, fundamental knowledge concerning the functional activity and mechanism of action of bodily systems is essential. This is especially true in endocrine gland interrelationships. There is, however, much controversy regarding their mode of action, especially in adrenal-thyroid relationship. This investigation will undertake to clarify some of this confusion.

2,735

Johnson, W. H. 1946 MOTION SICKNESS.
(National Research Council, Canada) Proj. Rept. NM 20

2,736

Johnson, W.H., W.R. Franks, G.F. Kelk, J.E. Loree, et al. 1950 STUDIES TO DEFINE QUANTITATIVELY THE STIMULUS REQUIRED TO PRODUCE MOTION SICKNESS. (RCAF Institute of Aviation Medicine, Toronto, & Defence Research Board of Canada) Paper No. 12, March 1950, ASTIA ATI 103 891

SUMMARY AND CONCLUSION: 1) In studies involving the types of motion which induces sickness, it is necessary to measure the movements of the head as these show considerable variation from one individual to another even though the subjects be exposed to identical types of motion. 2) Individual susceptability to swing sickness shows a significant correlation with the degree of head movement of the subject being swung. Swing sickness can be prevented by preventing this independent head movement, possibly the result of preventing any gyroscopic precussion. 3) The results suggest a promising subject for further research. (Author)

2,737

Johnson, W.H. 1951 SUGGESTIONS FOR IMPROVEMENTS OF OPERATIONAL EFFICIENCY (ESPECIALLY IN REGARD TO AIR SICKNESS) OF RCAF AIRCREW FLYING LANCASTER AIRCRAFT. (Defence Research Board, Working paper.)

2,738

Johnson, W.H. 1951 THE IMPORTANCE OF HEAD MOVEMENTS IN THE PRODUCTION OF MOTION SICKNESS (Def. Res. Med. Labs., Canada) April, 1951
ASTIA ATI 153 905

ABSTRACT: An investigation is being undertaken to determine the effectiveness of various motions of the head relative to the body in inducing motion sickness. The results indicate that individual differences in susceptibility to motion sickness on the swing are dependent upon the degree of movement of the head relative to the rest of the body. Sickness was abolished in susceptible individuals by preventing these independent head movements. In order to resolve the forces acting on the head, an electronic head movement recorder has been devised which measures the movements of the head in response to the motions imposed on the body by the vehicle (whether swing, aircraft, ship or other vehicle) It is expected that these studies will have practical application to the armed services.

2,739

Johnson, W. H., R. A. Stubbs, G. F. Kelk and W. F. Franks 1951 STIMULUS REQUIRED TO PRODUCE MOTION SICKNESS: I. PRELIMINARY REPORT DEALING WITH IMPORTANCE OF HEAD MOVEMENTS.
J. of Aviation Med. 22(5):365-374.

SUMMARY: In studies involving the types of motion which induce sickness, it is necessary to measure the movements of the head as these show great individual variation even when the subjects are exposed to identical types of over-all motion.

Individual susceptibility to motion sickness produced by a simple harmonic swing shows a significant correlation with the degree of concomitant head movement. Swing sickness can be almost totally overcome by preventing this head movement, thereby preventing any gyroscopic precession. It is probable that these findings are of importance to motion sickness in the air or in motor cars, trains or ships, where the imposed angular motion is much more complex. (Author)

2,740

Johnson, W.H. 1952 AIR SICKNESS
Air Facts 15(8):61-63, August 1, 1952

ABSTRACT: Johnson has found that head motion is the basic cause of motion sickness. Nausea results when violent motion affects the fluid in the labyrinthine channels of the inner ear. This, in turn, depends on the way in which a person "carries his head." The likelihood of sickness is reduced when head motion is reduced. Head rests have proven useful; iar travellers should rest the head firmly against the back of the seats, lessening forward and backward motion. Staring straight ahead prevents sideways movement.

Several devices have been developed to help determine individual susceptibility to motion sickness. One is an electronic machine which includes a fifteen-foot swing, electrically rocked, and a special helmet for the subject's head. A cage-like apparatus is overhead, and when the swing is set in motion head movement is charted on a nearby recording machine. From the amount of head movement shown, the scientists can forecast whether or not a subject should be acceptable as an aircrew member of the RCAF. (Journal of Aviation Medicine 23(6):630, December 1952)

2,741

Johnson, W.H. 1953 A PRELIMINARY REPORT OF A NEW METHOD FOR THE EXAMINATION OF NYSTAGMUS THROUGH TELEVISION.
The Laryngoscope, 63(12):1193-1196, December 1953

2,742

Johnson, W. H. and J. W. Mayne 1953 STIMULUS REQUIRED TO PRODUCE MOTION SICKNESS: RESTRICTION OF HEAD MOVEMENT AS A PREVENTIVE OF AIR-SICKNESS—FIELD STUDIES ON AIRBORNE TROOPS.
J. of Aviation Medicine 24:400-411, 452, October.

ABSTRACT: The conclusions of approximately 700 tests using over 500 subjects indicate that:

1. The headrest devices have a consistent effect in preventing air motion sickness and that they are significantly effective under fairly rough conditions of turbulence.

2. It is possible to predict that in approximately ninety-five out of every 100 flights made under this turbulence condition, the percentage of susceptible paratroop trainees who would be prevented from becoming airsick by the headrest device would vary between a minimum of 60 per cent and a maximum of 83 per cent.

3. The proportion of subjects becoming sick was independent of past flying experience.

4. There is some indication that the incidence of air motion sickness in soldiers similar in relevant characteristics to those tested decreases as the time since last meal increases but no general conclusions on this relationship can be made with confidence

5. The percentage of test subjects who are susceptible to air motion sickness varies with the type of turbulence but for any given turbulence condition there is no real difference between the susceptibility rates for Gliders and for Dakotas (DC-3) aircraft.

6. On the basis of these trials the estimated 95 per cent confidence intervals for the true percentage of paratroop trainees susceptible to air motion sickness varies from approximately 30 per cent to 41 per cent for "normal" turbulence to 42 per cent to 74 per cent for very rough turbulence (including violent evasive action.)

2,743

Johnson, W. H. 1954 HEAD MOVEMENTS AND MOTION SICKNESS.
International Record of Med. and G. P. Clinics Pp. 638-640, Dec. 1954
Def. Res. Med. Lab. (Canada) Rept. No. 20-41-1-1

ABSTRACT: Although it is apparent that different physiologic and psychologic factors are important in the etiology of motion sickness, recent experimental evidence has established that the nonauditory membranous labyrinth in the head is an extremely important sensory receptor in this regard. Furthermore, it has been noted by several investigators that an acute vertigo often associated with marked motion sickness follows movement of the head in one plane of space when the body is already rotating in another plane.

Controlled laboratory experiments were recently carried out by Johnson ET AL, when it was demonstrated that individual differences in susceptibility to motion sickness are to large extent dependent upon concomitant movements of the subject's head in response to movements imposed on the body as a whole. Restriction of head movement is a therapeutic measure in the prevention of all forms of motion sickness. This may be accomplished either with or without the aid of special head-rests.

2,744

Johnson, W.H. 1956 STIMULATION OF THE LABYRINTH BY ANGULAR ACCELERATION.
20th International Physiological Congress, Communications
(Brussels) p. 1035, August 4, 1956

2,745

Johnson, W. H. 1956 HEAD MOVEMENT MEASUREMENTS IN RELATION TO SPATIAL DISORIENTATION AND VESTIBULAR STIMULATION. J. Avia. Med. 27(2):148-152

ABSTRACT: By exposing several hundred Royal Canadian Air Force flight cadets to the motion of a simple swing, it was demonstrated that laboratory-induced motion sickness is directly correlated with vestibular sensitivity. A high correlation exists between the overall magnitude of the head movements and the incidence of motion sickness. Studies of susceptible individuals revealed much precessional head movement when exposed to complex movement. By fixing the head of the subject, swing sickness was prevented. This paper is concerned with evidence obtained by forcing head movements; one of the experiments consisted of placing the subject in a supine position upon a stretcher, mounted upon a turntable; the subject was rotated at a rate of 30 r.p.m. about a vertical axis. At the time of rotation, the subject rotated his head from side to side; a sickness rate of 95% is possible under these conditions, sometimes developing in 15 seconds. Gyroscopes rotating in three planes were fixed to helmets worn by the subjects; a precessional tumbling occurs in the affected gyroscope when there is any head rotation. The "cross product" of two angular accelerations applied simultaneously in any two orthogonal planes indicates the magnitude and the direction of the resulting subjective sensations of disorientation in the subject.

2,746

Johnson, W. H. 1957 DISORIENTATION IN FLIGHT. PART I. VERTIGO. (Defense Research Medical Laboratories, Toronto) Flight Comment 1957.

ABSTRACT: Vertigo - "the sensation of rotation or whirling around". This implies a subjective sensation either of the subject rotating with respect to his surroundings, or of the surroundings rotating with respect to the subject. Spatial disorientation - differs from vertigo in that it causes the pilot to put the aircraft in a relatively steady "off course" attitude (eg, nose down), although he continues to think he is flying straight and level. Vertigo causes the pilot to correct for a rotation, or turn, which is not actually occurring. In either case if the pilot fails to recognize the true attitude and correct it strictly by using instruments, a critical situation results.

2,747

Johnson, W.H. 1957 DISORIENTATION IN FLIGHT - PART II - SPATIAL DISORIENTATION. Flight Comment, September-October 1958

2,748

Johnson, W.H. 1958 DISORIENTATION. Institute of Aviation Medicine Aeromedical Reports (Toronto) p. 41-49 Winter 1958.

2,749

Johnson, W. H. 1958 PROCEEDINGS OF THE FIRST CONFERENCE ON VESTIBULAR PHYSIOLOGY AND SPACIAL DISORIENTATION. (School of Aviation Medicine, Air University, U.S.A.F., Randolph Air Force Base, Texas, June 1958.)

2,750

Johnson, W. H. 1959 THE IMPORTANCE OF THE UTRICLE IN ORIENTATION Paper, 1959 Meeting of the Aero Medical Assoc., 27-29 April 1959, Los Angeles, Calif.

ABSTRACT: The role played by the different components of the nonauditory membreaneous labyrinth in spatial orientation merits attention in the field of aviation medicine. Most attention in this regard has been concerned with the activity of the semi-circular canals. The otolithic receptors merits special attention because of their apparent stimulation by other types of accelerations which occur during certain types of aircraft maneuvers. The importance of these receptors during the weightless state involving high performance aircraft, rocket flight and orbiting satellites requires elucidation.

Difficulty in interpreting the importance of the utricle has been mainly due to lack of confirming experimental evidence. This can be decided most reliably by inactivation of the appropriate branch of the vestibular nerve concerned while leaving the semicircular canals in a functional state. A program designed to enable this type of investigation will be described together with movies showing the reactions of the operated animals when exposed to the gravity free state involving jet aircraft. Control animals were similarly exposed to zero-gravity and differences were noted in the responses of the two types, thus indicating the significance of the otoliths in the perception of gravity.

2,751

Johnson, W. H. and S. Brydon 1959 FUNCTIONS OF THE UTRICULAR MACULA. A PRELIMINARY REPORT. Can. J. Biochem. Physiol. 37:605-606.

2,752

Johnson, W.H. 1960 SYMPOSIUM OF MOTION SICKNESS.
(Panel discussion, USAF Advisory Panel on Motion Sickness and Weightlessness) Report March 1960

2,753

Johnson, W. H., J. B. Smith, & J. A. Sullivan 1960 ACCELERATION AS A MEANS OF DETERMINING THE SENSITIVITY OF THE COMPONENTS OF THE NON-AUDITORY MEMBRANOUS LABYRINTH. Ann. Otol. Rhinol. Laryngol. 69(2):610-621, June 1960

ABSTRACT: A procedure is described for comparing the responses of normal and diseased labyrinths to controlled accelerations. The comparisons are facilitated by a newly-devised apparatus which enables humans to be exposed to various magnitudes and types of motion, thereby making it possible selectively to stimulate otoliths and semicircular canals. By simultaneously exposing the head to angular motion in any of two planes of space at right angles to each other, a resultant acceleration is produced in the third remaining orthogonal plane. Proper orientation of the head under these conditions allows determination of the threshold of excitation to angular motion of the various semicircular canals individually. Furthermore, by the proper positioning of the subject with the head fixed relative to the trunk, rotation of the body at various speeds enables a determination of the threshold of excitation of the otolith to be made. In both of these arrangements, both subjective and objective vestibular responses can be accurately recorded during rotation, the latter by means of a closed-circuit television which enables all type of eye responses to be recorded with relative ease. (AUTHOR)

2,754

Johnson, W.H. & N.B.G. Taylor 1960 SOME EXPERIMENTS ON THE RELATIVE EFFECTIVENESS OF VARIOUS TYPES OF ACCELERATIONS ON MOTION SICKNESS
Paper: 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960

ABSTRACT: The nausea which is readily induced by the motions of vehicles moving by land, sea or air has long defied attempts to clearly understand its precise etiology because of the complex interrelationship and differing importance of linear and angular accelerations and other concomitant factors such as vision. An understanding of these factors has become urgent in relation to space travel because of the complex accelerations to which the travelers will undoubtedly be exposed during rocket flight and in the subsequent artificial gravity situation during orbit. The present status of our knowledge will be reviewed and will be followed by a description of some controlled experiments in which over 600 human subjects have been exposed to various types of simple and compound accelerations in the laboratory.

2,755

Johnson, W.H. 1960 ETIOLOGY OF MOTION SICKNESS (THE SIGNIFICANCE OF MOTION IN MOTION SICKNESS). (USAF Advisory Panel of Motion Sickness and Weightlessness) April 1960

2,756

Johnson, W. H. and N. B. Taylor 1961 A REVIEW OF THE PHYSIOLOGICAL EFFECTS OF ANGULAR ACCELERATIONS. In Bergeret, P., ed., Bio-Assay Techniques for Human Centrifuges and Physiological Effects of Acceleration. (London, New York, Paris: Pergamon Press, 1961). Pp. 23-34.

ABSTRACT: This paper reviews the known and possible physiological effects of angular (rotational) accelerations in relation to the production of motion-sickness, spatial disorientation and "blackout" by centrifugal acceleration. The characteristic accelerations of physiological significance produced by swings, turntables, centrifuges and a linear vertical accelerator are described. The significance of these accelerations to present flying conditions and to some proposals for future operations are discussed. A preliminary report is given on some experiments in cats which helped clarify the function of the utricle and the saccule.

2,757

Johnson, W. H. 1961 SOME VESTIBULAR PROBLEMS IN SPACE FLIGHT
Ann. Otol. Rhinol. Laryngol. 70(3):777-784, September 1961.

ABSTRACT: The present knowledge of the effects of space flight on the

nonauditory labyrinth is reviewed. Motion sickness is primarily caused by motion, although there are contributing factors. Whether or not angular acceleration or linear acceleration is the causative motion is debated. The relation of nausea and vomiting to motion sickness is discussed. It is suggested that weightlessness by itself is not nauseating, but that angular acceleration of the head will produce nausea during the weightless state. Vertigo will be a constant hazard during preweightlessness and weightlessness due to rotation of the rocket, tumbling movements of the capsule, and nodding of the head when the trunk rotates in the plane of vehicular rotation.

2,758

Johnson, W. H. & N. B. G. Taylor 1961 THE IMPORTANCE OF HEAD MOVEMENTS IN STUDIES INVOLVING STIMULATION OF THE ORGAN OF BALANCE. (Defence Research Medical Labs, Canada) Acta Oto-Laryngologica 53:213-218, Apr-May 61 , ASTIA Doc. No. AD-261 252

ABSTRACT: Certain findings and procedures have been described which enable precise determinations of the sensitivity of the various components of the non-auditory membranous labyrinth. We wish to emphasize very strongly one point which applies to motion sickness induced by various devices. The angular and linear accelerations that have been described as characteristic of various pieces of apparatus refer to the apparatus alone. If valid conclusions on the effects of these accelerations are to be drawn, care must be taken to ensure that the motion of the subject's head conforms as closely as possible to that of the apparatus. If the head is allowed to move freely, either voluntarily or involuntarily, it will be subject to additional accelerations due to these motions, and, in particular, to angular accelerations because of the short radii involved in the head movement with respect to the body (rotation of the head in the horizontal plane or swinging anteroposteriorly or laterally on the neck). It is hoped that the procedure outlined will be of use to those interested in vestibular threshold determinations both from the point of view of basic physiology and in the diagnosis of vestibular disease. (Author)

2,759

Johnson, W. H. and N. B. G. Taylor 1961 SOME EXPERIMENTS ON RELATIVE EFFECTIVENESS OF VARIOUS TYPES OF ACCELERATIONS ON MOTION SICKNESS. Aerospace Medicine 32(3):205-208, March 1961.

ABSTRACT: To compare the relative importance of linear and angular accelerations in causing motion sickness, 800 Ss were exposed to simple harmonic motion on a two-pole and four-pole swing. The conditions were varied as follows: 1) with the head secured to the back of the seat so the labyrinths were subjected to same accelerations as the seat, 2) with the head unrestrained, 3) with eyes open, and 4) with eyes blindfolded. The incidence of motion sickness under these conditions was observed and interpreted in regard to the primary stimulus for motion sickness. Implications of the findings for space flight were indicated. (Tufts)

2,760

Johnson, W. H. and N. B. G. Taylor 1961 THE IMPORTANCE OF THE OTOLITHS IN DISORIENTATION.
(Paper, 32nd Annual Meeting, Aerospace Medical Assoc., 24-27 April 1961, Chicago, Illinois)

ABSTRACT: Other than the oculogravic illusion, little is known of the effects of stimulating the otoliths. It is possible, even probable, that the stimulation of these organs particularly during and subsequent to weightlessness, and during changes in linear acceleration, could produce effects of importance in flight. The lack of knowledge results mainly from the difficulty in the laboratory of stimulating the otoliths without at the same time stimulating the semicircular canals; there is also a scarcity of objective signs of otolithic stimulation. A new laboratory procedure will be described with the aid of moving pictures. Human subjects are exposed to "revolution without rotation," i.e., to a linear acceleration that is continuously changing direction clockwise or counterclockwise. Evidence will be presented that suggests this is an otolithic stimulus causing measureable effects. (Aerospace Medicine 32(3):236, March 1961)

2,761

Johnson, W., J. Meek and A. Graybiel 1961 THE EFFECTS OF UNILATERAL AND BILATERAL LABYRINTHECTOMY ON CANAL SICKNESS IN THE SQUIRREL MONKEY.
(Naval School of Aviation Medicine, Pensacola, Fla.) NASA Order R-37; NASA N62-15687

ABSTRACT: Six squirrel monkeys which readily developed canal sickness when exposed to slow rotation were divided into two groups and subjected either to a unilateral left labyrinthectomy or a bilateral labyrinthectomy. Following surgery both groups of animals demonstrated vestibular dysfunction in unsteadiness of gait and absence of response to caloric testing of the operated ears. After bilateral labyrinthectomy all three monkeys developed a complete insensitivity to canal sickness. A similar lack of symptoms was seen initially in the monkeys subjected to unilateral labyrinthectomy; however, this behavior proved to be termporary, and by six months the animals had nearly returned to the presurgical level of sensitivity to canal sickness. (Author)

2,762

Johnson, W. H., A. Graybiel and J. C. Meek 1962 OBJECTIVE AND SUBJECTIVE MANIFESTATIONS OF CORIOLIS ACCELERATION ON A SLOWLY ROTATING ROOM
(Paper, 33rd annual meeting of the Aerospace Medical Assoc., 9-12 April 1962, Atlantic City, New Jersey.)

ABSTRACT: The Slow Rotation Room at Pensacola (Aerospace Med., 32:321-327, 1961) has been used to determine reactions associated with stimulation of the human non-auditory labyrinth. A head-mounted camera has been used to obtain records of eye movements during the vestibular stimulation. These records will be discussed together with other techniques for determining changes in threshclds of vertibular sensitivity. Application to aerospace medicine will be discussed. (Aerospace Med., 33(3):340, March 1962)

2,763

Johnson, W. H., J. C. Meek, & A. Graybiel 1962 EFFECTS OF LABYRINTHECTOMY ON CANAL SICKNESS IN SQUIRREL MONKEY. Annals of Otology, Rhinology & Laryngology 71(2):289-298, June 1962
NOTE: Reel 7, Flash 7, Item 20

SUMMARY: The syndrome of canal sickness as produced by slow rotation has been well defined and occurs in both man and animals. Previous studies with humans have offered indirect evidence that this disorder has its genesis in the semicircular canals. The squirrel monkey is particularly susceptible to canal sickness and provides an opportunity to obtain basic information regarding the pathogenesis of canal sickness. One such method of approach is to study the animals' response to rotation following unilateral and bilateral labyrinthectomy.
Six healthy squirrel monkeys which readily developed canal sickness when exposed to slow rotation were divided into two groups. One group was subjected to a unilateral left labyrinthectomy, the other group to a bilateral labyrinthectomy. Following surgery both groups of animals demonstrated evidence of vestibular dysfunction in unsteadiness of gait. This unbalance disappeared within six weeks following unilateral labyrinthectomy but persisted with gradual improvement in the bilateral labyrinthectomized animals.
Following bilateral labyrinthectomy all three monkeys developed a complete insensitivity to canal sickness which remained throughout the four month period of observation. A similar lack of symptoms from rotation was seen initially in the three monkeys subjected to a unilateral labyrinthectomy; however, this behavior proved to be temporary, and by six months the animals had nearly returned to the presurgical level of sensitivity to canal sickness. Caloric tests done before and after surgery indicated complete loss of canal function in the operated ears; there was a slight rise in sensitivity in the non-operated ears. (AUTHOR)

2,764

Johnston, A.R. 1960 MINIATURE ACCELEROMETER WITH A FUSED QUARTZ SUSPENSION (Jet Propulsion Laboratory, California Inst. of Technol.) Tech Release 34-81.
ASTIA AD 237 054

ABSTRACT: Describes a miniature accelerometer constructed as a supporting research project. The specific purpose was to investigate the capability of fused quartz in this application and to demonstrate an unusually small instrument which still maintains the high level of accuracy necessary for inertial guidance. Exceptional dimensional stability, ideal elastic properties, and high strength in small cross sections are qualities which make fused quartz an attractive material for this application.

2,765

Johnston, A.R. and S. Szirmay 1961 INVESTIGATION OF A PULSE-TORQUED SYSTEM (Jet Propulsion Laboratory, California Institute of Technology, Pasadena, Calif.) Technical Report No. 32-136, April 19, 1961. ASTIA AD 274 662.

ABSTRACT: An application of the pulse-torquing principle to acceleration measurement has been investigated. The circuitry was evaluated while functioning in an acceleration-measuring system. The dynamics of the digital force-rebalance loop, which included the accelerometer pendulum, were investigated. The use of derived-rate feedback was found to provide stable operation over the complete input range, even though the pickoff response time might be several times the pulse repetition period.

Although primarily tested with an accelerometer, the electronics could also be used to pulse-torque a gyro. An analog-digital converter using the pulse-torquing circuitry and exhibiting accuracy similar to that of the accelerometer was demonstrated.

2,766

Johnston, R. S., F. H. Samonski, Jr., M. W. Lippitt and M. I. Radnofsky 1962 LIFE SUPPORT SYSTEMS AND BIOMEDICAL INSTRUMENTATION. (In Results of the First U. S. Manned Orbital Space Flight, Feb. 20, 1962) (NASA Manned Spacecraft Ctr.) Pp.31-44.

2,767

Johnston, R. S. 1962 BIOENGINEERING
In (National Aeronautics & Space Administration, Wash., D. C.) Bioastronautics. NASA SP-18, Dec. 1962

ABSTRACT: This paper has presented a definition of bioengineering and has attempted to define the functions of the bioengineer in our manned space flight programs. The complexity in the evolution of life support sytems was presented and a limited research requirement was outlined.
In conclusion, bioengineering is emerging as one of the major fields of effort in the space era. To meet this challenge and to provide the skills required, some thought should be given in planning curriculum to establish a course of instruction in bioengineering. The course could combine basic engineering with some training in physiology. Graduates with such a background are needed and required by our space programs. (AUTHOR)

2,768

Johnston, S.P. 1960 REVIEW AND ANALYSIS OF AERONAUTICAL RESEARCH INFORMATION (Institute of the Aeronautical Sciences, Inc., New York) Project 9783(806); Contract AF 49(638)-185; AFOSR, DMS.

ABSTRACT: This work collects and prepares from current important unclassified

technical aeronautical literature, including AFOSR reports, indicative abstracts of approximately 100-150 words each. Approximately 50 per cent of these abstracts are from foreign literature of particular interest to the U.S. Air Force. The abstracts are disseminated through incorporation in "Aeronautical Engineering Reviews" and as a separate publication, "IAS Abstracts." 200 copies of "IAS Abstracts" are distributed through the European Office, ARDC, to the European scientific community. Abstracts cover the following scientific fields: ascoustics (sound and noise); aerodynamics and fluid mechanics (including aerothermodynamics, boundary layer, flow of fluids, internal flow, jet flaps and wings, stability and control, and wings and airfoils); aeroelasticity; electronics; fuels and lubricants; instruments; missiles and rockets; nuclear energy; power plants (including jet and turbine, ram-jet and pulse-jet and rocket); propellers; research and research facilities; rotating wing aircraft; space travel; structures (including beams and columns, cylinders and shells, sandwich construction, thermal stress)-and thermodynamics.

2,769

Joint Publication Research Service 1962 EAST EUROPEAN SCIENTIFIC AND TECHNICAL JOURNALS: BIBLIOGRAPHIC LISTINGS NO. 9. (Joint Publication Research Service, Washington D.C.) ASTIA AD-400 201, 6 November 1962

ABSTRACT: Contains bibliographic listings of authored articles appearing in 1962 issues of selected scientific and technical journals from Czechoslovakia, East Germany, Rumainia, and Yugoslavia.

2,770

Jokl, E. 1943 MEDICAL ASPECTS OF AVIATION (SPEED AND ACCELERATION). (London: Sir Isac Pitman & Sons, 1943) 104 p.

ABSTRACT: This book attempts to explain a specified group of medical problems of flying, namely those raised by speed and acceleration in the air. There are 61 sections. Some of the section headings are: speed and human reaction time: diving at 600 M.P.H.: "Blacking out;" giddiness and vertigo; the effects of being shot off; paracnute jumping and aero-embolism.

In discussing the effect of acceleration in the postero-anterior direction it is reported that a remarkable phenomenon was observed in rabbits, namely, the protrusion of the eyeball. It looked as if the eye would jump out of its socket following the "magic pull" exerted by the tremendous centrifugal impulse. During observations in the anteroposterior direction, there was little, if any inter ference, with respiration in human test subjects.

During these experiments hemorrhages into the conjunctiva were observed. In some cases no hemorrhages were present immediately after the experiment but bleeding took place as late as two days afterward. Subsequently analogous occurrences were encountered in pilots after fast centrifugal flying movements. One pilot after a steep spiral descent (acceleration 5 G lasting

10 to 15 seconds) showed an extensive conjunctival hemorrhage.

2,771

Joliet, Paul V. 1962 PUBLIC HEALTH ASPECTS OF AUTOMOTIVE COLLISION. (In M.K. Cragun, ed., The Fifth Stapp Automotive Crash and Field Demonstration Conference, 14-16 Sept. 1961). Pp. 90-93

2,772

Jones, B. 1941 REPORT ON THE TORONTO CENTRIFUGE. Misc. Canadian Aviation Report #49, 22 May 1941

2,773

Jones, B. F., F. D. Chapman, R. E. Mitchel, H. H. Jasper and A. Cipriani 1943 THE EFFECT OF REPEATED EXPOSURE TO LOSS OF ATMOSPHERIC PRESSURE UPON TOLERANCE TO POSITIVE ACCELERATION IN MONKEYS. (National Research Council, Committee on Avia. Med., Washington, D. C.) CAM No. 104, Jan. 1943.

ABSTRACT: Used 9 Macaca mulatta monkeys. One half received a diet rich in iron and copper and one half a diet poor in these elements. Four hours daily exposure to a simulated altitude of 25,000 feet produced polycythemia in the Fe-rich animals which increased their "g" tolerance by 2.3 "g" (49%). Protection lasted 30 days. It was measured by extinction of brain potentials and retinograms. Desoxycorticosterone reduced recovery time in all animals and reduced extinction time and "g" threshold in polycythemic animals although raising it in the controls."

2,774

Jones, C.D., J.H. Shaw, et al. 1961 PRELIMINARY INVESTIGATION OF INTERPLANETARY LUNAR AND NEAR PLANET ENVIRONMENTS AND METHODS OF SIMULATION (Aeronautical Systems Division, Wright-Patterson AFB, Ohio) ASD TR 61-267 July 1961. ASTIA AD 268 791

ABSTRACT: Summaries of the natural environments of Mars, Venus, the Moon and interplanetary space are presented. The primary induced environmental stresses associated with thermal radiation, cosmic atomic and subatomic radiation, meteoroid particles, vibration, shock, acceleration, and low pressure are described for operation near the above bodies including range of anticipated values and methods of simulation. Additional simulation techniques associated with temperature, heat flux and atmospheric composition are discussed. An environmental test philosophy and a summary of heat transfer characteristics of high speed vehicles are included. Important areas not covered in this report are combined, induced environments associated with atmospheric entry and biological effects and nuclear reaction radiations. (Author)

2,775

Jones, C. M. 1958 DISORIENTATION IN FLIGHT. (RAF Institute of Aviation Medicine, Farnborough) FPRC Memo. No. 96; ASTIA AD 209 302.

ABSTRACT: Two of the three main sources of information about orientation normally available to man, namely the special sensations responding to linear and angular movements respectively, usually prove misleading to a pilot except in steady straight flight. This fact alone explains many cases of pilot disorientation. But it also emphasizes the supreme importance of the eyes in this context; yet even these can at times prove misleading to a pilot who is then deprived of his last resort. Experiments are described which show how this can arise during maneuvers involving a component of roll, owing to the generation of involuntary and inappropriate rotational eye movements. It is concluded that for stability of the man-machine combination, aerodynamics may not always be self sufficient; disorientation of the man can upset even the aerodynamically stable aircraft. (Author) (See also AD 39 216)

2,776

Jones, G. M. n.d. DISORIENTATION DUE TO RAPID ROTATION IN FLIGHT (RAF Institute of Aviation Medicine, Farnborough) REP 11843

ABSTRACT: Difficulties which may be associated with maneuvers involving rapid rotation in flight are described. These difficulties are discussed first in connection with loss of control in a single very rapid rolling maneuver and second in connection with certain findings from a field inquiry into the causes of pilot disorientation.

2,777

Jones, G. Melvill 1958 PRESSURE CHANGES IN THE MIDDLE EAR AFTER FLIGHT. (RAF Institute of Aviation Medicine, Farnborough) FPRC 1059; ASTIA AD 216 080.

ABSTRACT; Experiments are described in which middle ear pressure changes were measured after simulated flights in a decompression chamber, during which approximately known gas mixtures were introduced into the middle ear space by breathing gases of known composition throughout the flight. The results show that when the eustachian tube remains closed after flight the middle ear pressure systematically falls in a manner depending largely upon the oxygen content of gas inhaled during a given flight. The effect after breathing pure oxygen was observed to be roughly twice the magnitude of that after similar flights breathing through an air-mix regulator. A potential clinical hazard of delayed barotrauma due to breathing 100% oxygen during flight can be at least halved by employing air-mix. A parallel phenomenon may manifest itself in the lungs as localized collapse due to rapid absorption of oxygen in a temporarily isolated region. Again the potential clinical hazard would probably be reduced substantially by employment of air-mix in place of 100% oxygen. The results also show that the normal equilibrium partial

pressure of oxygen in the middle ear approximates 66 mm Hg which is well below that in air at sea level. It is suggested that in the same situation in a sinus with obstructed ostia, it may prove an advantage in the treatment of acute sinusitis to replace sinus washout fluid with nitrogen rather than air, for oxygen would then diffuse from tissues into sinus, thus assisting rather than inhibiting subsequent drainage through the ostia. (Author)

2,778

Jones, G. M. 1958 DISORIENTATION IN FLIGHT (RAF Institute of Aviation Medicine, Farnborough) TPRC Rept. 114; Sept. 1958.

ABSTRACT: Two of the three main sources of information about orientation normally available to man, namely the special sensations responding to linear and angular movements respectively, usually prove misleading to a pilot except in steady straight flight. This fact alone explains many cases of pilot disorientation. But is also emphasises the supreme importance of the eyes in this contest; yet even these can at times rove misleading to a pilot who is then deprived of his last resort. Experiments are described which show how this can arise during manoeuvres involving a component of roll, owing to the generation of involving a component of roll, owing to the generation of involuntary and inappropriate rotational eye movements. It is concluded that for stability of the man-machine combination, aerodynamics may not always be self sufficient.

2,779

Jones, G. M. 1960 COMPARISON OF NYSTAGMOID RESPONSES TO ROTATIONAL STIMULI ABOUT VERTICAL AND ROLLING AXES.
(Paper Meeting of the Physiological Society, 29-30 July 1960)

ABSTRACT: The present experiment compares the slow-phase angular velocity of the nystagmoid response after stopping stimuli about two orthogonal axes, namely a vertical axis with head erect (horizontal nystagmus) and a rolling axis parallel to the visual axis (rolling nystagmus). Eight subjects were each exposed to a single stopping stimulus about each of these axes after turning for 3 min at 60 /sec. The mean time constants for all subjects, obtained from calculated regression lines, were 16.4 sec (S.D. 4.0) and 3.9 sec (S.D. 0.8) for the vertical and rolling axes respectively; a difference perhaps related to the difference in likely duration of rotational movement about these two axes in everyday life. However, the corresponding mean values of slow phase angular velocity immediately after stopping were similar to one another, although well below the velocity of the stimulus. The fact that these values are statistically only just distinguishable from one another suggests that if a similar stimulus were applied with eyes shut about an intermediate axis, the axis of resulting slow phase nystagmus would initially be roughly parallel to that of the stimulus, despite the considerably reduced angular velocity of response. (J. Physiol. 154:32-33P. 1960)

2,780

Jones, G. Melvill 1960 SOME ASPECTS OF LABYRINTHINE INFLUENCE UPON EYE MOVEMENT DURING RAPID ROTATIONAL MANOEUVRES
(RAF Institute of Aviation Medicine, Royal Air Force, Farnborough) FPRC/Memo 110. ASTIA AD 239 034

ABSTRACT: In a recent study of causes of disorientation in flying it transpired in Fighter Command that difficulty was being experienced in recovery from rapid rolling manoeuvres, and in Flying Training Command during and after the so-called third stage of a spin. An apparatus has been designed to obtain quantitative information about the interference due to misleading labyrinthine signals in circumstances such as these. It is composed mainly of a cine camera mounted on a flying helmet carrying a periscope so arranged that the camera sees a close up image of one eye. This film provides a quantitative measurement of the time course of the angular movements of the eye about its optic axis. The apparatus therefore affords a convenient means for comparison of the response exhibited in the eye to rotational labyrinthine stimuli about different axes.

2,781

Jones, G. M. 1960 COMPARISON OF NYSTAGMOID RESPONSES TO ROTATIONAL STIMULI ABOUT VERTICAL AND ROLLING AXES.

ABSTRACT: Eight subjects were exposed for 3 minutes to rotation at 60 degrees/sec about the vertical axis with head erect and about a rolling axis parallel to the visual axis. The results confirm an exponential decrease of the slow-phase angular velocity of nystagmus in relation to time elapsed after stopping for the vertical axis (horizontal nystagmus), and establish a similar form of decay, but with a different time constant, about the rolling axis (rolling nystagmus). The mean time constants for all subjects, obtained from calculated regression lines, were 16.4 sec. and 3.9 sec. for the vertical and rolling axes, respectively. The corresponding mean values of slow-phase angular velocity immediately after stopping were statistically only just distinguishable from one another (28.5 degrees/sec., 23.8 degrees/sec.). It is suggested, that if a similar stimulus were applied about an intermediate axis with eyes shut, the axis of resulting slow-phase nystagmus would initially be roughly parallel to that of the stimulus, and, at more prolonged rotation, the axis of eye response would tend to move towards the vertical axis of the head. (J. Physiol. 154(1):32-33, Nov. 1960)

2,782

Jones, G. M. & D. H. Drazin 1961 OSCILLATORY MOTION IN FLIGHT.
(RAF Inst. of Aviation Medicine, Great Britain) Dept. No. FPRC/1168, July 1961. ASTIA AD-267 952.

ABSTRACT: Experiments were performed in a Javelin two-seater aircraft to define limits of aircrew tolerance. The aircraft was exposed to oscillatory conditions in roll and pitch at various frequencies and angular velocity

amplitudes. Subjects assessed the conditions on a 4 point scale of subjective tolerance ranging from entirely acceptable to entirely unacceptable, and their performance in a number of visual acuity tasks was assessed. Maximum linear acceleration at the head proved the most significant criterion. When the maximum linear acceleration at the head was less than 0.1 g conditions were entirely acceptable, and when greater than 0.2 g were entirely unacceptable. In the pitching plane much greater vertical accelerations, due to the undulating flight path, led to rapid induction of severe nausea. Despite reaching the subjective limits of tolerance, objective measurements of visual acuity showed no serious deterioration in the worst flight conditions, but a parallel laboratory experiment suggested that serious deterioration would ensue with only slightly increased severity of oscillation. (Author)

2,783

Jones, G. M. & D. H. Drazin 1962 OSCILLATORY MOTION IN FLIGHT
In Barbour, A. B. & H. E. Whittingham, eds., Human Problems of Supersonic and Hypersonic Flight (New York, Oxford, London, Paris: Pergamon Press, 1962) pp. 134-151

2,784

Jones, I. H. 1918 EQUILIBRIUM AND VERTIGO
(Philadelphia: J. B. Lippincott Co., 1918)

2,785

Jones, I. H. 1937 FLYING VISTAS. THE HUMAN BEING AS SEEN THROUGH THE EYES OF THE FLIGHT SURGEON. (Philadelphia: J B. Lippincott Co., 1937), pp. 99-128

2,786

Jones, L. M. 1956 TRANSIT-TIME ACCELEROMETER
Rev. Sci. Inst. 27:374-377, June 1956

ABSTRACT: An omnidirectional transit-time accelerometer, developed for measuring the drag acceleration of spheres dropped from rockets, is described. The ambient density and temperature of air may be calculated from the drag acceleration. In the device, a bobbin is periodically caged and released within a cavity. The time for the bobbin to traverse the distance to the cavity, which distance is the same in any direction, is telemetered and measured. The accelerometer range is about 5×10^{-3} to 5 g. Systematic errors and standard deviations over the range are about 1%. The accelerometer was used successfully in a rocket flight in which the drag acceleration of a 7-in. diam. sphere was measured.

2,787

Jones, R.T. 1937 ACCELERATIONS IN LANDING WITH A TRICYCLE-TYPE LANDING GEAR. (NACA, Langley Aeronautical Lab., Langley Field, Va.) NACA ACR, Feb. 1937.

ABSTRACT: In connection with the application of stable tri-cycle-type landing gears to transport airplanes, the question arises as to whether certain of the passengers may not experience relatively great accelerations in an emergency landing. Since the main landing wheels are behind the center of gravity in this type of gear, a hard-braked landing will cause immediate nosing down of the airplane and, when this motion is stopped due to the front wheel striking the ground, there will be some tendency for the rearmost passengers to be thrown out of their seats. The following rough calculations are designed to show the magnitudes of the various reactions experienced in a severe landing under these circumstances.

2,788

Jones, W. L. 1952 THE FLIGHT SURGEON AND FLIGHT SAFETY
J. of Aviation Medicine 23(1):44-48, 84, February 1952.

ABSTRACT: The mission of flight safety is to foster correct techniques and habits on the part of operating as well as maintenance personnel to insure that equipment is so utilized as to minimize operational hazards. To insure the health and well-being of aviation personnel, the flight surgeon first performs very strict physical and psychological examinations on applicants for flying. The flight surgeon also gives medical care to the flyers' dependents in order to raise the morale of the flyer. Much of the sting of aircraft accidents has been removed through the development of protective equipment. Engineers, flight surgeons, and designers have developed safety equipment such as the parachute deployment bag, ejection seat and escapt chute, inertia reel, and shoulder harness. To increase man's compatibility with nes stresses, the flight surgeon has helped design and develop such devices as the anti-g suit. Other devices are automatic pressure breathing oxygen regulators, pressurized cockpits, cockpit air conditioning, and exposure suits. In spite of all of the safety equipment, physiological aids and excellend aeronautical designs, there are aircraft accidents. After the accident, the flight surgeon cares for the injured aircrew and then participates in the accident investigation.

2,789

Jones, Walton L. 1953 TYPICAL IMPACTS OF JET AIRCRAFT LAND CRASHES.
J Aviation Med., 24 (6):474-482.

ABSTRACT: Land crashes of jet aircraft with a small angle of impact usually result in minor injuries to the occupants, although the damage to the plane may be considerable. Higher speed, involving greater vertical forces, may lead to fractured vertebrae sustained by the occupants. Under these conditions, shoulder harnesses frequently fail after absorbing much of the energy of the impact. Protective helmets may lessen or prevent head injury.

Crashes with larger impact angles (30-90°) are generally fatal. Further research is needed for the development of a seat structure capable of dissipating more energy, and a cockpit capsule which would give the occupant more protection by separating him from the wreckage and possible fire.

2,790

Jones, W. L., & W. F. Madden 1963 EJECTION SEAT ACCELERATIONS AND INJURIES (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 28 - May 2, 1963)

ABSTRACT: A review of accelerations measured on ejection seat catapult tests, over the past four years, indicates a much wider range of values than was originally believed. This explains, in part, the occasional injury where no injury occurred in an almost similar set of circumstances. To reduce these values and obtain more performance capability a Rocket Assisted Propulsion Ejection Catapult (RAPEC) was developed by the Naval Ordnance Test Station, China Lake. This system is completely interchangeable size-wise with the present catapults resulting in much lower accelerations with increased trajectory. A review of the back injuries is given along with clinical management and results.

2,791

Jongbloed, J, and A. K. Noyons 1932 (CIRCULATORY RESPONSES TO ACCELERATIONS) Verh. internat. Kongr. Physiol. 1932, p. 128.

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Jongbloed, J. & A.K. Noyons 1932 WEITERE MITTEILUNGEN ÜBER DEN EINFLUSS VON BESCHLEUNIGUNGEN AUF DEN BLUTKREISLAUF (Further Information Concerning the Influence of Accelerations on the Blood Circulation)
Acta brev. neerl. Physiol. (Amsterdam) 2: 164-165
See also: Ned. Tijdschr. Geneesk 77: 613-614 (1933)

2,793

Jongbloed, J. & A.K. Noyons 1932 ÜBER DEN EINFLUSS VON BESCHLEUNIGUNGEN AUF DEN BLUTKREISLAUF (Concerning the Influence of Accelerations Upon the Blood Circulation)
Acta brev. neerl. Physiol. (Amsterdam) 2: 90-91

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Jongbloed, J. and A. K. Noyons 1933 CIRCULATORY RESPONSES TO ACCELERATIONS. Arch. Sci. biol., Bologna. 18:190.

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Jongkees, L. B. W., & J. J. Groen 1946 CONSIDERATIONS REGARDING THE SECONDARY AFTER-SENSATIONS CAUSED BY A STIMULATION OF THE SEMICIRCULAR CANAL SYSTEM. J. Laryngol. 61:241-244

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Jongkees, L.B.W., and J.J. Groen 1946 THE NATURE OF THE VESTIBULAR STIMULUS REQUIRED TO PRODUCE MOTION SICKNESS. J. Laryng. 61:529-541

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Jongkees, L. B. W., & J. A. J. Klun 1956 ON PER- AND POST-ROTATORY REACTIONS. Acta oto-laryngologica (Stockholm) 46(4):314-318, July-Aug. 1956

ABSTRACT: The effect of the interval between on and off rotational impulses on the duration of a rotatory sensation was measured for various magnitudes of the stimulation which was equally strong for both on and off acceleration. A rotating chair was used which could be accelerated in a short period of time until a constant velocity was reached (12.5 degrees/second in 3 seconds, 24 degrees/second in 2-½ seconds, 37 degrees/second in 2 seconds, 60 degrees/second in 3 seconds). The results support the view, expressed on graphs mathematically, that the cupula endolymph system acts as a highly damped torsion pendulum. Another conclusion is that the duration of the perrotatory sensation following acceleration in the beginning is identical with the duration of the postrotatory stopping impulses.

2,798

Jongkees,L. B. W. & J. A. J. Klijn 1956 ON PER- AND POST-ROTATIORY REACTIONS Acta Oto-laryngol. 46(2):312-318.

SUMMARY: The influence of the interval between on and off rotational impulses on the duration of a rotatory sensation is measured for various magnitudes of the stimulation which is equally strong for both on and off acceleration.

The results agree with the view that the cupula endolymph system acts like a highly damped torsion pendulum. Arithmetically the form of the graphs can be exactly described from this point of view.

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Jongkees, L. B. W. and A. J. Philipszoon 1960 SOME NYSTAGMOGRAPHICAL METHODS FOR THE INVESTIGATION OF THE EFFECT OF DRUGS UPON THE LABYRINTH Acta Physiol. Pharmacol. Neerlandica, 9:240, 1960.

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Jongkees, L. B. W. 1961 THE INFLUENCE OF SOME DRUGS ON THE FUNCTION OF THE LABYRINTH
Acta Oto-laryngol., 53:281. 1961.

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Jongkees, L. B. and A. J. Philipszoon 1962 NYSTAGMUS PROVOKED BY LINEAR ACCELERATIONS.
In Acta.Physiol Pharmacol. Neerl. 10:239-247, 1962.

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Jongkees, L. B. & A. J. Philipzoon 1963 THE INFLUENCE OF POSITION UPON THE EYE-MOVEMENTS PROVOKED BY LINEAR ACCELERATIONS.
Acta Otolaryng (Stockholm) 56:414-420, Mar.-April 1963.

2,803

Juan Valiente, F. de 1957 VERTIGO CAUSED BY INSTRUMENTS. (Vertigo de Instrumentos.) Revista de aeronautica (Madrid), 17(204): 881-884, November 1957

ABSTRACT: Aircraft accidents attributed to vertigo in the pilot may be caused by instrument flight. Vertigo is of interest to the pilot for reasons of safety, to the flight surgeon who must determine its causes, and to the aircraft engineer who is concerned with adaptation of the plane to the pilot. Pilots believe that vertigo is due to lack of confidence in the instruments during flight, insufficient training, psychophysiological factors, and external environmental causes. On the whole, the causes of vertigo during instrument flight are not well determined. It is postulated that since there is a correlation between vision and the proprioceptive system of equilibrium, any lack of stimulation from both systems can cause vertigo.

2,804

Judd, W. R. 1960 SITZMARKS OR SAFETY?
(Denver, Colo.: National Ski Patrol System, Inc., 1960)

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Juin, G. 1960 UNE NOUVELLE MEDECINE DU TRAVAIL: LA MEDECINE DU TRAVAIL AERIEN A L'ERE DES REACTEURS (A NEW OCCUPATIONAL MEDICINE: AVIATION MEDICINE IN THE JET AGE) In Proceedings of the 13th International Congress on Occupational Health, New York, 25-29 July 1960 (New York: Book Craftsmen Assoc., Inc., 1960) pp. 942-947

ABSTRACT: Jet aircraft personnel are exposed to many physiological hazards,

such as anoxia, high speed and high altitude, decompression, positive and negative accelerations, vibration, climatic changes, and the wearing of cumbersome clothing. In addition, jet flight is associated with changes in normal physiological rhythms affecting sleep patterns, hours of rest, body rempera-ture, cardiovascular and respiratory equilibrium, and digestive functions (changes in hunger sensations, types of meals). Therefore, a great number of jet personnel are suffering from flight fatigue and gastro-intestinal disorders (sever colitis, gastritis, gastro-duodenal ulcers). Exposures to ultrasonic rays affect the nervous, muscular, cardiovascular, intestinal, and endocrine systems. Mention is made of the psychological factors (tension, anxiety, emotion) related to jet flight, and recommendations are made for the extension, anxiety, emotion) related to jet flight, and recommendations are made for the extensive medical examination of jet personnel.

ACCELERATION

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2,806

Kaehler, R.C. 1957 INDIVIDUAL DATA SHEETS AND PILOT COMMENTS FOR THE X-15 CENTRIFUGE PROGRAM. (North American Aviation, Inc.) Report No. NA-57-830, July 15, 1957

2,807

Kaehler, R. C. 1959 HUMAN PILOT PERFORMANCE DURING BOOST AND ATMOSPHERE REENTRY.
Aerospace Med. 30(7):481-486.

CONCLUSIONS: 1. No physiologic limits were encountered during either of the boost or reentry conditions tested. It was demonstrated that "worst condition" accelerations, representing the maximum design limits of the aircraft, are withing the physiologic tolerance of a pilot in good physical condition with conventional G protection.

2. The tracking results for both direct and dynamic ratios have shown that performance with the right hand stick is consistently better than that with the center stick although a statistically significant difference between the two was not found.

3. Subject's comments indicated a preference for the right hand stick principally due to the amount of physical effort required to properly operate the center stick under acceleration as compared to the right hand stick.

2,808

Kaehler, R. C., J. P. Meehan, & T. Freedman 1959 DESIGNING FOR HUMAN CAPABILITIES UNDER ACCELERATION IN SATELLITE OPERATIONS (American Society of Mechanical Engineers) Paper No. 59-AV-34

ABSTRACT: The authors have attempted to survey the experimental results for human tolerance and performance capabilities under positive, negative, transverse, and positive transverse accelerations.

2,809

Kaehler, R.C. 1959 HUMAN PSYCHOMOTOR PERFORMANCE UNDER VARIED TRANSVERSE ACCELERATIONS. (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: A series of experiments have been conducted on the human centrifuge to quantify human psychomotor performance under varying conditions of transverse acceleration. The psychomotor parameters under investigation were response time, reach time and adjustment time. These measures were obtained from manipulations of five typical aircraft controls (lever, trim wheel, knob, "push-to-test" button and toggle switch) located in eight different workplace locations. Five subjects were exposed to front-to-back accelerations up to and including 8 G and back-to-front accelerations up to and including 4 G. Approximately 1200 centrifuge runs were made in the course of these experiments. The results demonstrate that all subjects were able to make effective control movements and adjustments throughout the range of the acceleration levels tested. Total time to respond, to reach and to adjust individual controls showed definite increases in front-to-back accelerations of 6 G and above. In back-to-front accelerations, physiologic tolerance is reached at 4 G with only minor decrements in the measures of performance studied. J. Aviation Med. 30(3):190, March 1959)

2,810

Kaehler, R. C. & J. P. Meehan 1960 HUMAN PSYCHOMOTOR PERFORMANCE UNDER VARIED TRANSVERSE ACCELERATIONS. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 60-621 August 1960 ASTIA AD-247 169.

ABSTRACT: Five male college students, 20 to 25 years old, were exposed to transverse accelerations from front-to-back up to 8 g and back-to-front up to 4 g on the USC centrifuge to investigate human motor performance. The results show that man can, with the proper controls and properly located in the workplace, participate effectively in aircraft control when exposed to relatively high transverse accelerations.
During front-to-back acceleration, man can perceive a visual stimulus, reach and adjust controls, e.g., the horizontal lever, toggle switch, and push-to-test button, regardless of location in a mean time of 1.0 second at 8 g. Controls normally more difficult to operate, the vertical wheel and rotating knob, require a mean time of 1.5 seconds at 8 g. For back-to-front accelerations, the toggle switch, horizontal lever, and push-to-test button require a mean time of 0.7 second at 4 g, whereas, the vertical wheel and rotating knob require a mean time of 1.0 second. (AUTHOR)

2,811

Kachler, R. C. 1961 THE EFFECTS OF TRANSVERSE ACCELERATIONS AND EXPONENTIAL TIME-LAG CONSTANTS ON COMPENSATORY TRACKING PERFORMANCE. (Aerospace Medical Laboratory, Aeronautical Systems Division, Wright-Patterson AFB, Ohio & School of Medicine, University of Southern California) ASD TR 61-457; Proj. 7222; Task 71746; Contract AF33(616)-5407; ASTIA AD-268 185

ABSTRACT: A study was conducted to determine the effects and interactions of front-to-back transverse accelerations, in the magnitudes of 0, 3g, and 6g, and exponential time-lag constants of 0.1, 1.0, and 2.0 seconds on human control performance on a compensatory tracking task. In general, the results substantiated predictions of human tracking performance based on Helson's U-hypothesis and Principle of Generality. Concepts from information theory are introduced to explain certain learning phenomena which occurred in the course of the experiment. (AUTHOR)

2,912

Kaleta, Z. 1957 ZAGADNIENIE PRZYSPIESZEN W LOTNICTWIE (THE PROBLEM OF ACCELERATION IN AVIATION) Wojsk Przeglad Lotn. (Poland) Special Medical Issue, 1957, pp. 65-91 (Air Technical Intelligence Ctr., Wright-Patterson AFB, Ohio, Rept. No. ATIC-IR-1771-58, 1957)

ABSTRACT: This article deals with the following topics: classification of accelerations, determination of acceleration value, the methods of inquiry into the effect of acceleration on the organism, and acceleration acting in the long axis of the body.

2,813

Kalinin, Yu. 1961 TRAINING OF THE BRAVE. "ROOM" FLIGHT Znaniye - sila 1961(9):9-11

ABSTRACT: The article describes the purpose and applications of flight trainers for simulating all the normal and abnormal features of actual flight. A brief account of Yuriy Gagarin's training in preparation for space flight is also given. Gagarin was accustomed to weightlessness in planes and was subjected on a centrifuge to stresses equal to those encountered in rocket take-off and braking. He parachuted onto land and into water and spent long periods alone in a soundproof chamber. He was subjected to vibration on a test stand and to prolonged exposure to cold and heat in hot and vacuum chambers. Gagarin learned to drink, eat and write in a space suit. His preparation also included instruction in a special trainer complete with instruments and controls and a computer to set the flight route. The author believes that such trainers will play a due part in space technique. They will be used for studying satellite communications in space, for simulating the meeting of satellites in orbit, for compiling "interplanetary stations" and for simulating landings on various planets, etc.

2,814

Kampik, A. 1930 EXPERIMENTELLE UNTERSUCHUNGEN UBER DIE PRAKTISCHE LEISTUNGSFAHIGKEIT DER VIBRATIONSEMPFINDUNGEN (Experimental Examinations Concerning the Practical Conductivity of the Vibration Sensation) Archiv fur die gesamte Psychologie (Leipzig), 76:3-70

2,815

Kaniss, S. TEST AND EVALUATION OF THE P-3 AUTOMATIC PILOT CATAPULT LAUNCHING EQUIPMENT. (U.S.Naval Air Material Center, Philadelphia, Pa.) Rept. No. NAES-INSTR-63-53.

2,816

Kanowski, M.B. 1961 EVALUATION OF ARMY FREE FALL PARACHUTE ASSEMBLY TYPE A/P28S-3. (Air Force Flight Test Center, Edwards AFB, Calif.) AFFTC TR 61-37, August 1961. ASTIA AD-261 567.

ABSTRACT: Tests were conducted for the U.S. Army to determine the reliability of an interim parachute assembly, designated Type A-P28S-3, and the suitability of associated equipment. The main parachute has a 35-foot nominal diameter MC-1 canopy, modified with a 14.48 sp. ft. single orifice, and an automatic ripcord release. One-hundred fifty-three tests were made with dummies at indicated airspeeds ranging from near 0 to 400 knots. Drop altitudes ranged from 65 to 170 knots at pressure altitudes of 5,000 to 25,000 feet. Each parachutist carried a front type equipment container having a loaded weight of approximately 40 pounds which was attached to the harness D-rings. The parachutists were able to achieve body stability in a prone position. The parachute assembly and associated equipment were satisfactory. (Author)

2,817

Kapitanov, R. A. 1962 TELEMETRY PROBLEMS AT THE SECOND ALL-UNION CONFERENCE ON THE USE OF RADIOELECTRONICS IN BIOLOGY AND MEDICINE Medit. Prom. SSSR, 16(11):62-64. Translation: (Joint Publications Research Service, Washington, D. C.) JPRS 17672.

2,818

Kapor, G. 1956 REACTIONS OF FLIERS TO STRESSES OF MILITARY LIFE AND JOB REQUIREMENTS. (O reakcijama letaca na stresove vojnickog zivota ias letackog poziva.)
Vojnosanitetski pregled (Beograd) 13(11-12):544-550
In Serbo-Croatian, with English Summary. P. 550.

2,819

Karlsen, Asbjorn (Karl) 1959 HERE'S HOW TECO PULLS THE "STOP" ON HIGH G'S! (Teco Aircraft Seats, Burbank, Calif.)

2,820

Karolinska Institutet 1961 FINAL TECHNICAL REPORT UNDER CONTRACT NUMBER DA-91-591-EUC-1619; OI-7206-61 CONCERNING THE CONSTRUCTION OF A HORIZONTAL-ROTOR CENTRIFUGE. (U.S. Army Research and Development Biolab, Fort Detrick). ASTIA AD 270 204L.

ABSTRACT: The report contains the following information concerning the construction of a horizontal-rotor centrifuge:
1. Objectives of the contract.
2. Summary of the research performed
3. Implications of results for future work
4. Summary on personnel utilized and administrative actions taken
5. Estimate of number of work hours expended and of costs for materials used and for property acquired.

2,821

Kashler, R. C. 1961 THE EFFECTS OF TRANSVERSE ACCELERATIONS AND EXPONENTIAL TIME-LAG CONSTANTS ON COMPENSATORY TRACKING PERFORMANCE. Report on Biophysics of Flight. (School of Medicine, University of Southern California, Los Angeles, Calif.) ASD TR 61-457, Sept. 1961. ASTIA AD-286 185.

ABSTRACT: A study was conducted to determine the effects and interactions of front-to-back transverse accelerations, in the magnitude of 0, 3 g, and 6 g, and exponential time-lag constants of 0.1, 1.0 and 2.0 seconds on human control performance on a compensatory tracking task. In general the results substantiated predictions of human tracking performance based on Helson's U-hypothesis and Principle of Generality. Concepts from information theory are introduced to explain certain learning phenomena which occurred in the course of the experiment. (Author)

2,822

Kas'ian, I. I. 1962 SOME PHYSIOLOGICAL REACTIONS IN MAN UNDER CONDITIONS OF THE ALTERNATING EFFECT OF OVERLOADING AND WEIGHTLESSNESS. Izv. Akad Nauk SSSR (Biol.) 6:896-908, Nov.-Dec. 1962 (Russian).

2,823

Kasparek, Catherine F. 1960 CATALOG OF TRANSLATED MATERIAL IN SPACE PERCEPTION (REVISED) (U.S. Naval School of Aviation Medicine, Pensacola, Florida) Research Project No. MR005.13-6001 Subtask 1 Report No. 51. ASTIA AD 243 503

ABSTRACT: A revised catalog of bibliographic materials in the area of proprioception, vestibular function, and vision which have been translated from foreign languages includes 501 items. Also included are instructions for obtaining copies of the articles from the Library of Congress, Washington 25, D.C.

2,824

Kastens, D. F. 1962 HUMAN PERFORMANCE IN A SIMULATED SHORT ORBITAL TRANSFER (6570th Aerospace Med. Research Lab., Wright-Patterson AFB, Ohio). AMRL-TDR-62-138, Proj. no. 7184; Task no. 71840b, December 1962.

ABSTRACT: Human performance was measured in a simulated short-range, coplanar orbital rendezvous task. Orbital conditions and vehicle dynamics were programmed on an analog computer. Two systems of vehicle control and one system of information display were investigated. Performance criteria included impact velocity, fuel consumption, and transfer time required. Comparisons were made between control systems and between initial conditions. Subjects' performance was better with an orthogonal-axes, thrust-constrol system than with a pitch attitude and one-axis thrust-control system. The simulated direct-version target display was found to be marginally acceptable. Suggestions about control systems and rendezvous techniques are included in the report.

2,825

Katzberg, A. A., & G. T. Dave 1960 SURVIVAL OF THE ISOLATED EMBRYONIC HEART WHEN EXPOSED TO HIGH RELATIVE CENTRIFUGAL FORCES. (School of Aerospace Medicine, Brooks AFB, Texas) Rept. No. 61-19, Dec. 1960. ASTIA AD 254 370

ABSTRACT: The effects of increased gravitation on the isolated embryonic chick heart were studied. Chick embryos that had incubated from 4 to 18 days were used as sources of the hearts. It was found that the younger hearts were more

resistant to trauma induced by gravitational stresses. Many of the young specimens withstood the effects of 98,500 x gravity, while most of the older group entered total cardiac arrest at levels less than the equivalent of 15,000 x gravity. Tracings made with an electrocardiograph substantiated these findings. (AUTHORS)

2,026

Katzberg, A.A. & L.H. Mori 1962 ORGAN AND TISSUE CULTURES. I. EMBRYONIC CHICK HEART AND HUMAN CELL CULTURES.
In Prince, J.E., ed., Biologic Systems of Discoverer Satellites XXIX and XXX. (School of Aerospace Medicine, Brooks AFB, Texas)
NASA N 62-17530, April 1962.

ABSTRACT: Living embryonic chick hearts were placed aboard Discoverer satellites to observe the effect that exposure to stress factors of a flight in space could have on a whole organ. Human cell cultures were also studied during the flight of the Discoverer satellites. It was concluded that the viability and the physiologic function of these hearts were not impaired by any of the stress factors that were encountered in space flight. Human cell cultures for both Discoverer satellites XXXIX and XXX showed no obvious degeneration. On being subcultered, those from Discoverer XXX showed normal proliferation. (STAR)

2,027

Katzen, E.D. and L.L. Levy Jr., 1961 ATMOSPHERE ENTRIES WITH VEHICLE LIFT - DRAG RATIO MODULATED TO LIMIT DECELERATION AND RATE OF DECELERATION-VEHICLES WITH MAXIMUM LIFT-DRAG RATIO OF 0.5.
(National Aeronautics and Space Administration, Washington, D.C.)
Technical note no. D-1145, ASTIA AD-267 471

ABSTRACT: An analysis has been made of atmosphere entries for which the vehicle lift-drag ratio was modulated to maintain specified maximum deceleration and/or maximum deceleration rates. The part of the vehicle drag polar used during modulation was from maximum lift coefficient to minimum drag coefficient. The entries were at parabolic velocity and the vehicle maximum lift-drag ratio was 0.5. Two- dimensional trajectory calculations were made for a nonrotating, spherical earth with an exponential atmosphere. The results of the analysis indicate that for a given initial flight-path angle, modulation generally resulted in a reduction of the maximum deceleration to 60% of the unmodulated rate. These results were equivalent, for a maximum deceleration of 10g, to lowering the undershoot boundary 24 miles with a resulting decrease in total convective heating to the stagnation point of 22%. The maximum convective heating rate was increased 18%. (Author)

2,823

Kaufman, A. B. 1956 ACCELEROMETER CALIBRATION BY BALLISTIC PENDULUM. Instruments and Automation 29:1322-1327, July 1956

ABSTRACT: On the six basic methods for accelerometer calibration, the ballistic pendulum provides vector (impact) test acceleration forces up to 500 g with the highest accuracy. Procedures, techniques, and variables are described for use of the ballistic pendulum, including details of calibration check and recording.

2,829

Kause, R. H., D. P. Woodward, A. J. Cacioppo 1959 EFFECT OF ACCELERATIVE FORCES ON ANIMAL PERFORMANCE (Goodyear Aircraft Co., Akron, Ohio) Rept. No. 2387; GER-9263, 26 March 1959.

ABSTRACT: Ten male albino rats were trained to perform a bar-pressing response by the use of avoidance conditioning techniques. The animals were then subjected to positive accelerative g forces. Immediately after being subjected to the g force, the rats were tested in the avoidance conditioning apparatus to check for any decrement in their performance capabilities. The experiment, which simulated the escape and reentry acceleration profiles of a space vehicle, was conducted in two parts.

2,830

Keighley, G. and W. G. Clark 1945 FLICKER FUSION FREQUENCY MEASUREMENTS ON HUMANS SUBJECTED TO POSITIVE ACCELERATION. (National Research Council, Committee on Aviation Medicine, Washington, D.C.) CAM Rept. no. 426, 29 March 1945.

2,831

Keighley, G., & W. G. Clark 1946 FLICKER FUSION FREQUENCY THRESHOLDS DURING POSITIVE ACCELERATION (William G. Kerckhoff Lab., California Institute of Technology, Pasadena; and the Dept. of Aviation Medicine, Univ. of Southern California, Los Angeles)

ABSTRACT: Monocular, flicker fusion frequency thresholds have been determined on 10 subjects, under positive acceleration on a centrifuge. The results are expressed as differences in cycles per second (C.P.S.) between the mean thresholds at rest, immediately before a run, and those found during acceleration.

At low accelerations (2.2-3.2 G, mean 3.0 G) causing no visual disturbances, 53 runs were made. Most lasted 45 seconds. The differences between thresholds ranged from +1.3 C.P.S. (Fusion frequency higher during acceleration) to - 1.6 C.P.S., and were distributed fairly equally about the zero baseline; 21 were positive; 32 negative. The range ± 1 C.P.S. includes 48 of the results 34 are in the range ± o.5 C.P.S. These figures show no changes in the flicker fusion thresholds. At higher accelerations (2.8-4.8 G, mean 4.0 G) 34 runs were made, lasting up to 60 seconds with negative pressure over the eyes to restore vision (Lambert, unpublished). At these accelerations without the negative pressure, there was dimming or loss of peripheral vision or blackout. No fusion frequency was higher during a run. The greatest difference in fusion frequency between rest and acceleration was -3.9 C.P.S. The range 0 to -2.0 C.P.S. includes 21 of the 34 results. The differences are all negative, more spread out than at lower accelerations and the range is greater. At these higher levels of accelerations, with vision restored, the fusion frequency of flicker is lowered. (Federation Proceedings 5(1):54, 1946)

2,232

Keigh y, G., W. G. Clark, and D. R. Drury 1951 FLICKER FUSION FREQUENCY MEASUREMENTS ON MAN SUBJECTED TO POSITIVE ACCELERATION ON A HUMAN CENTRIFUGE. J. Appl. Physiol. 4:57-62.

ABSTRACT: Flicker fusion frequency thresholds for one eye were determined on human subjects exposed to positive accelerations. A series of 38 runs was made at accelerations ranging from 2.5G to 3.2G; at these levels there was no or only minimal dimming of vision. There were no changes in the flicker fusion thresholds.

At higher levels of acceleration, from 2.8G to 4.8G, 34 runs were made. In control runs the subjects experienced visual impairment ranging from loss of peripheral vision to total blackout. In the 34 experimental runs, vision was restored by means of negative pressure goggles which produced a lowered pressure over one or both eyes. The flicker fusion frequency thresholds were slightly decreased.

2,233

Keist, B. F., W. F. Sheeley, J. M. Byers, & H. I. Quinn 1955 RELATIVE EFFECTS OF HEAD IMMOBILIZATION AND MEDICATION ON THE INCIDENCE OF AIR SICKNESS. (Air University School Aviation Medicine, Randolph AFB Texas) Rept. No. 55-78

2,834

Keist, B. F., W. F. Sheeley, J. M. Byers, & H. I. Chinn 1956 EFFECT OF HEAD IMMOBILIZATION ON INCIDENCE OF AIRSICKNESS. J. Applied Physiol. 8(4):369-370 Jan. 1956

ABSTRACT: Paratroopers on simulated combat jumps were randomly distributed aboard C-119 aircraft and divided evenly into four groups receiving, respectively: (a) 0.65 mg. of hyoscine hydrobromide together with head support, (b) 0.65 mg. of hyoscine but no head support, (c) placebo plus head support and (d) placebo without head support. Hyoscine afforded striking protection against airsickness whether or not it was supplemented with head support. Head support, on the other hand, gave no protection. (AUTHOR)

2,835

Kellaway, C.H. 1941 NOTES ON THE ANTI-"G" DEVICE FROM DR. COTTON, SIDNEY UNIVERSITY, TRANSMITTED BY COL. C.H. KELLAWAY OF FPRC, AUSTRALIA (National Research Council, Committee on Aviation Medicine, Washington, D.C.) CAM Rept. No. 27; 21 October 1941

ABSTRACT: Photographs of the centrifuge at Sydney. Cotton suit consists of air-filled bladders pressurized by a hydrostatic resevoir. Weight of the suit is 30 pounds. Suit protects against 9.3 "g" for 19 $\pm$ 1 seconds with no visual symptoms, minimum discomfort.

2,836

Kelley, R.E. & F.R. Stauffer 1950 A DEVICE FOR THE AUTOMATIC CONTROL BY G FORCE OF THE POSITION OF THE CONTROLLABLE SUPINE SEAT. SDC PROJECT 9-U-37a
(Naval School of Aviation Medicine, Pensacola, Fla.) Project No. NM 001 059. 02.05; 31 March 1950; ASTIA ATI 79310

ABSTRACT: Herein is described a device which controls the back rest position of the controllable supine seat: SDC Project 9-U-37a. This device is operated by G. When the G-level exceeds a given amount, the back rest rotates, on an axis about its lower end, backward to a horizontal position. When the G-level falls below a given amount, the horizontal rest rotates upward to its original position. An individual seated therein is then automatically changed from a seated position to a supine position, or vice versa, at specific G-levels. The G-level at which operation occurs is controlled by a 17-position switch which provides automatic supination control at levels from 1.0-6.0 G. The supination and recovery levels are dependent upon each other, and the recovery level is slightly below that of supination. The difference between these levels at any particular setting increases with the G, being 0.8 G at 2.5 G for supination and 1.6 G at 6.0 G for supination.

Such a device should be of practical value in aircraft equipped with such movable seats, as automatic protection can then be provided for air personnel exposed to positive and negative radial acceleration. (DACO)

2,837

Kellogg, W. W. 1958 I.G.Y. ROCKETS AND SATELLITES: A REPORT ON THE MOSCOW MEETINGS, AUGUST 1958. (The RAND Corporation, Santa Monica, Calif.) P-1501, Sept. 15, 1958.

ABSTRACT: A summarization of some 77 papers presented at the Technical symposia on Rockets and Satellites during the Fifth Meeting of the Committee Spéciale de l'Année Géophysique Internationale at Moscow, July 31 to August 9, 1958. Such topics are reviewed as atmospheric structure, electromagnetic properties of the ionosphere, cosmic and auroral particles, solar and stellar untraviolet and X-ray radiation, micrometeorites, biological experiments, rocket and satellite instrumentation, and rocket and satellite programs.

2,838

Kelly, C. F., A. H. Smith, & C. M. Winget 1957 PHYSIOLOGICAL RESPONSES TO ARTIFICIAL ALTERATIONS IN WEIGHT. (California University) Annual Progress Rept. 2; 15 Apr.-15 Dec. 1957; Contract Nonr-221101; ASTIA AD-150 390

ABSTRACT: An animal centrifuge has been constructed and used in prolonged centrifugation trials with domestic birds (chickens). These experiments indicate that chickens can survive accelerative forces up to 4 Gs, though with considerable mortality and growth repression. Up to 2.5 Gs, however, this treatment appears to have little effect (i.e., normal growth and negligible mortality). No definite syndrome has been established for birds dying while exposed to an accelerative force. Although neurological disturbances are encountered (and proven not to result from infectious disease) these are not considered to be primary causes of death in acceleration stress. Birds grown under an accelerative force show some anatomic changes. Physiological changes observed have been quite variable, and sometimes contradictory between different trials. It is assumed that these differences arise from other factors (age of animals, temperature, acceleration schedule, etc.) and can be rationalized with the accumulation of more data. Consistent changes have been observed in heart rate (increased) and respiratory frequency (decreased) On return to normal gravity, the physiological differences between centrifuged birds and their controls disappear in about 3 weeks. In some cases there is a period of over compensation (viz.: respiratory frequency, which is decreased centrifugation, becomes faster than the controls during the first two weeks at normal gravity.) Some progress has been made on the development of a high-Gs strain. The first selection (involving a 60% mortality) has been made, and this group will be reproduced in the near future. (AUTHOR)

2,839

Kelly, C.F., A.H. Smith and C.M. Winget 1960 AN ANIMAL CENTRIFUGE FOR PROLONGED OPERATION. J. Appl. Physiol. 15:753-7

ABSTRACT: In 1956 the authors undertook an investigation of the effect of chronic acceleration stress on animals. An essential step was the development of a centrifuge mechanism capable of producing accelerative forces up to 6G for long periods. Similar devices have been constructed for short-term operation with man (1) and various experimental animals (2), and for long-term operation with rats (3), but the literature contains little or no information on their mechanical requirements and characteristics. This report is therefore made on the construction details and functional characteristics of the apparatus, which ahs operated without mechanical difficulty for more than 15,000 hours. Results of experiments with this centrifuge are reported elsewhere.

2,840

Kelly, E. J. 1961 THE RADAR MEASUREMENT OF RANGE, VELOCITY AND ACCELERATION. (Lincoln Lab., Mass. Inst. of Tech., Lexington) ASTIA AD-261 306; 19 Jan.1961 See also Reprint IRE Transactions on Military Electronics MIL-5:51-57, April 1961

ABSTRACT: A study is presented of the ultimate attainable accuracy in the radar measurement of range, range rate, and range acceleration. It is assumed that these quantities are to be measured by a coherent radar with a large output signal-to-noise ratio. The approach is entirely theoretical, and the accuracy evaluated is the accuracy that would be attained with an ideal receiver which performs maximum-likelihood estimates of the unknown parameters. The transmitted waveform is fixed and arbitrary, and the error variances and covariances are evaluated in detail in terms of the amplitude and frequency modulation of the transmitted wave. Specific results are also given for constant amplitude pulses carrying arbitrary combinations of linear and quadratic frequency modulation. (AUTHOR)

2,841

Kelly, C.F. and C.G. Phipps 1961 IN FLIGHT BIO-INSTRUMENTATION IN A NEAR-SPACE OPERATIONAL ENVIRONMENT.
(Paper, 1961 Meeting of the Aero Medical Association, Chicago, April 24-27)

ABSTRACT: To bring known methods of airborne physiological instrumentation to a point of usefulness in an operational environment requires close coordination between the medical profession, the electronics profession and operational aviation. This cooperation has been possible to a large degree within the frame-

work of the Naval Missile Center. A versatile system of instrumenting pilots and radar operators of high performance aircraft for the electrocardiogram and electroencephalogram will be presented. Operational methods and techniques developed to instrument subjects in the Mark IV Full Pressure Suit and obtain data which is used as a part of missile system evaluation, will be discussed. Records and results will be presented as well as applications of these methods to physiological instrumentation during space flight.
(Aerospace Med. 32(3):237)

2,842

Kempf, E.J. 1958 BASIC BIODYNAMICS.
Annals of the New York Academy of Sciences. 73: 869-910, Sept. 30, 1958

ABSTRACT: Six laws of biodynamics that govern the behavior of all forms of life in reaction to their environment are presented, with well established scientific evidence demonstrating their validity. They are consistent with the laws of thermodynamics that govern the equilibrating behavior of enclosed, nonliving, reversible reaction system. The laws of biodynamics provide the biological sciences of genetics, cytology embrology, biochemistry, physiology, psychology,, and sociology, for the first time in their history, with a formulation of the basic natural processes involved in their special fields of investigation. These laws will clarify and facilitate the further development of secondary laws of the sciences of living behavior.

2,843

Kendall, S.K. 1942 CHARACTERISTICS OF HIGH SPEED STALL IN NAVAL FIGHTER AIRCRAFT. (National Research Council, Canada)
Report #C-2844, 15 August 1942

ABSTRACT: With the use of the Franks Flying Suit to prevent blacking out, studies were made on high speed stalls of aircraft flying at over 250 m.p.h. Trials were conducted on the Seafire, stalling speeds being determined at 100, 150, 200, 250, 300 and 350 m.p.h. at 10,000 feet and at 20,000 feet. Similar determinations were made on the Hurricane I up to 300 m.p.h. and the Martlet I up to 250 m.p.h. Also the Fulmar II aircraft up to 20 m.p.h. The pilot in these maneuvers went up to 8 1/2 and 9 G. The relationship between stalling speed and centrifugal force at various altitudes was determined.

2,844

Kendricks, E. J. 1951 MEDICAL PROBLEMS OF MILITARY AVIATION. THE KOBER LECTURE FOR 1951.
Mil. Surgeon 108(6):467-481, June 1951

ABSTRACT: With the appearance of aircraft in war, a new medical specialty developed. Man, in exploring a new environment, had encountered new physical, physiological and mental hazards. A team was then developed, consisting of scientists, engineers, and medical men, to deal with the complicated problem of keeping man, the air frame and the power plant as an efficient, relatively safe instrument of peace and war. The advance of military flhing made three things evident: (1) flyers must be carefully selected, (2) they must be classified in some way to indicate their capabilities, and (3) there must be a constant alert to search out fatigue, staleness, fear of flying, increased recklessness and foolhardiness. Research efforts fall in two broad categories: (1) Human requirements in aircraft design, as imposed by acceleration, altitude, cold, heat, and man's physiological limitations, and (2) development of personal equipment to improve tolerance of acceleration, altitude, cold, and heat.

2,845

Kendricks, E.J. 1952 AEROMEDICINE: THE DOMINANT SCIENCE
Aero Digest 64(1): 72-80, 82, 90. Jan. 1952

ABSTRACT: The physiological problems resulting from the advances of modern aviation in high-altitude and high-speed flying are briefly discussed. New methods and techniques in meeting problems such as temperature and pressure changes, anoxia, bio-acoustic effects, bailing out from high altitudes, and instrument control (human engineering) are summarized. In conclusion, the requirements for and the functions and duties of the flight surgeon are outlined.

2,846

Kendricks, E. J., et al 1955 MEDICAL PROBLEMS OF SPACE FLIGHT.
IN USAF School of Aviation Medicine, Randolph AFB, Texas, Epitome of Space Medicine, Item No. 9.
Reprinted from Instructors Journal, Winter 1954. Catalogued by ASTIA as AD 144 581.

CONTENTS:
Kendricks, E. J., Men are now Flying in Space;
Strughold, H., Living Room in Space;
Douglas Aircraft Co., Inc., Characteristics of the Earth's Atmosphere;
Haber, H., From High Altitude Flight to Space Flight;
Gerathewohl, S. J., The Peculiar State of Weightlessness.

2,847

Kendricks, E. J. 1955 MEN ARE NOW FLYING IN SPACE.
In USAF School of Aviation Medicine, Randolph AFB, Texas, Epitome of Space Medicine, pp. 1-3 ASTIA AD 144 581.

ABSTRACTS: During the years immediately following World War II, Major General Harry G. Armstrong, then Commandant of the School of Aviation Medicine, perceived that flight in the upper atmosphere or in space was an imminent reality. Therefore, he created the Department of Space Medicine at the School and placed Dr. Hubertus Strughold at its head. Dr. Strughold and his co-workers have considered all the known properties of the border zone between the troposphere, where conventional flight occurs, and outer space, with their probably effects upon the human body. The research of this Department is wholly basic, the application remaining for other agencies to perform.
Men must somehow take their own peculiar environment with them when they venture into space. Every element that supports human life, and protects it from the unfriendly medium outside, must be supplied from within the confines of the craft. A real task of aviation medicine today, then, is to show men how to live in space.
(CARI)

2,848

Kennedy, P. J., & R. O. Fimmel 1955 UNBALANCE INDICATING INSTRUMENTATION FOR FLIGHT SIMULATOR (Signal Corps Engineering Labs., Fort Monmouth, N. J.)
Technical Memo. M-1666; ASTIA AD-80 667; Nov. 1955

ABSTRACT: A balancing system for use with a flight simulator was required as a safety device to indicate excessive unbalance. A system was designed using strain gages as the sensing element, a cutoff relay to trip the ignition system and a strain indicator to indicate unbalance. Mounting the strain gages on the stationary leg of the whirler mount, eliminated the need for slip rings which greatly simplified the installation. The system has been installed and is giving satisfactory operation. (SCEL)

2,849

Kennedy, R. S. and A. Graybiel 1961 A COMPARISON OF SUSCEPTIBILITY TO SYMPTOMS IN THE SLOW ROTATING ROOM (CANAL SICKNESS) AND MOTION SICKNESS IN FLIGHT PERSONNEL
Paper, 32nd annual meeting, Aerospace Medical Assoc., 24-27 April 1961, Chicago, Ill.

ABSTRACT: Previous studies have shown that stimulating the semi-circular canals in healthy subjects (caused by movements of the head while slowly

rotating in a small room) produces symptoms collectively termed "canal sickness." In this experiment susceptibility to canal sickness was measured in three groups of subjects (aviators who had completed military test pilot school, experienced aviators, and incoming flight students) and compared with their susceptibility to other forms of motion sickness and vertigo, as determined by interview and questionnaire. The findings are interpreted in terms of the validity of the test for canal sickness, as a predictor of motion sickness. Aerospace Med. 32(3):237, March 1961.

2,850

Kennedy, R.S. and A. Graybiel 1961 SYMPTOMATOLOGY DURING PROLONGED EXPOSURE IN A CONSTANTLY ROTATING ENVIRONMENT AT A VELOCITY OF ONE REVOLUTION PER MINUTE. (Naval School of Aviation Medicine, Pensacola, Fla.) Rept. No. 62. 8 Sept. 1961. ASTIA AD 268 791.

ABSTRACT: Eight subjects were systematically observed on certain tasks aboard the Pensacola Slow Rotation Room at a velocity of one RPM. Pilot experiments indicated the great majority of unselected subjects would be symptom free at this speed. Consequently, four subjects were selected whose susceptibility to canal sickness and motion sickness was far above average. The findings warranted the conclusion that under the conditions of this experiment, exposure to a constantly rotating environment on one RPM does not handicap the performance of persons with far greater than average susceptibility to canal sickness.

2,851

Kennedy, R. S., & A. Graybiel 1962 VALIDITY OF TESTS OF CANAL SICKNESS IN PREDICTING SUSCEPTIBILITY TO AIRSICKNESS AND SEASICKNESS. Aerospace Medicine 33(8):935-938, Aug. 1962

SUMMARY: Twenty-one subjects were exposed to a laboratory method for producing motion sickness (canal sickness) aboard the Slow Rotation Room. In an effort to determine the predictive ability of this method the subjects were also subjected to aerobatics in an aircraft and to heavy or calm sea states. In addition nystagmic response to caloric stimulation was observed. It was found that a positive relationship existed between performance on the Slow Rotation Room, caloric irrigation, and airsickness. This relationship also existed during heavy seas and to a lesser extent in moderate seas. (AUTHOR)

2, 52

Kennedy, R.S. & A. Graybiel 1962 THE VALIDITY [illegible]
IN PREDICTING SUSCEPTIBILITY TO AEROSPACE [illegible]
Aviation Medicine, Pensacola, Fla.) Proj. Medic., Bureau, [illegible]
no. 71. 27 June 1962

2,853

Kennedy, R. S., G. C. Tolhurst, & A Graybiel [illegible]
DEPRIVATION ON ADAPTATION TO THE CORIOLIS [illegible]
AND CANAL SICKNESS (Paper, 34th Annual Meeting of the [illegible]
Association, Statler-Hilton Hotel, Los Angeles, California, [illegible]
May 2, 1963)

ABSTRACT: In order to determine the effects of visual [illegible]
adaptation to the Coriolis illusion and to canal [illegible]
[illegible] 10 subjects were exposed on two different occasions [illegible]
continuous rotation at a constant velocity of 5.4 [illegible]
conditions: (1) with vision, (2) without vision.
A stress test was employed which caused the subject's head [illegible]
proceed through different complex arcs which in turn [illegible]
dus to the vestibular apparatus. Adaptation was measured [illegible]
postural equilibrium, the coriolis oculogyral illusion and [illegible]
matology. The findings indicated that vision played a significant [illegible]
adaptation. (Aerospace Medicine 34 (3): 258, March 1963)

2,854

Kennedy, W.A., W.E. Kerr, W.R. Martin, B.Rose and W.P. Fran[illegible]
THE RELATION OF BLACKOUT THRESHOLD TO AGE, WEIGHT, BODY [illegible]
CARDIOVASCULAR TESTS. (National Research Council, Can[illegible]
August 1, 1943

ABSTRACT: This investigation is limited to studies on train[illegible]
fit for aircrew duties between the ages of 18 to 35, exposed to [illegible]
human centrifuge. Within the limits studied there appears [illegible]
between blackout threshold and age, weight, body [illegible]
blood pressure and resting pulse rate for a series of over [illegible]
selected subjects. There appears to be no correlation [illegible]
hold and the response of the cardiovascular system to [illegible]
clinical methods of taking blood pressure and pulse rate [illegible]
of over one hundred subjects. Continuous electrocardio[illegible]
tilt tests did not enable the detection of any correlation [illegible]
threshold and the initial rate of increase in pulse rate on [illegible]
smaller series of 48 subjects.

Kennedy, W. A., W. K. Kerr, W. R. Martin, B. Rose, & W. R. Franks 1944 RELATION OF BLACKOUT THRESHOLD TO AGE, WEIGHT, BODY MEASUREMENTS, AND CARDIOVASCULAR TESTS. (Proc. 15th meeting Ass. Comm. Aer. Med. Res., Ottawa, 1944)

ABSTRACT: In 1568 centrifuge runs on 124 subjects, no statistically significant correlation was found between "g" threshold and age, weight, body measurement, resting pulse and blood presure, and response of pulse and blood pressure to tilting. Only factor which even looks promising is heart to seat measurement, for which P is only 0.04 for over 1000 subjects. Good distribution curve for blackout threshold is included.

1,856

Kennedy, W.A., W.K. Kerr, W.A.M. Russell and W.R. Franks 1944 INFLUENCE OF ACCELERATIONS PRODUCED IN THE CENTRIFUGE ON REACTION TIME. (National Research Council, Canada) Report #C-2720, April 10, 1944

ABSTRACT: When accelerations up to blackout level were studied, apart from (3) below and runs producing blackout, no significant difference was found between the time taken to react to visual stimuli delivered at the maximum G of the run and control conditions where stimuli were presented at one and one-third G during the same run. The time taken to respond to the auditory stimuli was not found to be significantly increased over controls at levels of G which produced blackout and a significantly longer response time to visual stimuli. Almost all of the thirty-five subjects used showed an occasional tendency to be inattentive in that they failed to respond to a stimulus for an excessively long time. There was a greater tendency to this lapse in attention to visual stimuli when at maximum G (often at sub-blackout levels) than when at one and one-third. G. The average time these lapses in attention lasted was the same at maximum G as at one and one-third G. There was no similar tendency with regard to the auditory stimuli used. There was significantly less tendency with the regard to the auditory stimuli used. There was a significantly less tendency to lapse in attention to visual stimuli when wearing F.F.S. than when

1,857

Kennedy, W.A. et al. 1944 INFLUENCE OF ACCELERATIONS PRODUCED IN THE CENTRIFUGE ON REACTION TIME. Proc. Assoc. Comm. Aviation Med. Research, NRCC, Appendix Z, 29 September 1944

2,858

Kennedy, W. A., W. K. Kerr, W. A. M. Russell and W. R. Franks 1944 INFLUENCE OF ACCELERATIONS PRODUCED IN THE CENTRIFUGE ON REACTION TIME. (National Research Council, Canada) Rept. No. 11, 10 April 1944 NOTE: CARI P&S 2.1

ABSTRACT: The purpose of this investigation was to study the influence of increased G on simple reaction time to visual and auditory stimuli as measures of mental alertness under G.

This investigation, carried out in the centrifuge, includes an analysis of 7853 stimuli and responses made by a total of 35 aircrew trainees when under varying accelerations up to blackout level. Measurements were made on subjects under increased positive G with and without portection from Mark III A.F.S. Responses to light stimulus and sound stimulus (buzzer) were studied.

2,859

Kennedy, W. P. EXTRACTS FROM GERMAN LITERATURE. PERVITIN. BLOOD PROCUREMENT. GAS. EYE INJURIES DUE TO AIRPLANE BOMBS. DISCOMFORT FROM MILITARY BELTS. CARDIOVASCULAR EFFECTS OF ANOXIA AND ACCELERATION. PSYCHIC SHOCK AND CRASHES.
(Flying Personnel Research Committee, Farnborough) FPRC Rept. #321 and 321-C (WAM-153-1) ASTIA ATI 206 431

2,860

Kent, H. C., & G. D. Moon 1961 DESIGN, DEVELOPMENT, AND EVALUATION OF THREE SETS OF DUAL PENDULOUS GYRO ACCELEROMETERS. (Minneapolis-Honeywell Regulator Co., Minn.) MH Aero Rept. No. 2379-TR1; Contract AF 33(616)6712; ASD TR 61-248; ASTIA AD-331 146; 15 Aug. 1961

2,861

Kephart, E. 1955 DEFECTIVE ANTI-BLACKOUT EQUIPMENT, INVESTIGATION AND TEST OF (Naval Air Development Ctr., Johnsville, Pa.) Project TED ADC AE-5201.4; 31 Dec. 1955

ABSTRACT: It was found that malfunction was caused by a burr of the plunger in the G valve which prevented the plunger from releasing the air from the suit. The burr caused the plunger to remain in the full down position, thus retaining the full eight pounds pressure in the suit.

2,862

Kephart, E. L., P. R. Edwards & [illegible], & R. Zavelsky 1955 DEVELOPMENT OF BIOLOGICAL AND RESEARCH APPARATUS FOR USE IN ACCELERATION AND DECELERATION STUDIES. Phase VI. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 5x3, 31 Dec. 1955

ABSTRACT: The support of the investigative program of the laboratory depends on the continued development of instrumentation for the human centrifuge, and for the associated scientific divisions of the laboratory. Particularly important during this period has been the development of a recording spectrophotometer for use in the biochemistry department.

2,863

Kerr, C.E., W.K. Stewart & J.R. Tobin 1942 NOTE ON PRONE POSITION IN AIRCRAFT (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. No. 500

ABSTRACT: Reclining in a prone position as a protection against "g" has been abandoned by the RAF because: (1) Visual difficulties are apparnelty insuperable, the blind area above the pilot is too large although the visula field behind him is not affected and the field below him is improved. (2) The position is extremely uncomfortable and produces much fatigue. The Germans report that a prone position raises the "g" threshold to 14 to 17 "g" on the centrifuge. A Heinkel has been reported to have been equipped with reclining seats.

2,864

Kerr, T.H. 1952 PILOT ESCAPE FROM SPINNING AIRCRAFT
(Royal Aircraft Establishment, Farnborough) December 1952. ASTIA ATI 199 859

ABSTRACT: A series of pilot escape tests from models of elementary and advanced trainers, and fighter aircraft in the spin are presented. Escapes were made from varying points relative to the wing chord, on the inboard and outboard sides of the spin. The analyzed results show that if the pilot requires to bail out from a spining aircraft, it is best to leave on the outboard side of the craft and in the crouching attitude. In this condition it is most probable that he will clear the aircraft cleanly and be outside the spiral flight path within a half turn of the spin. If he bails out on the inboard side, his flight path will probably be through or very near the propeller disc and it will probably take at least two turns of the spin for him to clear the helical flight path of the aircraft.

2,865

Kerr, W.A., and A. Graybiel 1946 THRESHOLDS OF STIMULATION OF THE HORIZONTAL SEMI-CIRCULAR CANALS IN MAN Amer. Psychologist 1:237-238

2,366

Kerr, W. K., & W. A. M. Russell 1944 EFFECTS OF POSITIVE ACCELERATION IN THE CENTRIFUGE AND IN AIRCRAFT ON FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM. (Canada, National Research Council) Rept. No. C-2719, April 1944
NOTE: CARI P&S 2.2re

ABSTRACT: The purpose of this report is to describe some of the effects on functions of the central nervous system resulting from positive acceleration in the centrifuge and in aircraft.

The report includes observations on approximately 5544 runs on 542 aircrew trainees exposed to positive G in the accelerator. Supplementary information on 16 flights with 13 subjects exposed to positive G in the aircraft is included. Physiological changes associated with blackout and unconsciousness due to G are described.

2,367

Kerr, W.K. and W.A. M. Russell 1944 EFFECTS OF POSITIVE ACCELERATION IN THE CENTRIFUGE AND IN AIRCRAFT ON FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM. Proc. Assoc. Comm. Aviation Med. Research, NRCC, Appendix Y. 29 September 1944

2,368

Kerr, W. K. & W. A. M. Russell 1944 EFFECTS ON POSITIVE ACCELERATION IN THE CENTRIFUGE ON FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM.
(National Research Council, Canada) Rept. No. C-2719, April 15, 1944.

ABSTRACT: Effects resulting from positive accelerations on functions fo the central nervous system have been studied in the accelerator on 5544 runs on 542 aircrew trainees and in aircraft on 16 flights with 13 subjects. Apparatus, methods and procedure have been described. Associated with greying and black-out, marked impairment of cerebral functions was found. Physiological changes associated with unconsciousness due to G have been described. The occurrence and incidence of convulsive episodes have been noted and the phenomena described in detail. Possible etiological factors have been considered.

2,369

Kerr, W.K. 1962 BIBLIOGRAPHY OF CANADIAN REPORTS IN AVIATION MEDICINE, 1939-1945. (RCAF Inst. of Aviation Medicine, Canada) Report no. DR 153; ASTIA AD-290 050

ABSTRACT: The bibliography consists of brief abstracts arranged in order of the report serial numbers, assigned as they were received by the Associate Committee

on Aviation Medical Research. As an aid in the use of the abstracts, alphabetical indexes of authors and of subject matter have been appended. These indexes are reproduced by photographic reduction direct from a copy of the NRC publication "A History of the Associate Committee on Aviation Medical Research" issued in June 1960. Page references to the "History" have been removed, but the report serial numbers refer to the present bibliography, and can be used to locate specific abstracts. The indexes appear on the colored pages. (Author)

2,870

Kettle, D. J. 1958 GROUND PERFORMANCES AT TAKE-OFF AND LANDING. Aircraft Engineering 30(347): 2 January 1958.

2,871

Khazen, I. M. 1958 ON THE REGULATION OF FUNCTIONS OF THE ORGANISM DURING RADIAL ACCELERATION. Voyenno-Meditsinskiy Zhurnal 1958(3):55-60

ABSTRACT: To clarify the regulation of the functions of the organism during radial acceleration, experiments on animals were made studying the secretions of the saliva, stomach and intestinal glands, as well as the motion of an empty stomach. Experiments were conducted on dogs and human patients. Analysis of the results shows that while the effects on the saliva glands are operative for a brief period (tens of minutes), and on the stomach glands for a few hours, the secretory processes of the glands of the isolated intestinal loop are affected for days, and for weeks in the case of large accelerations. Increasing accelerations invariably caused cessation of the periodic motion of the stomach for several hours and almost simultaneously an increase in secretion. There are grounds for thinking that functional changes are governed by the direct influence of radial acceleration on tissue processes. (CARI)

2,872

Khazen, I. M. & I. L. Zaisfel'd 1962 MODIFICATION OF THE CONTENT OF BIOLOGICALLY ACTIVE SUBSTANCES IN RATS UNDER THE INFLUENCE OF RADIAL ACCELERATION. Vop. Med. Khim. 8:493-497, Sep.-Oct. 1962 (Russian)

2,873

Khazen, I. M. & I. L. Vaysfel'd 1962 CHANGE IN THE CONTENT OF BIOLOGICALLY ACTIVE SUBSTANCES IN RATS FOLLOWING THE ACTION OF RADIAL ACCELERATIONS. (Joint Publications Research Service, Washington, D. C.)JPRS-16956. ASTIA AD 401 074. Transl. from Voprosy Med. Khem. (Moscow), v: 8, no. 5, Sept.-Oct. 1962 In its Translations from Voprosy Meditsinskay Khimii (Problems of Medical Chemistry), pp. 1-9.

ABSTRACT: A study is made of the changes in the content of adrenalin, acetycholine, histamine, and serotonin in rats subjected to radial acceleration In rats, following single positive radial accelerations, the histamine content increases in the intestinal mucosa and decreases considerably in the longs and brain tissues. The diaminoxidase activity rises in the investigated tissues, especially in the longs and cerebral tissue. Following single negative accelerations, the histamine content and diaminoxidase activity decreases in the tissues. The content of adrenalin-like substances decreases in the intestinal mucosa and brain tissues. With multiple and frequently repeated positive accelerations, the examined tissues also show a reduction of the content of histamine and of adrenalin-like substances in the intestinal mucosa and brain tissues. Under similar experimental conditions, the excretion of 5-hydroxyindole acetic acid with the urine decreases. The changes in the excretion of this acid are also directly correlated with the intensity, frequency, and duration of the radial acceleration.

2,874

Khromushkin, A.I. 1964 PARASHIUTNYE PRYZHKI IZ STRATOSFERY (Parachute Jumps From the Stratosphere) Tekhnika vozdushnogo flota No. 8-9, P. 18-21

2,875

Kiel, F.W., J.R. Halstead, & F.M. Townsend 1962 THE BEAR AS AN EXPERIMENTAL ANIMAL. (Paper, 33rd Annual Meeting of the Aerospace Medical Assoc., 9-12 April 1962, Atlantic City, N.J.)

ABSTRACT: The bear was chosen as the test animal in the development phase of the B-58 escape capsule. This animal was selected because of the essential similarities to man, namely, spinal characteristics, erect posture and large size. The Armed Forces Institute of Pathology provided the pathology support for this endeavor. Eight bears were used in this series of tests and were exposed to various attitudes and decelerative forces. Five of the bears came through the tests well, two had traumatic lesions, and one bear was unsuitable, having congenital hydrocephalus. Complete autopsies were done on all animals, and no difficulty was encountered in interpretation of anatomy or lesions. It appears the bear would be a suitable test subject in lieu of man in a variety of mechanical and safety experiments. (Aerospace Medicine 33 (3):341, March 1962)

2,876

Kiel, Frank W. & Joe M. Blumberg 1963 SURVEY OF ROTARY WING ACCIDENTS
Aerospace Medicine 34(1): 42-47 Jan. 1963

ABSTRACT: Of 245 helicopter accidents involving at least 1 fatality, the most common type was found to be the in-flight crash to the ground (typically open land), with weather being a minor factor. Usually the aircraft was largely or totally destroyed, and there was often a fire on impact. Cardiovascular lethal injuries--ruptures of heart and aorta mainly--have been nearly as common as lethal head injury. As helmets seem to offer protection to the head, perhaps attention should next be turned to the prevention of injury to the heart and great vessels. Burns, lacerations, and drowning still claim quite a few victims. Future developments in the field of protecting helicopter occupants in accidents must be along the lines of safer and stronger helicopters. Ejection seats do not seem to be the answer, but an emphasis on parachute bailouts might be worthwhile.

2,877

King, B. C., M. C. Richardson 1957 AN EXPERIMENTAL STUDY OF ESCAPE AND SURVIVAL IN AIRCRAFT DITCHINGS. Flight Safety Foundation International Air Safety Seminar, Palo Alto, California (Nov. 1957).

ABSTRACT: The Civil Aeronautics Administration - U. S. Navy Norfolk ditching trials with a modified Martin 404 fuselage were carried out in 1955 in collaboration with components of the aviation industry and with other government groups. The detailed analyses of the film records of the experimental study have been completed. A comprehensive report is being prepared bringing together the experimental results, data from our earlier tests, and the lessons learned from a study and analysis of operational experience. This presentation is to report on some of the principal findings.

SECOND ABSTRACT: This report gives results of water ditching trials with a modified Martin 404 fuselage plus an analysis of the records of air carrier ditchings between 1946 and 1956.

2,878

King, B. G. 1954 SOME SURVIVAL LESSONS LEARNED FROM RECENT ACCIDENTS. (Paper, Flight Safety Foundation Air Safety Seminar, Santa Fe, New Mexico, 10-12 November 1954.)

2,879

Kingsley, H.D. & R.F. Rushmer 1945 EFFECTS OF ABRUPT DECELERATION ON THE ELECTROCARDIOGRAM (LEAD II) IN THE CAT IN THE SUPINE POSITION. (AAF School of Aviation Medicine, Randolph Field, Texas) Report No. 459-1

2,'80

Kingsley, H. D., & R. F. Rushmer 1946 EFFECTS OF ABRUPT DECELERATION OF THE ELECTROCARDIOGRAM (LEAD II) IN THE CAT IN THE SUPINE POSITION. (School of Aviation Medicine, Randolph AFB, Texas) Proj. No. 459, Rept. No. 1; ASTIA AD-135 538; 21 Jan. 1946
See Also, Federal Proceedings 5(1):55-56, 1946

ABSTRACT: Electrocardiograms were recorded on thirty anesthetized cats in the supine position before and after exposure to peak decelerative forces averaging 1600 g. Transient bradycardia appeared within thirty seconds after impact in eight of ten control animals and in six of ten animals receiving physostigmine before deceleration. Tachycardia was noted in nine of ten animals which had been vagotomized. Depression or inversion of the T-wave on the electrocardiogram occurred in all experiments. Marked inversion occurred most frequently in the records of vagotomized animals, none of which developed conduction defects or ectopic contractions. Inversion of the T-wave in animals in the control group and in the majority of animals receiving physostigmine occurred in the same experiments in which conduction defects and or ectopic contractions were found. Ectopic contractions and conduction defects occurred in three of the normal animals, in one of the vagotomized animals, and in five of the animals which had received physostigmine. The magnitude of the changes was greatest in the latter group. The vagus appeared to have an important role in the production of conduction defects and ectopic contractions. There was no evident relationship between the degree of the electrocardiographic change and the phase of the cardiac cycle at which impact occurred. Post-mortem examinations revealed that there were no gross injuries of the heart in any of the animals. The degree of injury to the internal organs had no obvious relationship to the type of degree of electrocardiographic changes. (AUTHOR)

2,881

Kiorboe, F., n.d. THE SIGNIFICANCE OF NYSTAGMUS OBSERVED IN ROUTINE OTOLOGIC EXAMINATION OF FLIGHT PERSONNEL (Military Hospital, Copenhagen) Rept. No. 1554

ABSTRACT: Since November 1952 when I became attached to the Danish Royal Air Force as otolaryngologic adviser, I have undertaken the otologic examinations of all student pilots who presented themselves before the Medical Examination Board of the Air Force. The number of candidates examined aggregates 1338 "normal" persons.

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Kinney, G. F. 1955 TABLES FOR QUASI-EXPONENTIAL DECAY OF EXPLOSIVE SHOCK IN AIR. (U. S. Naval Postgraduate School, Monterey, California) Research Paper No. 8

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Kirchner, O. E. 1954 CRASH FORCES AND CRASH SURVIVAL (Paper, Flight Safety Foundation Air Safety Seminar, Santa Fe, New Mexico, 10-12 November 1954)

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Kirchner, O. E. 1958 CRASH FORCES AND SEATING. (Paper, Eleventh Annual International Air Safety Seminar, Atlantic City, New Jersey, November 11, 1958)

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Kirchner, O. E. 1960 CRITICAL FACTORS IN APPROACH AND LANDING ACCIDENTS (PART I - STATISTICS) (Flight Safety Foundation, Inc., New York, N. Y.) 31 Dec. 1960

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Kirkner, F. J. 1949 PSYCHOPHYSIOLOGICAL STUDIES OF MOTION SICKNESS AND AIRSICKNESS. J. Comp. Physiol. Psychol., 42:273-285.

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Kirsch, R. E. 1945 A PHYSIOLOGICAL STUDY OF AVIATORS DURING COMBAT FLYING. J. Aviat. Med 16 (6)-376-384.

SUMMARY AND CONCLUSIONS:

1. Observations have been made upon certain objective physiological reactions of pilots and other personnel during actual flight on twenty-one missions over enemy held territory.

2. The typical objective changes observed occurred in the pulse rate, respiratory rate, blood pressure, axillary perspiration and palmar skin temperature; these objective changes closely paralleled the subjective reactions described by the pilots.

3. The greatest changes occurred upon first sighting the target and upon flight over those portions of the target known to be most heavily defended by anti-aircraft emplacements. The reactions were more marked when the target was first sighted than when actual flight over the target was begun, and the appearance of the first bursts of anti-aircraft fire was associated with a small definite increase in the observed cardiovascular reactions.

4. Upon completion of the mission there was consistently a rapid decrease of pulse rate and blood pressure; at this time these invariably fell to their lowest levels of the entire flight.

5. On one's first combat mission there are marked objective physiological changes which are commensurate with the subjective reactions of severe fright.

6. Considerable evidence is presented which establishes the fact that attention to one's duties while engaged in flight over the enemy plays a great role in alleviating this fright. The reputation of a target's defences is a very important factor in determining an aviator's reactions, and repeated exposure to enemy fire does little to prevent the physiological reactions found to be characteristic of combat flying.

7. There was no evidence of either local or general retinal arterial spasm associated with the sudden, marked vascular hypertension observed in one subject on his first combat mission.

8. The observed physiological reactions were not affected during combat flight by periods of prolonged supplemental administration of oxygen.

9. The Schneider Index is of no value in predicting whether or not a given flier will undergo significant cardiovascular changes during combat flying.

10. Careful studies of changes in body weight of airmen during combat flying were undertaken. It was found that the loss of weight in even very hazardous and eventful flights is minimal.

2,888

Kitching, J.A. 1944 LIAISON REPORT TO ASSOCIATE COMMITTEE ON AVIATION MEDICAL RESEARCH FROM BANTING AND BEST DEPARTMENT OF MEDICAL RESEARCH. (National Research Council, Canada) Report #C-2686, 6 May 1944

ABSTRACT: This liaison report covers interviews and discussions with aviation medical research workers at the University of Southern California, Mayo Clinic, and Wright Field, U.S.A. dealing principally with the subject of pressure breathing but reporting also on subjects of acceleration, exposure suits, electrically heated suits, instruments for measuring the cooling power of the environment and frost bites.

2,889

Kittinger, J.W., Jr. 1960 STABLE VS. UNSTABLIZED FREE FALL FROM HIGH ALTITUDES. (Paper, 31st Annual Meeting of the Aerospace Medical Assoc., Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960)

ABSTRACT: During November and December of 1959, two parachute jumps were accomplished from 76,000 and 75,000 feet, respectively. The jumps were made from a balloon-supported open gondola over the White Sands Missile Range. Though not planned, the subject did not have any stabilizing device on the first jump. On the second jump the subject was stabilized by means of an experimental multistage parachute. The results of the two types of free fall are compared, using the subjective reactions of the subject, and film showing gyrations to which the subject was subjected during the two types of free falls.

2,890

Kitts, W.W., A. Nakai, S.M. Prather, & J.H. Best 1960 INTERIM REPORT ON PARACHUTE RECOVERY AND IMPACT SYSTEMS (Chance Vought Aircraft) 29 February 1960 ASTIA AD 263 499

ABSTRACT: This interim report contains information on the parachute recovery system for the Integrated Flight Capsule Program flight test vehicle. The various energy absorption systems investigated for the landing impact conditions are also discussed.

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Kitzes, G. 1959 OCCUPATIONAL HEALTH PROBLEMS IN SPACE FLIGHT: IMPORTANT HEALTH PROBLEMS IN THE MAN-IN-SPACE STUDIES AT THE AERO MEDICAL LABORATORY Military Medicine 124 (10): 717-719, Oct. 1959.

ABSTRACT: Problems related to man's survival in space are briefly reviewed and categorized. The primary objectives of space-medical research are to provide an environment, workspace, and sustenance for the space traveller that will allow him to carry out his mission with maximum efficiency and protect him from irreversible injurious body changes. Basic requirements -- physiologic (Metabolic, environmental), psychologic (isolation, weightlessness, workspace, reduced sensory environment), and requirements pertaining to protection (from radiation, toxic chemicals and odors, noise and vibration, acceleration, natural infection, disorientation) are outlined.

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Klee, J.B. & G.R. Wendt 1947 STUDIES OF MOTION SICKNESS. XVI. THE EFFECTS UPON SICKNESS RATES OF WAVES OF VARIOUS FREQUENCIES BUT IDENTICAL ACCELERATION. J. Exper. Psychol. 37:440-448

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Klemin, A. 1933 CORSETS FOR AVIATORS. Scientific American, 149:80, Aug. 1933

ABSTRACT: Concerns acceleration and deceleration forces on pilots and protection devices to increase g tolerance.

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Klemm, R.A. 1945 ATMOSPHERIC BLAST CONCUSSION: MEDICAL ASPECTS U.S. Nav. Med. Bull. 44:1228-1230.

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Klenov, A. 1960 ASTRONAUTS, ON THE STARTING LINE. THE DAY IS NEAR.... Komsomol'skaya pravda P. 2; 2 December 1960.

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Klier, Sol & Joseph W. Linskey 1960 SELECTED ABSTRACTS FROM THE LITERATURE ON STRESS.
(Naval Training Devices Center, Port Washington, New York. Contract No. N61339-565. Technical Report NAVTRADEVCEN 565-1 Nov. 1960 ASTIA AD 253 068.

ABSTRACT: This report is the result of a comprehensive literature search for information on stress pertinent to the training problem. It provides a source of background information from which specific hypotheses and variables will be delineated for study in a research program aimed at the introduction of stress in training devices and training programs.

From the literature on stress and anxiety 397 articles were selected and abstracted. In general, selection was made on the basis of the relevance of the study for determining and/or measuring the effects of stress or anxiety on human behavior.

2,897

Klumb, H., 1948 METHOD FOR PRODUCTION OF HIGH ACCELERATION OF MECHANICAL IMPACT. (Uber ein neus Verfahren zur Herstellung hoher mechanischer Stonbeschleunigungen und seine Verwendung der Entwichklung mechanischer Stobprufanlagen) (Central Air Document Office, Wright-Patterson AFB,Ohio) ASTIA ATI-43407 17 December 1948

ABSTRACT: An impact testing device was developed which permits the mechanical impact testing of machine parts used in the construction of machine tools, weapons, etc, which are subject to excessive acceleration. The apparatus was designed to withstand accelerations up to 10^5 g. The test specimens were of different size and weight throughout all the tests made. The construction of this apparatus is given in details, the impact velocity and maximum acceleration being measured through gas cushions consisting either of compressed air or in special cases of nitrogen and oxygen.

2,898

Knabengof, V.G., L.M. Dantsig & G.I. Simonyan 1943 INTERRELATIONSHIP BETWEEN HEMODYNAMICS AND RENAL FUNCTION DURING ACCELERATION
Klinicheskaia Meditsina (Moscow) 21(3): 47-50.

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Knacke, T. 1946 ABSTRACT FROM INFORMATION REPORT CONCERNING THE INVESTIGATIONS AND DEVELOPMENTS OF THE PARACHUTE DIVISION OF THE FORSCHUNGS-ANSTALT GRAF ZEPPELIN, DATED 14 JULY 1945. (War Dept., Air Forces) TSEAA-660-99, Appendix C, February 1946.

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Knacke, T. 1947 NOTES ON DECELERATION AT BAIL-OUT OF AIRCRAFT (U.S. AAF-AMC) Memorandum Report TSETE-672-22, April 10, 1947

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Knackstedt, tr. J. B. Bateman 1945 INVESTIGATION OF THE EFFECTS OF HIGH SLIP STREAM PRESSURES OF THE HUMAN BODY. (Luftfahrtforschungsanstalt Hermann Goring, Braunschweig) 20 Jan. 1943
Translated as Appendix 16 to Lovelace, W. R., E. J. Baldes, & V. J. Wulff, The Ejection Seat for Emergency Escape from High-Speed Aircraft, ATI No. 7245

SUMMARY: To test the effects on the human body of high wind blast pressures,

various subjects were placed in a high velocity wind tunnel at velocity of 650 kilometers per hour (403 miles/hr.). Tests showed that high pressures similar to the wind blast pressure developed on the forehead, eyes, nose, and chin. Lifting of the head from the head rest by the wind did not occur with the type of head rest tested. (AUTHOR)

2,902

Knerr, W. C. 1959 UNDERWATER ESCAPE PROGRAM: Description of High and Low-Level Test Drops Using F-9F and F86 Airplanes; and a 50-Foot Dummy Head Drop Test. (Naval Air Development Center, Johnsville, Pa.) Report no. 7, Proj. TED no. ADC AE-6307, NADC ED-5841; ASTIA AD 219 106.

ABSTRACT: The results and analysis of aircraft water-crash tests simulating the 50-foot fall from an aircraft carrier deck are presented in this report. Important pilot survival parameters such as water-impact forces, accelerations, canopy implosion characteristics, and aircraft rate of sink are fully discussed. These tests were conducted at Key West, Florida from April through July 1958 on completely instrumented F9F-series straight wing aircraft and F86 swept-wing aircraft. (Author)

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Knott, J. 1916 "AVIATOR'S SICKNESS." Med. Pr., 101:519-520

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Knowles, W.R. 1958 "Crash Design from Crash Injury Research." U.S Army Aviation Digest 4: 12-15.

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Knowles, W. R. 1960 IMPACT SURVIVAL IN ROTARY WING MILITARY AIRCRAFT (Aviation Crash Injury Research) March 1960

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Knowles, Zelda D. 1958 BIOLOGY AND MEDICINE: A LIST OF RUSSIAN REVIEW PAPERS
(Office of Technical Services, Washington, D. C.) 62-15087

2,907

Knowlton, G. C., & G. A. Hallenbeck 1944 MEETING OF THE NATIONAL RESEARCH COUNCIL SUBCOMMITTEE ON ACCELERATION, ROCHESTER, MINNESOTA, 23 AND 24 FEBRUARY 1944. (Air Materiel Command, Wright-Patterson AFB, Ohio) AAF Memo Rept. ENG 49-696-59; ASTIA ATI-140 675; 11 March 1944

2,908

Koenen, R. & O.F. Ranke 1937 DER KREISLAUF UNTER BESCHLEUNIGUNG. BLUTIGE BLUTDRUCKMESSUNG AM HUND (The Circulation Under the Influence of Acceleration. Intravascular Determination of the Blood Pressure in the Dog.)
Luftfahrtmedizin 2: 14-26

ABSTRACT: In 6 anesthetized dogs the carotid blood pressure, under the influence of flight force exerted in longitudinal axis of the animal was determined. In the anesthetized dog the blood pressure drops as soon as acceleration begins (flight force in the gluteal region) and rises under low flight force within 18 to 20 seconds, in accordance with the reflex time of the carotid sinus. In flight force with acceleration beyond 4 g the carotid blood pressure remains constantly below zero. The pulse frequency drops in the dog as soon as the action of flight force sets in, in spite of good functioning of the carotid sinus. This is due to an unexplained vagus stimulus. The drop in blood pressure under the action of flight force is due to a reduction in the quality of circulating blood, caused by displacement of the blood into the parts of the body which are hydrostatically in lower position. Upon cessation of acceleration, the blood returns to the heart within a few seconds.

2,909

Kolcum, E. H. 1961 CHIMP SHOT RAISES HOPE THAT U. S. CAN ORBIT MAN BEFORE YEAR'S END.
Aviation Week and Space Technology, December 4, 1961, Pp. 27-28.

ABSTRACT: This article contains a detailed account of an Orbital flight of a chimpanzee-carrying Project Mercury capsule on a two-orbit mission. The Atlas MA-5 was launched at 10:07 A.M. EST on November 29, 1961.

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Kolk, W. R. 1961 MODERN FLIGHT DYNAMICS. (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1961)

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Kolle, H.H. and H.J. Kaeppeler 1954 LITERATURVERZEICHNIS DER ASTRONAUTIK (BIBLIOGRAPHY OF ASTRONAUTICS)
(Tittmoning, Oberbayern: Pustet, 1954)

ABSTRACT: Lists 1,600 titles of original works on aviation and space-travel exploration. Includes a small section on artificial satellites.

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Komendantov G. & V. Kopanev 1962 MOTION SICKNESS, ITS PREVENTION AND CURE. Medit Gazeta, 5 Dec. 1962. FTD-TT-63-287

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Komendantov, Docent G. & V. Kopanev 1963 MOTION SICKNESS: PROPHYLAXIS AND TREATMENT
Translation Services Branch, Foreign Technology Division, WP-AFB, Ohio
FTD-TT-63-287/1+4 April 2, 1963 (Original Source: Russian newspaper, Meditsinskaya Gazeta, December 5, 1962, p. 3) ASTIA AD 402 444

ABSTRACT: The problem of motion sickness has become significant owing to the rapid growth of all forms of transportation. Sea, air, car sickness, etc. are distinguished depending on the type of transportation. All of these ailments have a common cause -- the mechanical effect on the human vestibular system caused by changes in direction and speed of motion. Motion sickness is controlled by technical improvement of transportation facilities, the establishment of an optimal microclimatic environment for passengers, and the special selection and training of transportation workers. Conditioning of the vestibular system is the best preventive for all forms of motion sickness. Motion sickness is controlled by improving the general hygienic conditions at places of work: by establishing optimal temperature, humidity, and pressure, decontamination of air, etc. Diet during transportation should also be carefully reasoned out. Many drugs have also been proposed for the prevention and cure of motion sickness. These are mostly drugs which lower the parasympathetic tone of the central nervous system, which, as a rule, is raised in the rolling process.

2,914

Komendantov, G. L., V. I. Babushkin, P. N. Ivanov, V. B. Malkin, A. R. Manserov, & V. V. Usachev 1955 THE EFFECT OF ACCELERATION UPON THE HUMAN ORGANISM. (Report at the Eighth All-Union Congress of Physiologists, Biochemists, and Pharmacologists, 24 May 1955)

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Komendantov, G. L. 1956 CONTROVERSIAL PROBLEMS IN THE FIELD OF "PHYSIOLOGY OF ACCELERATION".
Voyenno-meditsinskiy Zhurnal (Military Medical Journal) 5:85-90, 1956. (Translation in USAF Air Intelligence Information Report "Physiology of Acceleration: A Controversy between D. Ye. Rozenblyum and G. L. Komendantov." AF 1104152; IR-1407-57. 21 May 1957)

2,916

Konecci, E.B. 1957 PHYSICAL AND PHYSIOLOGICAL FACTORS IN MAJOR AIRCRAFT ACCIDENTS
(Directorate of Flight Safety Research, SAR, Norton AFB, California)
AFCFS-G-2, M-4-57, 13 February 1957.

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Konecci, E.B. 1957 PHYSIOLOGICAL FACTORS IN USAF AIRCRAFT ACCIDENTS
Paper: Aero Medical Association, 28th Annual Meeting, Denver, Colorado, May 1957
See also: Journal of Aviation Medicine 28(6): 553-558

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Konecci, E.B. 1957 PHYSIOLOGIC FACTORS IN AIRCRAFT ACCIDENTS IN THE U.S. AIR FORCE
J. Aviat. Med. 28(6): 553-558

ABSTRACT: In conclusion, we can say that factors affecting the normal physiologic state of the pilot (or crew) are contributing causes rather than primary causes of major aircraft accidents. A few physiologic conditions like hypoxia and vertigo disorientation were primary causes. Fatigue appeared as a contributing factor in a number of accidents but the incidence appears to be decreasing i.e., thirty-four cases in 1955 to thirteen in 1956. G forces and vibrations appeared as contributing factors in a large number of accidents; however, their significance could not be fully evaluated from the available data. The adversities of decompression, physical disturbances, hyperventilation, hypoglycemia, carbon monoxide poisoning, and air sickness do not seem to be primary problem areas.

2,919

Konecci, E. B., R. F. Trapp & M. W. Hunter 1960 MANNED NUCLEAR SPACE SYSTEMS, PART I - HIGH-THRUST NUCLEAR SYSTEMS.
Aero/Space Engineering 19(1):34 January 1960.

2,920

Konecci, E. B. 1961 REVIEW OF JANUARY 1961 LECTURES IN AEROSPACE MEDICINE (The Douglas Aircraft Co., Santa Monica)

ABSTRACT: Compiled to make the timely and valuable information presented during the Second Lecture Series in Aerospace Medicine promptly available to the large number of engineering and life sciences personnel. With the exception of three papers, the material was obtained from notes and photos taken during the five-day course. Speakers included de Vaucouleurs, Van Allen, Ney, von Braun, Flickinger, Crossfield, and Clamann.

2,921

Konecci, E. B. 1962 BIOASTRONAUTICS
Astronautics 7(11):104-109, Nov. 1962.

ABSTRACT: The National Aviation and Space Agency Biotechnology and Human Research Program is concerned with the human factors in all aspects of space flight. Human research considers man under normal and unusual conditions in order to determine the function of body systems under various environmental conditions, such as atmosphere, acceleration, radiation, and electrostatic, magnetic, and thermal conditions. Human psycholphysiological and behavioral sciences are also studied. The data obtained therefrom lead to design criteria for life-support systems, personal equipment, protective systems, and man-machine control, which include information handling, display, and controls. A representation of the Life Sciences Program is given in a table, along with a review of several government-and company-funded life science programs. A review of U. S. and Soviet space-suit development reveals some similarities, but differences in objectives and design. Reviewed briefly are some physiological aspects of the Vostok III and IV flights.

2,922

Konecci, E. B., & D. Flickinger 1963 INTERNATIONAL BIOASTRONAUTICS RESEARCH (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 29-May 2, 1963)

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Konstantinov, A. 1960 MAN GOES OUT INTO SPACE
Trud P. 2: 17 May 1960.

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Koochembere, C.T. 1952 HUMAN FACTORS RELATIVE TO THE PROBLEM OF ESCAPE-EJECTION ACCELERATIONS. (Paper, Conference on Problems of Emergency Escape in High Speed Flight, 29-30 September 1952, at Wright-Patterson AFB, Ohio) ASTIA AD-14 347

ABSTRACT: This paper concerns itself with research work associated with ejection accelerations and how this data has been utilized in the development of equipment that will safely eject pilots from high performance aircraft. German and British experiments on human tolerance to acceleration are reviewed. On the basis of the data obtained in these experiments, the Martin Baker Aircraft Company developed a high-performance catapult, on which test subjects were exposed to 17-21 g over periods from 0.15-0.25 seconds. No injuries or undesirable side reactions were sustained. The firm developed a face curtain "for effectively maintaining the proper body and head position and relieving some of the loading on the vertebrae during ejection strokes without injury or notable discomfort.

2,925

Koochembere, C.T. 1957 PREVENTION OF BACK INJURIES RESULTING FROM THE CRASH LANDINGS OF FTU AIRCRAFT.
(Paper, 1957 Meeting of Aero Medical Association, Denver, Colo., May 6-8)

ABSTRACT: The Air Crew Equipment Laboratory has recently completed a project involving investigation of vertebral injuries of pilots encountered as a result of nose wheel failure type crashes aboard carriers and in land operations, and the subsequent solution of this problem. The system of an energy absorption cushion, which also eliminates the necessity of foot stirrups, and a fully annealed, stainless steel strap which elongates under a predetermined load allowing the seat and pilot to displace downward in the ejection rails, is presented. Data concerning the basic accelerations and loadings endured on the aircraft, seat, and pilot were obtained by crashing a full scale airplane. This information was then utilized in designing the energy absorption system.
(J. Aviation Med. 28(2):206)

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Kooy, J. M. J. 1952 SOME PROBLEMS OF INTERPLANETARY TRAVEL Ingenieur 64:37-45, 1952 In Dutch.

ABSTRACT: "Calculation of satellite vehicle and escape vehicle. Discussion of overall mass-ratio as a function of exhaust velocity and acceleration."
(Brit. Interplan. Soc. J. 12:85, Mar. 1953.)

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Kopanev, V. I. 1960 PROBLEM OF DARK ADAPTATION IN MOTION SICKNESS. Voyenno-meditsinskiy Zhurnal, No. 9, pp. 213-130, Sept. 1960. (Joint Publication Research Service, Washington, D. C.) JPRS-7875.

2,928

Kornfield, A.T. and J.R. Poppen 1949 HIGH VELOCITY WIND BLAST ON PERSONNEL AND EQUIPMENT.
J. Aviation Med. 20(1):24-28

ABSTRACT: The necessity for providing safe aids to escape from high speed aircraft under emergency conditions is firmly established by statistics on escape accidents. Two methods of escape which have been considered are the capsule and the ejection seat. The pilot in escaping by means of the ejection seat is exposed to several important physiological stresses; acceleration due to ejection and to the windstream; anoxia, if escape is performed at high altitudes and unless bailout oxygen equipment is provided; low temperatures of the higher altitude air; and wind blast. This paper will consider the effects of wind blast, as related to this problem.

2,929

Kornhauser, M. 1954 PREDICTION AND EVALUATION OF SENSITIVITY TO TRANSIENT ACCELERATIONS. J. Appl. Mechanics 21:371

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Kornhauser, M. 1958 IMPACT PROTECTION FOR THE HUMAN STRUCTURE. APPLIED MECHANICS. (Paper, Western Regional Meeting, American Astronautical Society, 18-19 August 1958, Palo Alto, California) American Astronautical Society Preprint No. 58-38, Aug. 1958

ABSTRACT: The tolerance of humans to transient accelerations is presented in a form which permits rapid estimation of allowable impact velocities. As an example of the application of the human "impact sensitivity curve", detailed analysis is made of a manned capsule on impact with water and concrete. Although it is found that no special protection is required for low-speed impact, shock-mounting space requirements become significant at higher impact velocities. (DACO)

2,931

Kornhauser, M. 1958 IMPACT PROTECTION FOR THE HUMAN STRUCTURE
Applied Mechanics Memorandum No. 58, (Structures and Dynamic Oper., Aerosciences Laboratory, Missile and Ordnance Systems Department) July 24, 1958.

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Kornhauser, M. 1958 DESIGN OF AN IMPACT TEST FOR DETERMINATION OF RESISTANCE OF MICE TO SHORT DURATION ACCELERATION.
In (Aero Science Laboratory, Missile and Space Vehicle Department, General Electric Company) Structures and Dynamics, Memo No. 63; 22 Oct. 1958.

2,933

Kornhauser, M. 1961 THEORETICAL PREDICTION OF THE EFFECT OF RATE-OF-ONSET ON MAN'S G-TOLERANCE
Aerospace Medicine 32(5):412-421, May 1961.

SUMMARY: The effects of build-up time and of total duration of acceleration-time pulses on man's G-tolerance are predicted within the framework of a simple thoretical mass-spring model. It is demonstrated both theoretically and experimentally that a short duration impact regime exists in which neither pulse shape nor pulse duration is significant, velocity change being the governing criterion of damage. At intermediate durations (0.1 to 1 second), theory indicates that both pulse duration and onset rate are of paramount importance; while response to the long duration pulses (duration greater than 1 second and $\Delta V > 500$ fps) of equal acceleration is shown theoretically to depend on rate-of-onset. For these long duration acceleration pulses, it is estimated that man's G-tolerance remains at the centrifuge value of about 20 g for onset rates less than 10 g/sec., dropping to about 10 g for onset rates above 100 g/sec. The difficulties in detecting these onset effects experimentally are discussed. (Author)

2,934

Kornhauser, M. and A. Gold 1961 THE IMPLICATIONS FROM MOUSE IMPACT STUDIES (Paper, Symposium On Impact Acceleration Stress, Brooks Air Force Base, San Antonio, Texas, November 27-2?, 1961)

2,935

Kornhauser, M., & R. W. Lawton 1961 IMPACT TOLERANCE OF MAMMALS.
Planet. Space Science 7:386-394, July 1961
See also Reprint Proceedings of the Fourth AFBMD/STL Symposium "Advances in Ballistic Missile and Space Technology 3:386-394, 1961, (F)
See also Reprint Ballistic Missiles and Space Technology (Oxford, London, New York, Paris: Pergamon Press, 1961) 3:386-394

ABSTRACT: Correlation of experimental data on human impact tolerance, treating the test subject as a typical structural element, has led to the conclusion that impacts at velocities below about 80 ft/sec are tolerable regardless of the peak deceleration. The present paper is concerned with the empirical verification of the theory adopted in this study of human acceleration resistance, using mice as test specimens.
Impact tests were performed using a drop tester capable of velocity changes up to about 90 ft/sec, with various stopping devices for shaping the acceleration-time pulses. The practical ranges of impact parameters for the mouse "impact sensitivity curve" were recovered by varying the impact duration from less than 0.5 msec to about 2 msec and peak accelerations from about 500 g to about 10,000 g. The effects of acceleration, impact duration and velocity change were evaluated. The conclusions reached in this mouse impact study, when extended to larger mammals and humans by thorough experimentation, will have immediate application in the establishment of a simple design criterion for manned satellites and space vehicles on landing impact. (AUTHOR)

2,936

Kornhauser, M. and A. Gold 1961 APPLICATION OF THE IMPACT SENSITIVITY METHOD TO ANIMATE STRUCTURES
(Paper, Symposium on Impact Acceleration Stress, November 27-29, 1961, Brooks Air Force Base, San Antonio, Texas)

ABSTRACT: The method of presenting G-tolerance data in the form of a sensitivity curve was evolved at the United States Naval Ordnance Laboratory, White Oak, Maryland in the mid-1940's. Originally, this was a G-actuation presentation, since it described the performance of inertia-operated devices such as impact switches which consisted, typically, of a mass on a spring which would be displaced by the acceleration pulse until it closed an electrical circuit. The G-actuation data consisted of the threshold levels of acceleration, at various durations, sufficient to actuate the switch. Also, the sensitivity curve method of presentation proved useful when applied to structural failure, elastic and plastic deformation up to the failure point being analogous to the motion of the inertia mass restrained by its spring up to the point of actuation.
Application of this theory to man's impact tolerance was attempted, but the lack of sufficient test points prevented firm verification of the theory. The mouse impact studies described in this paper were therefore performed on large numbers of animals under well-controlled conditions in order to evaluate the sensitivity curve method of presenting G-tolerance data for mammals.

2,937

Kornhauser, M. & A. Gold 1962 APPLICATION OF THE IMPACT SENSITIVITY METHOD TO ANIMATE STRUCTURES
(In: Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, pp. 333-344)

ABSTRACT: Mouse impact studies were performed in order to verify a theory of impact tolerance of mammals. The theory, which expresses tolerance in terms of two significant parameters of the input or loading function, velocity change and average acceleration, has proved useful in presenting performance data for inanimate mechanical systems. Application of man's impact tolerance appeared to be successful, but with very few data points in critical regions. To test this hypothesis with animate structures, experiments were conducted with large numbers of mice in a free-fall impact facility, with velocity changes up to about 80 fps, and average decelerations up to 10,000 g. Results fit the theoretical model well, failures occurring at velocity changes above about 27 fps and at average decelerations above 650 g.

The primary results of the experimental program validated the theoretical model used for presentation of g-tolerance data. Other results of significance were the wide range of impact resistance in this uniform mouse population, and the finding that death resulted primarily from abrupt displacement of the central nervous system. Correlation of these experimental results with those for other animals showed an inverse relationship of g-tolerance with size, while tolerance to impulsive velocity change varied relatively little among different species.

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Korsak, K. 1960 TRAJECTORIES OF OBJECTS EJECTED FROM AIRCRAFT.
Can. Aeron. Journal 6(1):3-9 Jan. 1960

Abstract: A method of calculating the trajectories of objects, such as occupied seats or capsules, ejected from an aircraft is presented.

2,939

Koshtoyants, Kh. 1960 TESTING SPACE SHIP CABIN
Pravda, May 19, 1960, p. 4, cols. 1-5

ABSTRACT: The pressurized cabin is the most important feature of the space ship satellite. Successful results have already been obtained in the regeneration of atmosphere. Biologists are solving the metabolic problem by transforming the pressurized cabin into a closed system with constant temperature, moisture, and atmospheric regeneration. Acceleration and weightlessness affect the nervous system, particularly its perceptive or receptory functions, which can cause the coordination of an organism's physiological functions to break down. (CARI)

2,940

Kositskiy, G. I. 1959 MAN IN COSMIC FLIGHT
Zdorov'ye (Moscow) 10:4-6, Oct. 1959

ABSTRACT: The first section, entitled "How the Weight of the Body Changes", deals with the physiological effects of weightlessness and high G forces, and means of counteracting them with centrifugal force and special anti-G suits. Sechenov's theory that brain activity is impossible without a continuous flow of nerve impulses from the sensory organs is reviewed; the author states that centrifugal force would provide the necessary vigorous stimulation of the sensory organs. According to recently obtained data on respiration and heart function in experimental animals, the absence of gravity alone does not seem to affect these functions in any special way; however, it is not yet clear how the activity of the higher branches of the brain would be affected under similar conditions. The second section, entitled "Insidious Dangers", discusses the oxygen-carbon dioxide balance necessary for the smooth functioning of the human organism. The third section, "In the Zone of Cosmic Radiation", discusses the possible effects of cosmic rays on the human organism. (CARI)

2,941

Kositskii, G.I. 1960 CHELOVEK V KOSMICHESKOM POLETE
(MAN IN SPACE FLIGHT) Zdorov'e (USSR) 10:4-6, 1959
(Air Technical Intelligence Ctr., Wright-Patterson AFB, Ohio)
Rept. No. ATIC-1419621, 17 June 1960.

ABSTRACT: The article deals with accelerative stress and other ecological problems of Space flight.

2,942

Kositskiy, G. 1961 MAN AND SPACE FLIGHT. (Chelovek i Kosmicheskii Polet)
Meditsinskiy rabotnik (USSR) 24(21:1, 4. 1961.
(Joint Publications Research Service, New York, N.Y.) 18 July, 1961.
JPRS: 9699.

ABSTRACT: Prof. G. Kositskiy states that G-stress is more difficult to withstand after a period of weightlessness and therefore recommends that re-entry stress should not exceed four to five G's as compared with seven to eight G's permissible for launch stress. Candidates should be carefully selected and trained in centrifuges and pressure suits. Automatic devices should be used to orient the cabin with respect to acceleration forces. The water immersion technique is unsatisfactory as a protective device because the astronaut would not be able to control the ship.

2,943

Kositsky, G. 1961 NOTES ON THE PHYSIOLOGY OF FLIGHT
Moscow News, May 20, 1961

ABSTRACT: The author discusses several problems of man during space flight. First among them is excess strain on the organism starting with acceleration. The most effective protection is a special anti-excess-strain suit and an adoption of the correct position. Weightlessness is a problem in space flight. However, Gagarin's flight proved that man adapts quickly to weightlessness and does not experience any particular inconveniences. An important problem is the maintenance of necessary living conditions in the cabin of a spaceship. Short flights have simply used a chemical process but longer flights will use biological methods such as a closed-cycle system. The problem of protection from radiation - hard x-rays and above all cosmic rays - is also difficult. (CARI)

2,944

Kosmarskaia, E.N. 1962 REAKTSIIA NERVNYKH KLETOK GOLOVNOGO MOZGA NA DLITEL'NOE UVELICHENIE RAZDRAZHENII OT PERIFERICHESKIKH RETSEPTOROV (REACTION OF THE NERVE CELLS OF THE BRAIN TO PROLONGED INCREASE OF STIMULI FROM THE PERIPHERAL RECEPTORS)
Biulleten' eksperimental'noi biologii i medi siny (Moskva), 53 (6): 88-91. June 1962. In Russian, with English summary (p. 91)

ABSTRACT: The vestibular apparatus of adult rabbits was stimulated by horizontal rotation, i.e., the animals were rotated on a platform 2-3 times a day for 10-15 minutes for a total of 18-19 days. As a result of the increased vestibular stimulation the neurons in three nuclei (triangular nucleus and the nuclei of the oculomotor and abducens nerves) became hypertrophied, the greatest enlargement of the cell bodies occurring in the triangular nucleus. The cell nucleus in comparison with the cell body did not enlarge to a significant extent.

2,945

Kosmolinskii, F. P. 1960 MEDIKO-BIOLOGICHESKIE VOPROSY POLETOV V KOSMICHESKOE PROSTRANSTVO. OBZOR INOSTRANOI LITERATURY
(Biomedical Problems of Flight into Cosmic Space: A Survey of Foreign Literature)
Klin. Med. (Moscow), 38(5):8-12, May 1960, (in Russian).

ABSTRACT: This is a review of articles on physiological, psychological, and biological problems of space flight published in the West European and American aviation literature during the last decade.

2,946

Kotovskaya, A.R. & Ye. M. Yuranov 1960 [EFFECT OF LONG-ACTING TRANSVERSAL ACCELERATIONS ON THE ANIMAL ORGANISM]
Voyenno-meditsinskiy Zhurnal 4: 90

2,947

Kottenhoff, H., & L. E. H. Lindahl 1958 VISUAL AND EMOTIONAL FACTORS IN MOTION SICKNESS: PRELIMINARY COMMUNICATION. Percept. Mot. Skills 8(3):173-174, Sept. 1958

ABSTRACT: To test the hypothesis that locomotor nystagmus is the pathogenic "visual" factor in motion sickness, 12 adults and 16 children fixated a rotating Barany drum for five minutes, and were rhythmically rocked and rolled while wearing visual-field-inverting spectacles. Mann-Whitney tests were used in comparing results for adults and children. Forty-nine other subjects tested on the moving chairs also were given tests of personality and of psycho-galvanic reflex.

2,948

Kousnetzov, A. G. 1958 SOME RESULTS OF BIOLOGICAL EXPERIMENTS IN ROCKETS AND SPUTNIK II
J. of Aviation Medicine 29(11):781-784, November 1958

ABSTRACT: Scientific research work investigating the effect of space flight upon living organisms has been carried on in the Soviet Union since 1949. Penetration of the upper air layers by animals is achieved with the help of rockets. The first thing was to place the animals in specially equipped and hermetically-sealed cabins which were supplied with an air-conditioning system allowing to keep up the gas composition of the air, the temperature, and humidity at the required level so as to make the normal vital activity of the organism possible. The next task was to find out the possibility of separation from the rocket, with the help of a catapult, with a subsequent descent of the animals by parachute. The third stage of the experiments was started in 1958. The launching of animals into space with the help of rockets was effected at the height of 473 km. (294 miles). Changes noticed in the physiological functions of the animal were brought about by the sudden effect upon the latter of external irritants: acceleration, noise and vibration which appeared at the start and continued when the rocket was placed in orbit. The return to normal of the blood circulation and breathing during the zero-gravity state, when the Sputnik is in orbit, seems to prove that this factor caused no considerable changes nor any stable changes in the physiologic functions of the animal.

2,949

Kovalenko, E. A., V. L. Popkov & I. N. Cherniakov 1963 INTRAVITAL STUDY OF OXYGEN TENSION IN BRAIN TISSUES DURING PROLONGED ACCELERATIONS Biull. Eksp. Biol. Med. 55:43-48, Jan. 1963 (Russian)

2,950

Kozachenko, B. 1960 [DREAM BECOMES FACT] Gudok P. 4; 20 May 1960

2,951

Kozlov, A. V. 1962 [PRINCIPLES AND CALCULATIONS OF HYDRAULIC LINEAR ACCELERATION CHAMBERS]. Inzhenernyy sb. 1961(31):179-187
Abstract: Referativnyy zhurnal, Mekhanika 1962(1):20, Abstract No. 1A167

2,952

Kraft, C. C., Jr. 1959 SOME OPERATIONAL ASPECTS OF PROJECT MERCURY. (Presented at the Annual Meeting of the Society of Experimental Test Pilots, Los Angeles, Calif., Oct. 9, 1959).

2,953

Kraft, C. C., Jr. 1961 FLIGHT PLAN FOR THE MR-3 MANNED FLIGHT.
In: Conference on Results of the First U. S. Manned Suborbital Space Flight, June 6, 1961. Pp. 7-10. ASTIA AD 259 061.

ABSTRACT: This paper presents some of the preflight preparations for the manned Mercury-Redstone (MR-3) flight and gives an outline of the flight plan. Also, a brief description of the recovery operations is given. The preflight operations deal with the preparations that were carried out, and the flight plan is based on the times that the events occurred during the flight test.

2,954

Kraft, C. C., Jr., T. Roberts, E. F. Kranz & C. F. Matthews 1962 FLIGHT CONTROL AND FLIGHT PLAN.
In: Results of the First U. S. Manned Orbital Space Flight, February 20, 1962. (NASA Manned Spacecraft Ctr.) Pp. 69-76.

SUMMARY: A number of malfunctions occurred during this flight which caused some concern to the flight control team. These included the malfunction of the auto-

matic control system, and what later proved to be the false indication of heat-shield deployment. However, the presence of the astronaut onboard the spacecraft made these malfunctions of a minor nature. The astronaut's ability to evaluate the performance of the spacecraft systems and take corrective action, and his excellent method of reporting these results to the ground, resulted in the successful completion of the MA-6 flight.

2,955

Kraft, J. A. 1957 AIRCREW STRESS AND FATIGUE PROBLEMS DURING EXTENDED ENDURANCE FLIGHT.
(Lockheed Aircraft Corp. Marietta, Georgia) AF Contract No. 33-(616)-3743, 24 April 1957.

2,956

Kramer, S.B. & R.A. Byers 1960 A MODULAR CONCEPT FOR A MULTI-MANNED SPACE STATION
In: Proceedings of the Manned Space Stations Symposium, Inst. Aeronautical Sciences, New York, 1960, Pp. 36-73

ABSTRACT: Contains a section on the Micro-Encology which is broken down into the following subsections: Biochemical (Respiratory, Nutritional, Waste): Psychological (Termal, Vibratory and Aurol, Gravitational); External Phenomena (Radiation, Meteors): and Hardware (Micro-Atmosphere System, Equipment Weights plus Power).

2,957

Krause, R. and W.F. Haldeman 1958 VERTICAL DESCENT TRAJECTORIES INCLUDING RE-ENTRY INTO THE ATMOSPHERE.
(USAF Missile Development Center, Holloman Air Force Base, New Mexico) Tech. Rept. 58-4, March 1958.

ABSTRACT: Trajectories for bodies descending vertically through the atmosphere have been calculated for a wide range of initial altitudes and body characteristics to provide information required for design purposes. Parameters and equations used, as well as the method of calculation by means of an analog computer, are discussed. The results are plotted as velocity-versus-altitude and time-versus-altitude. A guide for using the graphs is included, and deceleration data are evaluated and plotted.

2,958

Kraus, R. N. 1959 DISORIENTATION: AN EVALUATION OF THE ETIOLOGICAL FACTORS Paper: Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959.

ABSTRACT: Dr. Isaac M. Jones described the role of the labyrinth in relation to equilibration in 1918 when he wrote: "Equilibration in general depends upon impulses from three sources -- the kinetic - static sense, the sight and the muscle sense." Subsequent experience proved that orientation cannot be maintained while flying without a visual reference. Although the usefulness of the turn indicator, which provided a visual reference, was demonstrated by Ocker, in 1918, the practicability of "blind flight" was not generally accepted for over ten years. Today, no one questions the necessity for visual references while flying. Instruments are installed in all aircraft which provide adequate visual cues. Nevertheless, almost all pilots have been disoriented at one time or another. This report will point out some of the factors that lead to disorientation. The length of time required for a pilot in a jet aircraft to transition from VFR to IFR, variations in flight attitude while copying an ATC clearance, and procedures which prevent the pilot from monitoring his flight instruments, will be reported.

2,959

Kraus, R. N. 1959 DISORIENTATION: AN EVALUATION OF THE ETIOLOGIC FACTORS. (School of Aviation Medicine, Brooks AFB, Texas) Technical Rept. 59-90; ASTIA AD-231 542; Aug. 1959

SUMMARY: A brief history of the development of instrument flight is presented, and the physiological mechanisms involved in maintaining aerial orientation are reviewed. Each of three subjects flying in F-100F aircraft completed transition from VFR to IFR in an average time of 24, 27, and 26.5 seconds, respectively. No abnormal changes in the attitude of the aircraft or in the flight path took place during the transition. An aircraft flying at 10,000 feet can assume an attitude from which recovery is impossible in as little time as 20 seconds if the pilot does not have a visual reference. The period of time that the pilot deliberates -----from the instant when he loses his outside visual reference until he initiates transition to IFR----is the critical factor in disorientation accidents A jet aircraft can assume an attitude from which recovery is impossible while the pilot is completely unaware that a change in attitude has occurred. (AUTHOR)

2,960

Kraus, R. N. 1959 DISORIENTATION IN FLIGHT. Aerospace Med. 30(9): 664-673.

SUMMARY: A brief history of the development of instruments flight has been presented. The physiologic mechanisms involved in maintaining aerial orientation have been reviewed. Each of three subjects flying in F-100F aircraft completed

transition from VFR to IFR in an average time of 24, 27 and 26.5 seconds, respectively. No abnormal changes in the attitude of the aircraft or in the flight path took place during the transition. An aircraft flying at 10,000 feet can assume an attitude from which recovery is impossible in as little time as 20 seconds if the pilot does not have a visual reference. The period of time that the pilot deliberates from the instant when he loses his outside visual reference until he initiates transition to IFR is the critical factor in disorientation accidents. A jet aircraft can assume an attitude from which recovery is impossible while the pilot is completely unaware that a change in attitude has occurred.

2,961

Kraus, R. N. 1960 EVALUATION OF A SIMPLE CORIOLIS TEST FOR VESTIBULAR SENSITIVITY. (Paper, 31st Annual Meeting of the Aerospace Medical Association Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960)

ABSTRACT: The duration of the primary turning sensation resulting from voluntarily induced Coriolis stimulation was measured in highly qualified pilots and control subjects of the same age group. The stimulation was presented repetitively and changes in the duration were studied. The role of prolonged and intensive training is considered. (Aerospace Medicine 31(10):852-855.)

2,962

Kraus, R. N. 1961 EARLY DIAGNOSIS OF HYDROPS OF THE LABYRINTH. In Bergeret, P., ed., Escape and Survival: Clinical and Biological Problems in Aero Space Medicine. (Advisory Group for Aeronautical Research and Development, Paris) AGARDograph No. 52. ASTIA AD 261 851.

ABSTRACT: While no definite conclusions can be drawn from the cited case presentations, the following facts concerning hydrops of the labyrinth were clearly demonstrated: (1) the hearing defect due to hydrops of the labyrinth can be accurately differentiated from other types of hearing defects; (2) defective hearing is frequently observed before vertigo occurs; (3) the early diagnosis is of particular importance to aviation medicine.

2,963

Kraus, R. N., L. L. Elliott, & E. W. Moore 1961 STAPES MOBILIZATION: EXPERIENCE IN THE UNITED STATES AIR FORCE. (School of Aerospace Medicine, Brooks AFB, Texas) Rept. 61-38; ASTIA AD-264 461; July 1961

ABSTRACT: This paper reviews results of 151 stapes mobilization operations on 94 patients. For patients on whom followup data were available, improvement in

hearing seemed to be well maintained for a 6-month period. Although it was noted that operations performed on both ears of a patient tended to have similar results, the tendency was not statistically significant. Finally, there was considerable evidance that successful operations were proportionately higher in patients requiring surgery on only one ear. A further study is being conducted to obtain additional followup information for the entire sample. (AUTHOR)

2,964

Kraus, R. N., E. W. Moore, P. J. Dowd, & R. L. Cramer 1961 PARTICIPATION OF THE VERTICAL SEMICIRCULAR CANALS IN ADAPTATION TO STIMULATION OF THE HORIZONTAL SEMICIRCULAR CANALS. (Paper, 32nd Annual Meeting, Aerospace Medical Assoc., 24-27 April 1961, Chicago, Ill.)

ABSTRACT: It is hypothesized from data on the rapid adaptation to Coriolis stimulations that adaptation to a simple acceleratory stimulation of one set of canals is facilitated by simultaneous stimulation of another set. The data to be presented will compare adaptation to simple acceleratory stimulation of the lateral semicircular canals when only these canals are stimulated and when they are stimulated simultaneously with the vertical canals. These data will contribute to the specifications of training regimens against aerial disorientation. (Aerospace Medicine 32(3):238, March 1961)

2,965

Krieger, F.J. 1956 A CASEBOOK ON SOVIET ASTRONAUTICS (The Rand Corporation, Santa Monica, Calif.) RM-1760, 21 June 1956. ASTIA AD-108 750.

ABSTRACT: This casebook is a preliminary attempt at uncovering evidence of Soviet interest in the subject and presenting it in a suitable, readable form for the edification of readers interested in what the Russians are writing about the challenging problems of space flight.

This casebook consists of two principal sections. The first is a four-part bibliography dealing with the historical, scientific, and technical aspects of rocketry and astronautics. The second is a series of complete translations from the Russian (except in three cases) of articles and papers by various authorities selected from a variety of periodicals, and arranged chronologically so that the reader can appreciate the Soviet technique in developing the subject in the open literature and become acquainted with some of the personnel entrusted with the exposition of the problems of space flight.

2,966

Krieger, F.J. 1957 BEHIND THE SPUTNIKS: A SURVEY OF SOVIET SPACE SCIENCE. (The Rand Corporation, Santa Monica, California) U.S. Air Force Project Rand R-311, 3 Nov. 1957. ASTIA AD 150 689.

ABSTRACT: This report is a survey of Soviet astronautics based entirely on the open literature. It attempts to uncover evidence of increasing Soviet concern with the challenging problems of space flight.

The Introduction to the survey delineates, briefly, the history of the development of astronautics in Russia from the turn of the century up to the launching of the first artificial earth satellite. It is intended to provide the reader with a background of the events that presaged Sputnik I and to acquaint him with some personnel entrusted with the exposition of the problems of space flight.

The articles and papers that form the main portion of the survey are, for the most part, translations from the Russian. They were written by various authorities on Soviet astronautics and have been selected from a wide variety of publications.

The Bibliography, which contains more than 339 items, has been divided into two parts in order to increase its value to the reader as well as the scholar. Part I lists books and monographs dealing with the historical, scientific, and technical aspects of rocketry and astronautics. Part II contains references drawn from various Russian newspapers, popular magazines, and serious technical journals.

Most of the articles and papers in this report appeared in Rand Research Memoranda RM-1760 and RM-1922 which formed Parts I and II of a series entitled "A Casebook on Soviet Astronautics", dated June 21, 1956, and June 21, 1957 respectively.

2,967

Krieger, F. J. 1957 A CASEBOOK ON SOVIET ASTRONAUTICS: PART II. (The RAND Corporation, Santa Monica, Calif.) RM-1922, June 21, 1957, ASTIA AD 133 018

ABSTRACT: A two-part bibliography of Russian books and periodicals dealing with various aspects of rocketry and astronautics. In addition, this study contains a series of complete translations from the Russian of articles and papers which show the singleness of purpose in the Soviet space-flight program. (Superseded by R-311.) See Behind the Sputniks

2,968

Krieger, F. J. 1958 BEHIND THE SPUTNIKS: A SURVEY OF SOVIET SPACE SCIENCE. (Washington: Public Affairs Press, 1958)

ABSTRACT: An investigation of recent Russian research and ideas on such matters as artificial satellites, flight to the moon, interplanetary communications, biological aspects of space travel, atomic airplanes, trips to the planets, worldwide television broadcasting from space stations, intercontinental rocketry, and the technical problems of cosmic flight. This report delineates the history of the development of astronautics in Russia from the turn of the century up to the launching of the first artificial earth satellite. It shows how the Soviets, in their struggle for world dominations, are applying their sledge-hammer technique not only to terrestrial affairs but also to the conquest of cosmic space.

2,969

Krieger, F. J. 1958 THE SOVIET BALLISTIC MISSILE AND SPACE FLIGHT PROGRAM
(The RAND Corporation, Santa Monica, Calif.) P-1388, June 2, 1958

ABSTRACT: An investigation of the Soviet ballistic missile and space flight program from the organization of the GIRD (Group Studying Reactive Motion) in 1929 to the present time. The paper discusses the exploitation of the German rocket power-plants and guidance and control equipment after World War II, the upper-atmosphere research-rocket program traced to 1949, the existence of an official Soviet space-flight program around 1953, the Soviet announcement of a successful test of an ICBM in 1957, and the activities of the present Soviet program in terms of the theoretical minimum-space-flight-velocity requirements and of the type of missions to be accomplished.

2,970

Krieger, F. J. 1958 SOVIET PERIODICAL LITERATURE ON ASTRONAUTICS
(The RAND Corporation, Santa Monica, Calif.) P-1562, Dec. 1, 1958.

ABSTRACT: A discourse on the many problems confronting Western readers interested in Soviet developments in astronautics. The Soviet press not only frequently misinforms its readers, but also never presents facts objectively. The Soviets prefer to publish their astronautical studies in their own rigidly controlled media. Tables presented list Soviet newspapers, journals published by the USSR Academy of Sciences and by various institutes and ministries, and Soviet abstract and reference journals that carry articles on or pertaining to astronautics.

2,971

Krieger, F. J. 1958 SOVIET ASTRONAUTICS
(The RAND Corporation, Santa Monica, Calif.) P-1437, Feb. 24, 1958.

ABSTRACT: A description of the long and active history of Soviet interest in space flight leading up to the launching of Sputniks I and II. A discussion of Soviet technical and popular literature on space flight is included.

2,972

Krimshteyn, A. Ye. 1960 ELECTROCARDIOGRAPHIC CHANGES IN FLIGHT PERSONNEL UNDER THE INFLUENCE OF FLIGHT STRAIN
Voyenno-meditsinskiy Zhurnal 5: 224-227
See also: JPRS Trans. No. 5592

2,973

Kris, C. 1957 SIMULTANEOUS MEASUREMENT OF REFLEXLY ORGANIZED PROPRIOCEPTIVE (VESTIBULAR AND NECK) AND VISUAL (OPTOKINETIC) NYSTAGMUS SHOWING DOMINANCE OF THE VISUALLY EVOKED RESPONSE.
Electroencephalography and Clinical Neurophysiol. (Montreal), 9(3): 568 August 1957

ABSTRACT: After prior rotation of the subject in a Barany chair, the head alone was rotated through an arc of 180° from left to right and vice versa. Differences between both directions of rotation in the amplitude, frequency, and rate of nystagmus were established in control sessions (a) with eyes closed, (b) with eyes open, and (c) in a stationary black and white striped drum. Then the drum was rotated at various speeds. When the drum was rotating in the same direction and speed as the head (relative angular velocity, 0) nystagmus disappeared entirely. When the head was rotated in the opposite direction to the drum, the nystagmus was accelerated by an amount proportional to the rate at which stripes were moving relative to the subject's head. It is concluded that visual field controlled stimulation dominates- in its influence on the ocular nystagmus- over the vestibular and neck oculomotor reflexes, when the rate of nystagmus produced by the head and body rotation alone is compared to the rate recorded when optokinetic response is added to visual stimulus.

2,974

Kriz, K 1959 KOTAZCE SOUCASNEHO VYSKYTU NYSTAGMU U INTRASPINALNICH EXPANZIVNICH LAZI (TO THE PROBLEM OF SIMULTANEOUS OCCURRENCE OF NYSTAGMUS IN INTRASPINAL EXPANSIVE LESIONS)
Ceckoslovenska Otolaryngologie, 8 (6):

2,975

Kroeger, W.I. 1952 THEORETICAL ASPECTS OF CATAPULTIC DEVICES (Pitman-Dunn Labs., Frankford Arsenal, Philadelphia, Pa.) 29-30 Sept. 1952, ASTIA AD-14 355

ABSTRACT: A theoretical outline for the basic ballistic design of powder gas operated personnel catapults is presented with specific applications.

2,976

Krohn, Whitteridge, and Zuckerman 1941 EFFECT OF BLAST ON THE HEART AND HEAD. (Ministry Home Security, Comm. Civil Defense Research) RC 249, August 1941

2,977

Krohn, P. L., D. Whitteridge & S. Zuckerman 1942 PHYSIOLOGICAL EFFECTS OF BLAST.
Lancet 1:252-258, Feb. 28, 1942.

2,978

Krotkov, F. G. 1959 AVIATSIONNAYA GIGIYENA (AVIATION HYGIENE)
Voyennaya gigiyena (Military Hygiene) pp. 319-341

ABSTRACT: This is a full translation of Chapter XII "Aviatsionnaya gigiyena" (Aviation hygiene) of the monograph "Voyennaya gigiyena" (Military hygiene), by F. G. Krotkov, Major General of Medical Services, Moskva, 1959, p. 319-341. The chapter discusses in general terms certain aspects of aviation sickness, altitude sickness, etc. The successful launchings of the three artificial earth satellites and of the cosmic space rocket in the USSR which became the tenth comet of the solar system gave new urgency to the solution of the problems of space medicine. The special properties of flights beyond terrestrial atmosphere in the physiological and hygienic plan are characterized by the influence of considerable accelerations, weightlessness and cosmic radiation on the organism. The crew of a space ship will experience 6-10 Gs at the end of each period of acceleration development Experiments conducted on a centrifuge demonstrated that such accelerations are within those which can be tolerated by man. During the ascent of the rocket men must assume prone positions. After the space ship leaves at atmospheric boundaries and the flight proceeds by inertia, men will lose their weight and will experience a feeling of weightlessness foreign to them. According to the Soviet and foreign research, the state of weightlessness of short duration (2-3 minutes) will not cause serious changes in respiration and blood circulation of the experiment animals. Pulse frequency which increases at the start (from 80 to 240 per minute), drops in the state of weightlessness to almost normal. (CARI)

2,979

Kuenzli, N. G. 1950 HOW FAST? HOW HIGH?
Flying, 46(1):34-35-47-48, Jan. 1950.

ABSTRACT: At the close of World War II, Germany conducted high-speed tests on humans and animals. During an autopsy of the animals after whirling on a centrifuge, the scienctists found proof of what killed men in high-speed air craft spins and turns. The heart and all vessels near the center of rotation of the animals except those of the head were devoid of blood. Death had resulted from the total collapse of blood circulation. From this initial form of research, anti-G suits were developed to pro ect the pilot up to maximum G forces which would be encountered in aircraf.. Other tests showed that the pilot should crouch with every muscle tense in order to resist centrifugal force. Humans lying on their backs could withstand centrifugal forces of 15 G without suffering visual trouble. Wind velocity of about 599 m.p.h. was the threshold of human endurance.

2,980

Kulouiski, J. 1958 MEDICINE: A NEW CATALYST OF MEDICAL, LEGAL, AND ENGINEERING ASPECTS OF MOTORIST INJURIES AND SAFETY.
International Record of Medicine 171(9):533-537, Sept. 1958.

2,981

Kulowski, J. 1957 ORTHOPEDIC ASPECTS OF AUTOMOBILE CRASH INJURIES AND DEATHS. The J. of the American Medical Association 163:230-233 26 January 1957.

ABSTRACT: There is a need for better ways of determining and maintaining the fitness of people to drive automobiles. The medical profession should press for application of the facts of medicine and engineering to methods of crash-proofing motor vehicles. The medical care available in emergencies must be improved. Attention should be directed not only to the prevention of fatal accidents but also to Le rehabilitation of the many people who are seriously injured.

2,982

Kulowski, Jacob 1958 MOTOR VEHICLE SAFETY IN THE AGE OF SPEED AND POWER. A BIOMECHANICAL APPROACH. Police, Pp. 33-36, May-June 1958

2,983

Kulowski, J. 1958 AUTOMOTIVE CRASH INJURIES TO THE SPINAL AND FEMORAL LINKAGES.
Am. J. Surg. 95:908-913, June 1958.

2,984

Kulowski, Jacob 1958 FRACTURES OF THE ELBOW JOINT. NEW CLASSIFICATION AND ROENTGENOLOGIC GUIDE TO MAJOR PITFALLS OF DIAGNOSIS AND TREATMENT.
The American J. of Roentgenology, Radium Therapy and Nuclear Medicine 79(4):692-696, April 1958

2,985

Kulowski, J. 1959 CRASH INJURIES
(Springfield, Ill.: Charles C. Thomas, 1959)

2,986

Kulowski, Jacob 1960 CRASH INJURIES: THE INTEGRATED MEDICAL ASPECTS OF AUTOMOBILE INJURIES AND DEATHS
(Springfield, Illinois: Charles C. Thomas, Publisher) Library of Congress Card Number: 59-8499

ABSTRACT: This book contains sections on the following subjects: biomechanics and pathomechanics; autopsy pathology; clinical pathology or pathological anatomy; medical aspects of prophylaxis or prevention; and toward a united medical concept and integrated report.

2,987

Kulowski, J. 1962 INTERCONNECTED MOTORIST INJURIES OF THE HIP, FEMORAL SHAFT AND KNEE. (In M. K. Cragun, ed., The Fifth Stapp Automotive Crash and Field Demonstration Conference, Sept. 14-16, 1961) Pp. 105-124.

2,988

Kulwicki, P. V. and G. Peoples 1962 CONTROLLED ROTATION AND STABILIZATION FOR THE ORBITAL WORKER
(Aerospace Medical Division, 6570th Aerospace Medical Research Labs. Wright-Patterson AFB, Ohio)
AMRL MEMO P-21, December 1962

ABSTRACT: A continuously acting stabilization system for a selfmaneuvering unit for an orbital worker is discussed. The stabilization is supplied by two mementum wheels rotating uniformly in the manner of gyroscopes. Since a rotating wheel tends to remain in its plane of rotation in the absence of external forces, the capability for stablization is provided. Also, since a rotating wheel tends to change its plane of rotation with the application of force ments, the capability for controlled rotation is provided.

2,989

Kumai, T. 1957 SOME MEASUREMENTS OF ACCELERATION, OF HULL VIBRATION, AND HUMAN SENSITIVITY TO VIBRATION. (Kyushu University, Japan)
Reports of Research Institute for Applied Mechanics 5(17):21-26

2,990

Kunkle, E.C., P.J. Maher Jr., A.C. Lund & D.W. Lund 1946 PRELIMINARY STUDIES OF THE EFFECTS OF POSITIVE G UPON INDUCING HEADACHE, UPON THE PERCEPTION OF PAIN, AND UPON VASCULAR HEADACHE INDUCED BY INTRAVENOUS HISTAMINE. (Aero Medical Lab., Engineering Div., Wright-Patterson AFB, Ohio) Memorandum Report No. TSEAA-695-72, 15 November 1946. ASTIA ATI 123 455

ABSTRACT: A slight reduction in the intensity of pain induced by local cooling or intramuscular hypertonic saline occurs during exposure to positive G of 3.0 to 4.0 upon the human centrifuge. The basis for this decrease in pain perception is incompletely defined by these few experiments, but the time relations of the phenomenon suggest that the distraction accompanying centrifugation is an important and probably major factor.

Headache induced by intravenous histamine is readily eliminated by exposure to positive G of 3.0 to 3.6. Correlation of this observation with those of earlier studies suggests that the effect is an indirect demonstration of a decrease in intracranial arterial pressure produced by positive G.

2,991

Kunkle, E. C., P. J. Maher and D. W. Lund 1947 HUMAN CENTRIFUGE IN STUDY OF PAIN PERCEPTION AND HEADACHE MECHANISMS.
(Aero Med. Lab., Wright-Patterson AFB, Ohio) Memo rept. TSEAA-695-72A, April 16, 1947.

2,992

Kunkle, E. C., D. W. Lund & P. J. Maher 1948 STUDIES ON HEADACHE: ANALYSIS OF VASCULAR MECHANISMS IN HEADACHE BY USE OF THE HUMAN CENTRIFUGE, WITH OBSERVATION ON PAIN PERCEPTION UNDER INCREASED POSITIVE G. Arch. Neurol. & Psychiat. 60:253-269, Sept. 1948.

2,993

Kuntz, W.H. 1946 PILOT EJECTION SEAT TESTS AT MUROC ARMY AIR FIELD. (Engng. Div., AMC, Wright-Patterson AFB, Dayton, Ohio) July 1946. ASTIA ATI 43122

ABSTRACT: Report is given of pilot ejection seat tests conducted from an F-61B fighter. Detailed description and general remarks are given for each test. Curves showing the trajectory of seat and dummy with respect to the test airplane after ejection are included. Still prints from the motion picture records of the tests are given. It is concluded that this pilot ejection seat is satisfactory for ejecting a 200-lb dummy and parachute equipment from an airplane in flight up to velocities of approximately 290 mph IAS at 12,000 ft altitude. Automatic devices are satisfactory for releasing the lap belt and the dummy's parachute when proper inspection is applied. Recommendations are given for future tests.

2,994

Kuntz, W.H. 1948 THE DORNIER-335 PILOT EJECTION SEAT. (AMC, Wright-Patterson AFB, Dayton, Ohio) Technical Report F-TR-1191-ND, Aug. 1949. ASTIA ATI 27204

ABSTRACT: The Dornier-335 Ejection Seat was developed by the Germans, during the latter part of World War II, to provide a means of escape from high-speed aircraft. The seat is ejected from the airplane by a piston-type catapult, utilizing compressed air stored in three steel bottles of two liters capacity each, pressure of 1707 pounds per square inch. The system produced an ejection velocity of approximately 57.4 feet per second at maximum accelerations of approximately 25 "G". The seat has a total vertical adjustment of 2-7/16 inches. The seat back is parallel to the ejection angle, which is 13° from vertical.

2,995

Kuntz, W.H. 1948 THE DORNIER 335 PILOT EJECTION SEAT. (LeBoeuf Co., Dayton, Ohio) Report 2-R-001, Feb. 1948. ASTIA ATI 54820

ABSTRACT: The Dornier 335 pilot ejection seat was evaluated to determine if the system or any features thereof might be of value to the USAF in developing ejection seats as a means of emergency escape from high speed aircraft. The seat was ejected by a piston type catapult utilizing compressed air as a source of energy, and the system produced an ejection velocity of approximately 57.4 fps at maximum accelerations of approximately 25 g. The system is described in detail, including performance data and a comparison of Dornier 335 and USAF ejection systems. The complete Dornier installation was studied to determine the relationship between the various components of the system, and the measurements of significant features were recorded. It was found that there are no advantages of this system over the present USAF ejection system utilizing a powder charge catapult.

2,996

Kupalov, P. S. and M. M. Khananashvili, 1960 DIFFERENTSIROVANIYE PROSTRANSTVENNYKH USLOVNYKH RAZDRAZHITELEY (Differentiation of Conditioned Space Stimuli) (Trans. of Zhurnal Vysshev Nervnov Devatel'nosti (USSR) 10(3):305-312, 1960) (Office of Technical Services, Washington, D.C.) 60-41681

2,997

Kuznetzov, A.G. 1958 SOME RESULTS OF BIOLOGICAL EXPERIMENTS IN ROCKETS AND SPUTNIK II. J. Aviation Med. 29:781-784

ABSTRACT: Scientific research work investigating the effect of space flight upon living organisms has been carried on in the Soviet Union since 1949. Penetration of the upper air layers by animals is achieved with the help of rockets. The first thing was to place the animals in specially equipped and hermetically-sealed cabins which were supplied with an air-conditioning system allowing to keep up the gas composition of the air, the temperature, and humidity at the required level so as to make the normal vital activity of the organism possible. The next task was to find out the possibility of separation from the rocket, with the help of a catapult, with a subsequent descent of the animals by parachute. The third stage of the experiments was started in 1958. The launching of animals into space with the help of rockets was effected at the height of 473 (294 miles). Changes noticed in the physiological functions of the animal were brought about by the sudden effect upon the latter of external irritants: acceleration, noise and vibration which appeared at the start and continued when the rocket was placed in orbit. The return to normal of the blood circulation and breathing during the zero-gravity state, when the Sputnik is in orbit, seems to prove that this factor caused no considerable changes nor any stable changes in the physiological functions of the animal.

2,998

Kydd, G. H. and A. M. Stoll 1957 G TOLERANCE IN PRIMATES. I. UNCONSCIOUSNESS END POINT.
(U. S. Naval Air Development Ctr., Johnsville, Pa.) NADC MA 5717, 11 Dec. 1957. ASTIA AD 156 855
See also J. Avia. Med. 29(6):413-421, June 1958.

ABSTRACT: In the study unanaesthetized monkeys were observed by means of both a movie and television camera during centrifuge runs of from 2.8 to 13.6 positive G (accelerative force) for periods up to three minutes. An end point was found which served to separate the initial period of activity from that which occurred later during the run. The curve resulting from the plot of end points with respect to maximum G was compared with the human tolerance curve with respect to unconsciousness. The results are discussed in terms of a beginning in the systematic correlation of animals and human experimentation.

2,999

Kydd, G.H. & R.L. Fenichel 1958 END POINT VARIATION AT CONSTANT ACCELERATION (Paper, 1958 Meeting of Aero Medical Association, Statler Hotel, Washington, March 24-26)

ABSTRACT: Unanesthetized monkeys have been observed on the 3-foot centrifuge at from 2 to 15 G, and an end point for unconsciousness has been observed. This end point has been described as the beginning of a period of inactivity or quiescence which separates periods of activity on the part of the animals. Further observations are reported at this time in which the experimental procedure has been altered to indicate some of the variation to be expected. The animals have been given multiple runs of varying duration at constant G separated by 5-minute rest periods and the occurrence of the end point has been observed. The duration of the first run was 30 seconds and succeeding runs were increased by increments of 30 seconds. The experiments indicate that the animals withstood the initial run much better than any of those that followed. The differences between the times of occurrences of the end points in the later runs were decreased indicating that there is some adaptation and the resistance of the animal is not improved under these conditions. (J. Aviation Med. 29(3):239, March 1958)

3,000

Kydd, G., R. Fenichel, & R. Crosbie 1958 RELATIONSHIP BETWEEN MEAN PRESSURE AND G-TIME PATTERN DURING POSITIVE ACCELERATION Fed. Proc., 17(1, pt. I): 91, March 1958

ABSTRACT: Unanesthetized monkeys were subjected to increasing accelerations from 1.5 to 12 g in order to determine the relationship between the mean arterial

pressure curve and the shape of the applied g time pattern. Evaluation of mean carotid pressures and acceleration at 0.25-second intervals revealed that single time constant described the acceleration curves, while the time constants for arterial pressure became shorter as the maximum g level was increased. The deviation of the pressure curves from the simple exponential form is attributed to damping in the circulatory system.

3,001

Kydd, G.H. & A.M. Stoll 1958 G TOLERANCE IN PRIMATES. I. UNCONSCIOUSNESS END POINT.
J. Aviation Med. 29(6):413-421, June 1958.
See also (U.S. Naval Air Development Center, Johnsville, Pa.)
NADC MA 5717, 11 Dec. 1957.

ABSTRACT: Unanesthetized monkeys were observed during centrifuge runs of from 2.3 to 13.6 positive G for periods up to 3 minutes. An end point was found which serves to separate the initial period of activity from that which occurred later during the run. It provides a convenient means for investigating the effect of the initial rate of application of G on the tolerance time. The curve resulting from the plot of the end points with respect to maximum G and time from the onset of G parallels the human tolerance curve with respect to unconsciousness. The establishment of a constant relationship between these curves constitutes the first step in the systematic correlation of animal and human experimentation.

3,002

Kydd, G. H., R. L. Fenichel, & R. J. Crosbie 1959 G TOLERANCE IN PRIMATES. II. OBSERVATIONS ON THE RELATIONSHIP OF CAROTID PRESSURE AND END POINT DURING ACCELERATION. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5903; ASTIA AD-220 557

ABSTRACT: Observations have been made simultaneously of the occurrence of an end point of unconsciousness and carotid pressure in Rhesus monkeys during centrifugation. The data indicate that the carotid pressure is influenced initially by a maneuver which gives rise to a positive wave of pressure that is well coordinated with the onset of tangential G. Following this, there is a phase of pressure drop that can be described by a single time constant which varies with G. The data indicate that the end point occurs at a constant time following this occurrence of the pressure minimum and therefore is related to the slope of the blood pressure curve. The significance of this observation with respect to the blood supply is discussed. (AUTHOR)

3,003

Kydd, G.H. & P. Craig 1960 BIOSATELLITE, DEVELOPMENT AND STUDY WITH; LETTER REPORT CONCERNING LIFE SUPPORT SYSTEM
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-L6001, Jan. 6, 1960. ASTIA AD 231 548

ABSTRACT: This report describes work in progress in the development of a facility which will allow the simulation of the ambient conditions of the life cell of the biosatellite and to provide for the metabolic requirements of the animal. Accomplishment of these objectives will permit the study of the animal under the simulated conditions, excepting zero gravity. The environmental simulation is detailed, including the simulation of the capsule conditions, the carbon dioxide absorber, circulation pump, oxygen supply and data recording.

3,004

Kydd, G.H. & K.E. Dickerson 1960 BIOPROBE, DEVELOPMENT AND STUDY WITH; LETTER REPORT CONCERNING THE LIFE SUPPORT SYSTEM
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-L6007, May 20, 1960. ASTIA AD 237 369

ABSTRACT: The life support system for the bioprobe and its components is discussed including material concerning the circulating pump, the animal capsules, temperature control and feeding of the animals. Data is given for a 14-day run inside the environmental chamber.

3,005

Kydd, G. H., R. L. Fentichel, & R. J. Crosbie 1960 RELATIONSHIP OF CAROTID PRESSURE AND END POINT DURING ACCELERATION. J. Appl. Physiol. 15(5):903-906, Sept. 1960

ABSTRACT: Simultaneous observations have been made of the occurrence of an end point of unconsciousness and carotid blood pressure in rhesus monkeys during positive acceleration. The data indicate that the carotid pressure is influenced initially by a maneuver which gives rise to a positive wave of pressure that is well coordinated with the onset of tangential acceleration, while positive acceleration is at a very low level. Following this, there is a pressure drop that can be described by a time constant, that is, a function of peak g. The data indicate that the end point occurs after a constant interval following the pressure minimum and is therefore related to the slope of the blood pressure curve. The significance of this observation with respect to blood supply is discussed. (AUTHORS)

3,006

Kydd, George H., Richard L. Fenichel & Richard J. Crosbie 1960
RELATIONSHIP OF CAROTID PRESSURE AND END POINT DURING ACCELERATION
J. Appl. Physiol. 15(5):903-906. March 1960.

ABSTRACT: Simultaneous observations have been made of the occurrence of an end point of unconsciousness and carotid blood pressure in rhesus monkeys during positive acceleration. The data indicate that the carotid pressure is influenced initially by a maneuver which gives rise to a positive wave of pressure that is well coordinated with the onset of tangential acceleration, while positive acceleration is at a very low level. Following this, there is a pressure drop that can be described by a time constant, that is, a function of peak g. The data indicate that the end point occurs after a constant interval following the pressure minimum and is therefore related to the slope of the blood pressure curve. The significance of this observation with respect to blood supply is discussed.

3,007

Kydd, G. H. and K. L. Cappel 1961 LIFE SUPPORT IN THE SMALL SPACE BIOPROBE.
Aerospace Medicine 32(3):238, March 1961.

ABSTRACT: Space bioprobes of various types accommodating small animals remain an important means of investigating the effects of the space environment on biological specimens . Successful operation of life support systems for prolonged periods would lead naturally to an investigation of the physiological and behavioral problems associated with prolonged trips into space such as the biological specimens and studies of the effects of zero gravity on behavior. Over the past few years the Aviation Medical Acceleration Laboratory, together with the Franklin Institute Laboratories, have investigated many of the problems associated with the design of small animal bioprobes. Using a simulated system, animals have been subjected to the environmental conditions of a proposed bioprobe for as long as 18 days. Observations made during such tests will be discussed together with their significance in bioprobes.

3,008

Kydd, G. H., R. L. Fenichel and R. J. Crosbie 1962 OBSERVATIONS ON THE RELATIONSHIPS BETWEEN HUMAN ACCELERATION END POINTS AND THE CENTRIFUGE ACCELERATION PATTERN.
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-6146; 6 Feb. 1962: ASTIA AD 273 313
(Paper, 33rd Annual Meeting Aerospace Med. Assoc., Atlantic City, N. J., 11 April 1962).

ABSTRACT: Nine human subjects were centrifuged on the 50-foot centrifuge according to a (positive) acceleration pattern similar to one used previously with

monkeys. A total of 79 runs was made which yielded 14 end points for peripheral light loss and unconsciousness. Analysis of the records showed that only one of the end points occurred later than 15 seconds and a cinematographic record made during the runs showed that the subjects strained hardest during the initial period of the run whether or not an end point was reached. Accordingly, the hypothesis is advanced that the occurrence of an end point is dependent upon the time derivative of the onset acceleration for g forces that rise to a maximum in approximately 6 seconds and less. Since the time course of the fall in blood pressure can also be measured, a more rigorous treatment of the effects of positive acceleration is thus made possible. (Aerospace Medicine 33(3): 342, March, 1962)

3,009

Kylstra, J. 1954 REGISTRATIE VAN VERSNELLINGEN MET BEHULP VAN HET ZGN. U. EFFECT (REGISTRATION OF ACCELERATIONS BY MEANS OF THE SO-CALLED U. EFFECT
Aeromedica Acta (Soesterberg, Netherlands) 3: 271-275. 1954. In Dutch with English summary (p. 275)

ABSTRACT: A description is given of a simple method of registering small linear and rotatory accelerations. Its use in ballistographic tests and its technical applications are discussed. Analogies with the mechanism of the vestibular apparatus are shown.

3,010

Kylstra, J. 1956 REGISTRATION OF ACCELERATION BY MEANS OF U-EFFECT
Nederl. tijdschr. geneesk. 100: 911-914, March 31, 1956

3,011

Kylstra, J. 1957 THE USE OF U-EFFECT IN PHYSIOLOGICAL RESEARCH: MEASUREMENT OF ACCELERATIONS
Aeromedica Acta (Soesterberg) Spec. Ed. 1956 (1957). Pp. 159-170.

ABSTRACT: A description is presented of the design for a simple, highly sensitive accelerometer which can detect vibrations in the range of less than 1 up to

3000 c.p.s. and acceleration forces as low as .01 g. The principle employed is the so-called U-effect -- the appearance of electropotentials in a non-metallic tube filled with mercury in diluted sulfuric acid, whenever small accelerations are directed along the longitudinal axis of the system. Applications of such apparatus to study of the heart action, blood pressure, circulation, and motion are illustrated. Phenomena similar to the U-effect may exist in nature in the semicircular canals of the vestibular system.

3,012

Kylstra, J. 1957 THE USE OF U-EFFECT IN PHYSIOLOGICAL RESEARCH: MEASUREMENT OF ACCELERATION. Actas Dermo. Sefelograf. (Madrid) 48(3):159-170, Mar. 1957

ACCELERATION

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3,013

Labosky, A. 1948 INSTRUCTIONS FOR UPKEEP AND OPERATION OF THE H.G. MARK I CATAPULT AND ARRESTING GEAR (Naval Aircraft Factory, Philadelphia, Pa.) Rept. no. M-4640; 22 April 1948; ASTIA AD-103 436

3,014

Lachmann, J., F. Bergmann & M. Monnier 1958 CENTRAL NYSTAGMUS ELICITED BY STIMULATION OF THE MESO-DIENCEPHALON IN THE RABBIT. Am. J. Physiol. 193(2):328-334.

ABSTRACT: Unilateral stimulation at high frequencies (20-50cps) of a circumscribed, meso-diencephalic area, including the reticular formation medial to the nucleus reticularis thalami and geniculate bodies in rabbit's brain, produces a 'central nystagmus' with its fast component usually directed towards the contralateral side. The reaction is tentatively explained as the result of a primary inhibition of the tonic innervation of the ipsilateral musculus rectus internus and of the contralateral rectus externus of the eyes. The relationship between this higher nystagmogenic area in the meso-diencephalon and the elementary three-neuron reflex arc of the nystagmus is discussed.

3,015

Lachmann, J., F. Bergmann, J. Weinman & A. Welner 1958 CENTRAL NYSTAGMUS. II RELATIONSHIP BETWEEN CENTRAL AND LABYRINTHINE NYSTAGMUS. Am. J. Physiol. 195(2):267-270.

ABSTRACT: Rotation of a rabbit influences the 'central' nystagmus, provoked by electrical stimulation of a nystagmogenic area in the mesodiencephalon, in opposite sense during the acceleratory and deceleratory period, respectively. Nystagmic movements, produced by simultaneous central and labyrinthine stimulation, show enhancement, when they possess identical direction, and suppression, when their directions are opposite. The same rule applies to superposition of central and caloric nystagmus, the latter resulting from temperature changes near the tympanic membrane. When electrical stimulation is stopped, central nystagmus often increases its frequency for a short period.

3,016

Lafferty, R. E., & R. Graetzer 1957 A STRAIN GAUGE METHOD OF MEASURING WIND-BLAST ON FLIGHT HEADGEAR.
(Wright Air Development Division, Wright-Patterson AFB, Ohio). WADD TR 57-204; ASTIA AD 118 169.

ABSTRACT: The headgear, such as helmets, oxygen masks, etc., worn by pilots must be able to withstand the windblast conditions encountered during emergency ejection from a moving aircraft. During the course of the tests herein described, strain gauges were used to measure the forces exerted by the windblast. When plotted, the data obtained gave qualitatively consistent graphs and when correlated with high speed motion pictures of the test runs, indicated this method of instrumentation to be a feasible means for windblast force measurements.

3,017

Laidlaw, W. R. 1961 THE SIMULATION OF LOW ALTITUDE FLIGHT UTILIZING A LINEAR HUMAN ACCELERATOR. (Paper, Panel on Acceleration Stress of the Armed Forces NRC Committee on Bio-Astronautics, 6-11 March 1961, NASA Ames Research Ctr., Moffett Field, Calif.)

3,018

Lalli, G. 1961 INFLUENCE OF SIGNIFICANT POSITIVE ACCELERATIONS ON THE ACTIVITY OF SOME ENZYMES IN RAT SERUM.
Rev. Med. Aero (Paris) 2:30-33, Dec. 1961 (France)

3,019

Lalli, G. 1962 SULL'INFLUENZA ESERCITATA DA NOTEVOLI ACCELERAZIONI POSITIVE SU ALCUNE ATTIVITA ENZIMATICHE SIERICHE NEL RATTO (ON THE EFFECT OF HIGH POSITIVE ACCELERATIONS ON SOME SERUM ENZYME ACTIVITIES IN THE RAT)
Rivista di medicina aeronautica e spaziale (Roma), 25 (2): 234-24_. April-June 1962. In Italian, with English summary (p. 240)

ABSTRACT: The following serum enzymes were determined in rats surviving twenty-four hours of exposure to positive accelerations of high intensity, long duration, and capable of producing instantaneous death (Mortality rate as high as 30%): glutamic oxalacetic and glutamic pyruvic transaminase; aldolase; lactic, malic, sorbitol, and isocitric dehydrogenase; acid and alkaline phosphotase; and ceruloplasmin. The most significant increases, as compared with control animals, were found in transaminases, especially glutamic oxalacetic transaminase, and in aldolase. These changes were inconsistent.

3,020

Lalli, G. & G. Paolucci 1963 BEHAVIOR OF VARIOUS SERUM ENZYMES IN THE RAT IN RELATION TO THE ANATOMOPATHOLOGICAL LESIONS PRODUCED BY TRANSVERSE ACCELERATIONS OF GREAT INTENSITY AND VERY SHORT DURATION. Riv. Med. Aero 26:26-57, Jan.-Mar. 1963 (Italy)

3,021

Lamb, L.E. 1959 FIRST INTERNATIONAL SYMPOSIUM ON CARDIOLOGY IN AVIATION CONDUCTED AT THE SCHOOL OF AVIATION MEDICINE, 12-13 NOVEMBER 1959 (School of Aviation Medicine, Brooks AFB, Texas) ASTIA AD-244 389

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  Influence of aerospace flight on the normal cardiovascular system-stresses and effects
Cardiovascular techniques
  Phonocardiography
  Current status of vectorcardiography
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  The problem of elevated blood pressure or hypertension in the pilot
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Electrocardiographic studies
  Royal Canadian Air Force experiences in electrocardiographic evaluation
  The prognostic implications of the electrocardiogram
  Electrocardiographic findings in 67,375 asymptomatic individuals
Limits of cardiovascular normality for flying
The national program for study of cardiovascular disease

3,022

Lamb, L.E. 1959 MEDICAL ASPECTS OF INTERDYNAMIC ADAPTATION IN SPACE FLIGHT. J. Aviation Med., 30(3):158-160

ABSTRACT: The astronaut's journey into space will require a series of adaptations to multiple sequential changes in environmental circumstances. These adaptations will involve an inter-relationship of more than one biological stress and more than one organ system. The ability to make sequential adaptations to a variety of different biological stresses is greatly influenced by individual characteristics.

3,023

Lamb, L. E., H. C. Green, J. J. Combs, S. A. Cheeseman, & J. Hammond 1960 INCIDENCE OF LOSS OF CONSCIOUSNESS IN 1,980 AIR FORCE PERSONNEL (School of Aerospace Medicine, Brooks AFB, Texas) Rept. 61-6, Oct. 1960

3,024

Lamb, L. E. 1960 INFLUENCE OF AEROSPACE FLIGHT ON THE NORMAL CARDIOVASCULAR SYSTEM: STRESSES AND EFFECTS
Am. J. Cardiol. 6(1):8-18, July 1960

ABSTRACT: The mechanics of the adjustments and alterations of cardiovascular functions in response to flight stresses such as hypoxia, explosive decompression or acute anoxia, positive pressure breathing, relative immobility, acceleration, decreased barometric pressure, and weightlessness are discussed. Consideration is also given to measures of counteracting the effects of these stresses, such as the administration of 100 per cent oxygen, the use of pressure suits and helmets, assumption of the transverse position by the pilot, the creation of an artificial g force during the weightless period, and constant stimulation of the circulatory system with forces comparable to 1 g as normally encountered at ground level. (Aerospace Medicine 31(10):874, October 1960)

3,025

Lamb, L. E. and J. Roman 1961 THE HEAD-DOWN TILT AND ADAPTABILITY FOR AEROSPACE FLIGHT
Aerospace Medicine 32(6):473-486, June 1961.

SUMMARY: 1. A study of 224 subjects with feet down (+1 g), horizontal (tranverse g), and 45-degree head-down tilt (—0.7 g) in the laboratory on a standard tilt table was carried out.

2. Marked changes in heart rate were noted by using this simple laboratory tool. The changes in heart rate were frequently associated with striking cardiac arrhythmias. Despite arrhythmias of the magnitude of sinus arrest with idioventricular rhythm, no examples of significant circulatory disturbance were encountered during a one-minute period of head-down tilting.

3. The subjects studied ranged from 20 to 45 years of age. Age did not appear to be a significant factor influencing the changes in heart rate or rhythm.

4. Analysis was carried out in reference to the influence of physical fitness as judged by relatively standard treadmill exercise tests, and it was apparent that physical fitness or exercise tolerance was not a significant factor in influencing the level of sympathetic acceleration or vagotonic

rebound indicated by changes in pulse rate for this group.

5. As a group, there were no significant differences between individuals who had had previous history of loss of consciousness, individuals who presented for a variety of complaints to the Consultation Service other than loss of consciousness, and individuals undergoing special testing from the Test Pilot School.

6. The most significant factor influencing the degree of cardioinhibitory response noted in the head-down tilt was the level of sympathetic activity in an individual as indicated by his baseline heart rate and his post-stress sympathetic acceleration level.

7. The tilt table provides a convenient tool for studying an individual's circulatory reflex response in reference to adaptation to stresses imposed during +1 g and to responses incurred following termination of stresses and exposure to —0.7 g.

3,026

Lamb, Lawrence E. 1962 SELECTION & STRESS TESTING OF ASTRONAUTS
In: (School of Aerospace Medicine) Lectures in Aerospace Medicine, 1962 pp. 45-64

ABSTRACT: Early in the history of aviation it was recognized that flight causes major stresses upon the circulatory system. Increased g forces and hypoxia both cause major alterations in cardiovascular dynamics. Much of the research which has been carried out by investigators throughout the world concerning the influences of g forces and hypoxia may be applied directly to problems of space flight. This presentation by Dr. Lamb designates the circulatory responses that may be encountered and will indicate ways by which the circulatory system may be studied in the laboratory to gain some knowledge of its adaptability to multiple sequential stresses.

3,027

Lambert, E. H. 1944 ACCELERATION CONFERENCE OF THE COMMITTEE ON AVIATION MEDICINE (Mayo Clinic, Rochester, Minnesota) 23 Feb. 1944

ABSTRACT: (a) In 215 centrifuge trials in which peripheral light loss occurred, it took place an average of 6.4 seconds after the maximal "g" was reached. Recovery averaged 12.7 seconds after the attainment of maximum "g". Where blackout also occurred, peripheral light loss developed after 5.8 seconds, recovery after 15.5 seconds. Blackout occurred at 7.9 seconds, recovery after 15 seconds. If subject became unconscious, peripheral light loss occurred at 6.8 seconds. If symptoms are going to appear in a given centrifuge run, they happen before the tenth second. In only one out of 71 cases did peripheral light loss occur after this time. The time for peripheral light loss remains constant in a given individual over a period of a year and a half.

(b) "Variations of intraoccular pressure". 200 observations on one subject whose resting blood pressure averaged 110/80 show that extraocular pressures of 50 mm Hg cause peripheral dimming beginning nasally, of 55 mm Hg result in peripheral light loss, and of 65 mm Hg cause blackout. First areas of the retina to become insensitive to light are those most remote from the origins of the retinal blood vessels. Application of 30 mm Hg negative pressure to the eyes will clear vision of a subject riding the centrifuge at blackout level. Naturally this is a very hazardous procedure.

3,028

Lambert, E. H., E. H. Wood, E. J. Baldes & C. F. Code 1944 COMPARISON OF PROTECTION AGAINST THE EFFECTS OF POSITIVE ACCELERATION AFFORDED BY THE STANDARD GRADIENT PRESSURE SUIT (GPS) AND A SIMPLIFIED SINGLE PRESSURE SUIT.
(National Research Council, Committee on Aviation Medicine, Washington,D.C.) CAM Rept. No. 308; 27 May 1944.

ABSTRACT: (a) The GPS inflated to the standard three pressure gradient afforded an average protection of 1.5 "g" in 21 subjects.

(b) The simplified single pressure suit inflated with 1.25 psi offered 1.4 "g" protection in 13 subjects. A comparison of the SPS and GPS on 8 subjects revealed no significant difference between the two suits.

(c) The GPS modified for a single pressure of 3 psi plus 1 psi/"g" afforded an average protection of 1.8 "g" in 6 subjects.

(d) The SPS inflated with a two pressure gradient afforded an average protection of 1.8 "g" in 6 subjects.

Conclusion: There is no significant difference between the GPS and SPS when either is inflated by either single or gradient pressure.

3,029

Lambert, E. H., C. F. Code, E. J. Baldes, & E. H. Wood 1944 THE F.F.S. WITH PNEUMATIC PRESSURIZATION AS AN ANTI-G DEVICE.
(National Research Council, Committee on Aviation Medicine, Washington, D.C.) CAM Rept. No. 248; 19 Jan. 1944.

ABSTRACT: The FFS, designed to contain water, was inflated with air at 1 psi/"g" and tested on 8 subjects on the centrifuge. Average protection provided was:

Visual symptoms	2.2 "g"
Blood content of ear	2.2 "g"
Amplitude of ear pulse	2.5 "g"

When the FFS was inflated with 4.7 liters of water, less than 1 "g" protection was obtained by all criteria; when fully inflated with water, 1.5 "g" protection was provided.

3,030

Lambert, E. H., E. H. Wood & E. J. Baldes 1944 PROTECTION AGAINST THE EFFECTS OF ACCELERATION AFFORDED BY PULLING AGAINST A WEIGHTED CONTROL STICK AND THE INFLUENCE OF THIS ON THE EFFECTIVENESS OF PNEUMATIC ANTI-BLACKOUT SUITS. (National Research Council, Committee on Aviation Medicine, Washington, D.C.) CAM Rept. No. 265, 12 Feb. 1944.

ABSTRACT: (a) Pulling against a force of 19 pounds per "g" applied to a mock airplane control stick increased the average "g" tolerance of 12 subjects 0.7 "g". (b) In 8 subjects (4 wearing GPS, 3 wearing ADS, and 1 wearing a modified GPS) the protection of the stick was added to the protection offered by anti-"g" suits as follows:

		PROTECTION OFFERED BY		
	THRESHOLD	STICK	SUIT	STICK + SUIT
Bar Opacity		+0.5	+1.4	+1.9
Bar Pulse		+0.6	+2.0	+2.6
Clear Vision	2.9 "g"			
Dim Vision	3.4 "g"			
Peripheral light loss	3.9 "g"	+0.7	+1.2	+1.8
Blackout	4.7 "g"			

(c) Pulling on a weighted stick speeds the time of recovery of vision and is twice as effective during recovery period as during maximum acceleration. Cardiac acceleration is greater when pulling on the stick, reaches a maximum later, and last longer.

3,031

Lambert, E.H. 1945 COMPARISON OF THE PHYSIOLOGIC EFFECTS OF POSITIVE ACCELERATION ON SUBJECTS IN THE MAYO CENTRIFUGE AND IN AN A-24 AIRPLANE (Army Air Forces Materiel Center) Contract No. w(33-038) ac-9166; August 1945; ASTIA ATI 13243

ABSTRACT: An RA-24A Douglas Dauntless dive bomber has been equipped for study of the physiologic effects of positive acceleration on the human subject in flight. The physiologic changes studied in the airplane were the visual symptoms, the changes in the ear pulse, the blood content of the ear and the pulse rate. Motion pictures of the subjects were taken in many instances. G tolerance as measured by the occurrence of visual symptoms was on the average 0.7 g higher in the airplane than on the Mayo centrifuge. The level of acceleration at which loss of the ear pulse occurred was on the average 0.5 g higher in the airplane. The observations included in this study establish the essential similarity of the effects of positive acceleration on subjects in the airplane and on the centrifuge. They support the validity of applying the results of centrifuge studies to conditions of actual flight.

3,032

Lambert, E. H. 1943 COMPARISON OF THE PHYSIOLOGIC EFFECTS OF POSITIVE ACCELERATION ON SUBJECTS IN THE MAYO CENTRIFUGE AND IN AN A-24 AIRPLANE. (Submitted to Nat'l. Research Council, Sept. 1943, and as memo. rept. to Aero Medical Lab., Wright Field, Oct. 1943) CAM Rept. No. 467.

ABSTRACT: This study was undertaken to determine whether or not there are differences between the subjective and objective physiologic changes which occur in human subjects as a result of exposures to positive acceleration on a centrifuge as compared with those which occur in an airplane. The pulse rates of the subjects both prior to and during exposure to acceleration were higher in the airplane than they were on the centrifuge. On the other hand, the actual cardiac acceleration resulting from exposure to a given magnitude of acceleration was less in the airplane than on the centrifuge, while the increase in pulse rate on exposure to accelerations which produced an equal degree of impairment of vision was almost the same in the two instances. The general pattern of the change in pulse rate during exposure to acceleration was the same in the airplane and centrifuge, although like other events the maximum cardiac acceleration was attained slightly earlier in the airplane.

3,033

Lambert, E.H. 1943 COMPARISON OF THE PROTECTIVE VALUE OF AN ANTIBLACKOUT SUIT ON SUBJECTS IN AN A-24 AIRPLANE AND ON THE MAYO CENTRIFUGE
(Mayo Aero Med. Unit Memo Rept. to AAF Material Center. Contract No. W(33-038) ac-9166. Serial Rept.: Series 3, No. 2)
See also: J. Avia. Med. 21(1): 23-37, Feb. 1950

3,034

Lambert, E.H. 1943 COMPARISON OF THE PROTECTIVE VALUE OF AN ANTIBLACKOUT SUIT ON SUBJECTS IN AN A-24 AIRPLANE AND IN THE MAYO CENTRIFUGE
(National Research Council, Committee on Aviation Medicine, Washington, D.C.)
CAM Rept. No. 467; October 1943

ABSTRACT: With the anti-blackout suit uninflated the g tolerance of the subjects as measured by the occurrence of visual symptoms was on the average 0.7 g higher in the airplane than it was on the centrifuge. The pulse rates of the subjects were on the average 13 beats per minute faster in the airplane than they were on the centrifuge.

The average protection afforded against the development of visual symptoms by inflation of the anti-blackout suit during exposure to acceleration in the airplane and centrifuge was 1.1 g and 1.2 g, respectively.

The average protection afforded the blood content of the ear in the airplane and centrifuge was 1.2 g and 1.1 g, respectively.

The average protection afforded the amplitude of the ear pulse in the airplane and centrifuge was 1.6plus g and 1.3plus g, respectively.

The average protection afforded the heart rate was 1.4 g in both the airplane and centrifuge.

Thus, despite the higher g tolerance of the subjects when in the airplane, the amount of protection afforded by the anti-blackout suit was the same in the airplane as it was on the centrifuge.

3,035

Lambert, E. H. & C. Sheerd 1943 INVESTIGATIONS OF THE SITE OF ORIGIN OF "BLACK OUT" IN MEN.
(Paper: 13 th Annual Meeting of the Optical Society of America.)

ABSTRACT: Blackout is a temporary loss of vision without loss of consciousness which aviators experience when they are subjected to high positive acceleration. In these investigations, temporary loss of vision was produced at 1 G (gravity) by the application of air pressure to the eyeball. When the effective systolic arterial pressure to the eye (the systolic pressure at head level minus the pressure to the eye) was 49 to 51 mm. of mercury, vision was dimmed, peripheral vision was lost at 42 to 21 and vision was completely lost at 21 to zero. These visual changes were the same in the latent period, progress of development and level of effective blood pressure as in the case of the visual changes produced by positive acceleration of the human centrifuge. Application of 42 to 51 mm. of mercury applied to the eyeball prevents the occurrence of blackout when man is subjected to high accelerations. These experiments indicate that the loss of vision which occurs without loss of consciousness during high positive acceleration is of retinal origin. (J. Optic. Soc. Am. 33:504.)

3,036

Lambert, E.H. F.H. Wood & H.J. Baldes 1943 MAN'S ABILITY TO WITHSTAND TRANSVERSE ACCELERATION WHEN IN THE SITTING POSITION.
(National Research Council. Division of Medical Sciences)
Report No. 413, March 7, 1943. ASTIA ATI 148 404

ABSTRACT: Five subjects in the sitting position have been exposed to transverse acceleration in the dorsal-ventral direction of up to and including 12 g for 3 to 12 seconds. No residual harmful effects were observed in any of the subjects. During the period of exposure 1) The pulse rate decreased and the blood content of the ear increased in all subjects in whom the head was not supported at a level appreciably above that of the trunk. 2) Premature systoles occurred during part of the exposures in 2 subjects. 3) All subjects noted some feeling of dyspnea at accelerations above 5 g. 4) Distracting epigastric pain occurred in 2 subjects. This pain was decreased by supporting the hips and shoulders above the level of the cockpit floor. Recommendations are listed which should be considered if it is proposed to expose pilots in the sitting position to high transverse accelerations.

3,037

Lambert, E. H. 1945 THE PHYSIOLOGIC BASIS OF "BLACKOUT" AS IT OCCURS IN AVIATORS.
Fed. Proc. 4:43.

ABSTRACT: "Blackout" in aviators is a temporary loss of vision without disturbance of consciousness occurring during exposures to high positive acceleration. Experiments were designed to determine the role of the retina in the origin of this phenomenon.

1. At 1 g (Gravity) temporarly loss of vision was produced by application of air pressure to the eyeball, using special masks. The effective systolic arterial pressure to the eye (systolic pressure at head level minus the applied eye pressure) at which symptoms occurred was in millimeters of mercury: vision dim, 40 to 30; peripheral vision lost, 32 to 20; vision completely lost, 21 to 0. These visual changes were the same in latent period and progress of development and occurred at the same level of effective blood pressure as the visual changes that occur at high positive accelerations on the human centrifuge.

2. On the centrifuge, application of 20 to 30 mm. of mercury pressure to the eyeball lowered by 1 g the threshold acceleration at which visual changes occurred. This pressure corresponds to the fall in systolic arterial pressure per g found to occur at head level during exposure to acceleration.

3. The application of 30 to 40 mm. of mercury suction to the eyeball prevented the occurrence of blackout during exposure to high accelerations. When suction is applied to only one, that eye maintains clear vision while the other "blacks out."

These experiments allow the conclusion that the loss of vision (blackout) that occurs without loss of consciousness during exposure to high acceleration is of retinal origin.

3,038

Lambert, E. H. 1945 SITE OF ORIGIN OF BLACKOUT.
Proc. Am. Federation Clin. Research 2:64-65.

3,039

MOTION PICTURE

Lambert, E. H., G. A. Ballenbeck, et al. 1945 THE SYMPTOMS WHICH OCCUR IN MAN DURING EXPOSURE TO POSITIVE ACCELERATION
Federation Proceedings 4(1):43.

ABSTRACT: This motion picture illustrates the sequence of the symptoms which develop in normal men when exposed to positive acceleration while sitting in a comfortable physical and mental state, free frm undue excitement or muscle tension. Under these conditions there is a definite sequence or pattern in the symptoms. As accelerations of greater magnitude are experienced, symptoms of increasing consequence are encountered. These symptoms are ushered in by dimming or graying of vision which is most noticeable in the peripheral fields and occurs on the average at about 3 g. Between 3 to 4 g this dimming usually progresses so that lights placed in the peripheral fields of vision cannot be seen

(peripheral lights lost). In the neighborhood of 4 to 5 g vision is quite regularly lost completely, the subject being rendered temporarily completely blind (true blackout, amaurosis fugax-temporary loss of vision during positive acceleration without loss of vision during positive acceleration without loss of consciousness). At still higher accelerations (on the average 5 to 6 g) consciousness is lost. The color changes in the faces of the subjects seen in the motion picture indicate: a period of progressive failure during which blood is progressively lost from the face, and a period of compensation during which blood is returned to the face. The motion picture illustrates that if visual symptoms are encountered, they occur during the period of progressive failure and that recovery from visual symptoms often takes place during the period of compensation while the accelerative force is still at maximum.

3,040

Lambert, E. H. & E. H. Wood 1946 DIRECT DETERMINATION OF MAN'S BLOOD PRESSURE ON THE HUMAN CENTRIFUGE DURING POSITIVE ACCELERATION.
(Acceleration Lab., Mayo Aero Medical Unit, Rochester, Minn.)

ABSTRACT: Determination of the changes in arterial pressure during exposure to positive acceleration on the Mayo centrifuge was made in 20 men by puncture of the radial artery. Pressures were recorded routinely by means of a resistance wire strain gauge manometer which activated a sensitive galvanometer and occasionally by a Hamilton manometer. Pressures in the seated subject were measured with the wrist supported at head level or at heart level. The various hydrostatic levels were determined from photographs of the subject taken prior to and during exposure to acceleration.

For correlation with changes in arterial pressure simultaneous records were obtained of the subject's ear pulse, blood content of ear, heart rate, electrocardiogram, respiration, rectal pressure and reaction time to light signals in peripheral and central fields of vision.

At the level of the eyes, the decrease in blood pressure per g increase in positive acceleration averaged 32 mm. Hg systolic and 20 mm Hg diastolic. During maintained acceleration the lowest pressure occurred in about 7 seconds and was followed by some recovery. In general, with unimpaired vision the systolic pressure at eye level remained above 50 mm. Hg and with complete loss of vision it was less than 20 mm. Hg. At the level of the heart (third interspace) the average decrease in pressure per g increase in acceleration was 4 mm. Hg systolic and 0 mm. Hg diastolic. During recovery in g the pressure at heart level rose 20 to 70 mm. Hg above the control value. (Federation Proceedings 5(1):59, 1946)

3,041

MOTION PICTURE

Lambert, E. H. 1946 PHYSIOLOGIC STUDIES OF MAN'S G TOLERANCE IN AIRCRAFT. (Acceleration Lab., Mayo Aero Medical Unit, Rochester, Minn.)

ABSTRACT: This motion picture shows the procedures used in studies of g tolerance carried out on 42 men in a specially instrumented airplane and illustrates the sequence of symptoms which develop in airplane pilots and passengers exposed to positive acceleration.

Pulling a g pattern similar to that used on the centrifuge, maintaining given acceleration for 10-15 seconds, pilots on the average experienced dimming of vision at 5.1 g and blackout at 5.4 g. This was 0.7 g units higher than their tolerance as passengers in the airplane and 1.4 g units higher than their tolerance on the Mayo centrifuge. Factors causing the higher tolerance of pilots in the airplane included: colder environmental temperature, more exciting circumstances of flying, crouching and the effort of pulling the control stick to execute the high g maneuver.

Anti-blackout suits afforded the same increase in g tolerance to pilots and passengers in the airplane as to subjects on the centrifuge.

The pattern of changes in the ear pulse, blood content of the ear, and pulse rate was the same for pilots and passengers in the airplane as for subjects on the centrifuge. However, compensatory changes tended to occur one to two seconds earlier during exposure to g in the airplane.

Conclusion: The modern human centrifuge is a valid means for studying the physiologic effects of acceleration as encountered in aircraft and for developing methods of protection against these effects for pilots. (Federation Proceedings 5(1):59, 1946)

3,042

Lambert, E. H. and E. H. Wood 1946 THE PROBLEM OF BLACKOUT AND UNCONSCIOUSNESS IN AVIATORS. Med. Clin. N. Amer. 30:833-844.

3,043

Lambert, E.H., C.F. Code, E.H. Wood & E.J. Baldes 1947 THE EFFECTIVENESS OF MAN'S CARDIOVASCULAR ADJUSTMENTS TO CENTRIFUGAL FORCE. (Paper, 17th International Physiological Congress, Oxford) In Proceedings of the Seventeenth International Physiological Congress (Oxford, 1947)

3,044

Lambert, E.H., & O.L. Slaughter 1947 VENOUS PRESSURE IN THE EXTREMITIES OF MAN DURING POSITIVE ACCELERATION ON A CENTRIFUGE.
(Acceleration Lab and Section on Physiology, Mayo Foundation)
Fed. Proc. 6(1):146

3,045

Lambert, E. H. & E. H. Wood 1943 EL PROBLEMA DEL "BLACKOUT" Y LA PÉRDIDA DEL CONOCIMIENTO EN LOS AVIADORES. (The Problem of Blackout and Loss of Consciousness in Aviators.)
Med. depor. y trab. 12:1315-1322, 1323-1331, Jan. 1943.

3,046

Lambert, E. H. 1949 COMPARISON OF THE PHYSIOLOGICAL EFFECTS OF POSITIVE ACCELERATION ON A HUMAN CENTRIFUGE AND IN AN AIRPLANE. J. Avia. Med. 20(5):308-335

SUMMARY: A comparison was made of the responses of 24 men to positive acceleration on the Mayo centrifuge and in flight as passengers in a specially instrumented dive bomber. In both instances acceleration was developed at a rate of approximately 1.5 g per second after 1.5 g was exceeded, and was maintained on the average for 15 seconds.

Tolerance to positive acceleration as determined by the occurrence of visual symptoms was 0.7 g higher in the airplane than it was on the centrifuge. The difference in tolerance to positive acceleration was confirmed by objective measurements using loss of the ear pulse as an end point.

Important factors contributing to the higher tolerance to positive acceleration in the airplane included (1) the colder temperatures in the airplane cockpit and (2) the more stimulating psychological environment in the airplane. That greater excitement was associated with exposure to acceleration in flight is suggested by the fact that control heart rates were on the average 20 beats per minute more rapid in the airplane than they were on the centrifuge.
The nature of the subjects' symptoms and the basic pattern of their cardiovascular responses to the positive acceleration were the same in the airplane and centrifuge. However, certain events tended to occur slightly earlier in the airplane. This was evident particularly for the recovery phase of the response to acceleration. Recovery of vision, the ear pulse, content of blood in the ear, and heart rate while acceleration was maintained began 1 to 2 seconds earlier in the airplane than they did on the centrifuge.

Emphasis must be placed on the essential similarity of the effects of positive acceleration in the airplane and centrifuge. The results of this study support the validity of applying the results of studies of subjects on the centrifuge to conditions of flight. (DACO)

3,047

Lambert, E. H. 1950 COMPARISON OF THE PROTECTIVE VALUE OF AN ANTI-BLACKOUT SUIT ON SUBJECTS IN AN AIRPLANE AND ON THE MAYO CENTRIFUGE. J. Aviation Medicine 21(1):28-37.

SUMMARY: Assays of the protective value of the G-4 (Z-1) antiblackout suit were preformed on thirteen subjects in an airplane and on the Mayo centrifuge. In both instances the tests were conducted according to procedures commonly used to determine the effectiveness of antiblackout suits on subjects on the centrifuge.

With the antiblackout suit uninflated, the g tolerance of the subjects as measured by the occurrence of visual symptoms was on the average 0.7 g higher in the airplane than it was on the centrifuge. Control pulse rates were on the average about 15 beats per minute faster in the airplane than they were on the centrifuge.

The average increase in tolerance to positive acceleration afforded by the G-4 suit as appraised by the occurrence of visual symptoms, the decrease in blood content of the ear, the decrease in amplitude of the ear pulse and the increase in pulse rate was 1.1 g, 1.2 g. 1.6+ g, and 1.4 g, respectively, in the airplane and 1.0 g. 1.1 g. 1.5+ g and 1.4 g, respectively, on the centrifuge. Thus, despite the higher g tolerance of the subjects in the airplane, the increase in g tolerance afforded by the antiblackout suit was essentially the same in the airplane as it was on the centrifuge.

3,048

Lambert, E. H. 1950 EFFECTS OF POSITIVE ACCELERATION ON PILOTS IN FLIGHT, WITH A COMPARISON OF THE RESPONSES OF PILOTS AND PASSENGERS IN AN AIRPLANE AND SUBJECTS ON A HUMAN CENTRIFUGE. J. Aviation Med. 21(3):195-220.

SUMMARY: The responses to positive acceleration of sixteen men piloting a specially instrumented dive-bomber have been compared with their own responses as passengers in the airplane and with those of other men on the Mayo centrifuge.

When piloting, the men experienced accelerations which were reached in 2 to 6 seconds and maintained for 8 to 20 seconds in a diving spiral maneuver at altitudes between 5,000 and 11,000 feet with cockpit temperatures of 9° to 22° C. Average accelerations at which vision was dimmed, lost peripherally and lost completely were 4.0 g, 5.0 g and 5.4 g, respectively. Loss of the ear pulse occurred at 5.3 g. These values were 1.7 g higher than the g tolerance of passengers in the airplane and 1.4 g higher than the g tolerance of subjects on the centrifuge. Factors causing the higher g tolerance of pilots included the slightly crouched posture and effort of controlling the plane when piloting, and the cooler temperatures and more exciting circumstances of exposure to acceleration in the airplane.

Certain changes in arterial pressure were determined from records of the ear

pulse. Exposure to acceleration caused an initial progressive fall of arterial pressure at head level which was terminated by a compensatory reaction that produced some recovery of arterial pressure even though acceleration was continued. In pilots, the lowest systolic arterial pressure (minimal ear pulse) occurred at an average of 5.2 seconds after 2.5 g was exceeded during the onset of acceleration.

The lowest systolic arterial pressure at head level was less than 50 mm. of mercury in all maneuvers in which loss of peripheral vision occurred and zero or very near zero in 71 per cent of maneuvers in which blackout occurred.

Pulse rates increased progressively from an average of 95 beats per minute just prior to acceleration to a maximum of 104 to 160 beats per minute at an average of eleven seconds after 2.5 g was exceeded.

Recovery of arterial pressure was in progress at an average of 7 seconds after 2.5 g was exceeded. Some recovery of the blood content of the ear, compensatory slowing of the heart rate and recovery of vision followed even though exposure to acceleration was continued.

The cardiovascualr responses of pilots, with a single minor exception, were remarkable similar to those of passengers in the airplane. The responses of both pilots and passengers differed from those of centrifuge subjects in that pulse rates prior to and during acceleration were faster in the airplane and events associated with compensatory recovery of circulation began one to two seconds earlier during acceleration in the airplane than they did on the centrifuge.

Most striking, however, was the general similarity of the visual symptoms and basic pattern of physiologic changes whether acceleration was experienced as a pilot or passenger in the airplane or as a subject on the centrifuge. It may be concluded that the results of centrifuge studies can be applied to the pilot in flight provided the conditions of exposure to acceleration are considered in each case.

?,049

Lamont, J. N. 1960 ANNOTATED BIBLIOGRAPHY ON FLIGHT SIMULATORS. (Defence Research Board, Dept. of National Defence, Canada) HR Rept. No. 68; ASTIA AD-247 044; Aug. 1960

ABSTRACT: This bibliography is a list of unclassified reports, articles, and other material referring to flight simulators. It is likely to be of use to Service personnel who have some responsibility in connection with the acquisition, evaluation and use of these devices for the training of aircraft pilots and crews. Simulators used for other purposes, such as research into problems of aircraft design or the training of individual crew members other than the pilot, are not referred to here.

In collecting items for the bibliography the compiler searched the literature of psychology, education, and training, but not of engineering. Hence the emphasis is on the simulator as a training device and the references deal only with the utility of the simulator in contributing to effective training, not with its maintainability nor its cost, nor any other aspect of its effectiveness purely as a piece of electromechanical equipment. (AUTHOR)

3,050

Lamport, H., E. C. Hoff, E. J. Baldes, A. R. Sweeney, C. F. Code, & E. H. Wood
1943 TESTS OF PROTECTION AGAINST THE EFFECTS OF ACCELERATION AFFORDED THE HUMAN BY THE USE OF THE LATEST MODEL OF THE GRADIENT PRESSURE SUIT (GPS) WHEN INFLATED BY THREE DIFFERENT PRESSURE ARRANGEMENTS.
(National Research Council, Committee on Aviation Medicine, Washington, D.C.) CAM Rept. No. 187; 25 Aug. 1943.

ABSTRACT: No significant differences were found between the protection offered by gradient pressure and single pressure anti-"g" suits when tested on the centrifuge.

Type of Inflation of Suit	No. Subjects	Protection in "g" units offered to Vision	Ear Opacity	Ear Pulse
3 gradient pressures	3	1.3	1.6	1.6
Gradient pressure in legs, single pressure over abdomen	7	1.2	1.3	1.4
Single pressure	6	1.2	1.4	1.2

3,051

Lamport, H. & L.P. Herrington 1944 CENTRIFUGE TESTS OF THE PNEUMATIC LEVER ANTI-"G" SUIT
(National Research Council, Committee on Aviation Medicine, Washington, D.C.) CAM Rept. No. 308; 14 June 1944

ABSTRACT: Nine male subjects tested the PLS inflated to 1.14 to 1.85 psi on the Wright Field Centrifuge. Overall protection against all visual symptoms was 1.35 "g". Roughly equal protection was obtained against all visual symptoms. The PLS suit offers promise of cooler anti-"g" device than those suits where pressurized bladders cover large areas of the body.

3,052

Lamport, H. B. C. Hoff & L. P. Herrington 1944 REVIEW OF METHODS OF APPLYING AIR PRESSURE TO THE EXTREMITIES FOR PROTECTION AGAINST ACCELERATION WITH MEASUREMENTS OF THE EFFECTIVE PRESSURES ON THE SKIN.
(National Research Council, Committee on Aviation Medicine, Washington, D.C.)
CAM Rept. No. 228; 24 November 1944.

ABSTRACT: When pressure is exerted on a curved body surface by cloth, the tension of the cloth over the curved surface equals the pressure exerted on the surface times the radius of curvature of the surfaces. The same relation applies to a curved bladder surface.

The pressures exerted by the GPS, Berger Bros. long tube suit, and the pneumatic lever suit have been measured on the subjects under 1 "g" and the results tabulated in a series of graphs. The pressures vary greatly and depend to a large extent on the location where they are measured (i.e., under bladder or under cloth of suit. etc.)

3,053

Lamport, H., E. C. Hoff, & L. P. Herrington 1944 STATISTICALLY VALID TESTS OF DRUGS AND OTHER FACTORS AFFECTING THE RESISTANCE OF MICE TO ACCELERATION.
(National Research Council, Committee on Aviation Medicine, Washington, D.C.)
CAM Rept. No. 298, 15 March 1944.
See also American J. Physiology 143(1):262-271.

ABSTRACT: (a) Mice were studied in the laboratory centrifuge and resistance to acceleration measured objectively in terms of the fatal spin number (FSN), the number of spins of equal duration but progressively higher top speed required to cause death.

(b) Ergonovine, throughout its dosage range, reduces the resistance of mice to acceleration.

(c) Pitressin increases resistance of mice with low initial resistance, but is without effect on mice of average or high initial resistance.

(d) Pitressin plus atropine give greater protection than pitressin alone.

(e) Dilantin is without effect on "g" tolerance.

(f) Preliminary tilting of mice in which they are not maintained in a head up position has no effect on "g" tolerance. Head up tilting protects mice if continued for 4 days prior to testing. It has no significant effect if continued for only 2 days.

(g) Experiments with humans to determine on the centrifuge the effect of sleeping in beds tilted head up are suggested.

3,054

Lamport, H., W.C. Clark & L.P. Harrington 1945 THE COMFORT AND ACCELERATION PROTECTION ON THE CENTRIFUGE OF THE L-12 PNEUMATIC LEVER ANTI-BLACKOUT SUIT
(National Research Council, Committee on Aviation Medicine, Washington, D.C.) CAM Rept. No. 433; 1 May 1945

ABSTRACT: Comparison between Pneumatic lever suit and the G-4 suit. Subjects preferred lever suit assuming each gave equal protection.

3,055

Lamport, H., E. C. Hoff & L. P. Herrington 1945 STATISTICALLY VALID TESTS OF DRUGS AND OTHER FACTORS AFFECTING RESISTANCE OF MICE TO ACCELERATION. Am. J. Physiol. 143:262-271, Feb. 1945.
NOTE: Reel 7, Flash 6, Item 4.

3,056

Lamport, H. & L. P. Harrington 1945 TEST OF THE GENERAL ELECTRIC ACCELERATION ACTIVATED AIR PRESSURE REGULATOR (P-321-14) AND VALVE (P-321-13).
(National Research Council, Committee on Aviation Medicine, Washington, D.C.) CAM Rept. No. 484, 1 May 1945.

3,057

Landis, E. M., J. L. Patterson, Jr., & G. C. Ham 1943 STUDIES ON THE CIRCULATORY CHANGES INDUCED BY TILTING AND NITROGLYCERIN ADMINISTRATION IN A SERIES OF YOUNG MALE SUBJECTS.
(National Research Council, Committee on Aviation Medicine, Washington, D.C.) CAM No. 190; 13 July 1943.

ABSTRACT: Fifty-eight subjects were tilted and 20 given nitroglycerin. Twenty subjects fainted (35%). A combination of the fall in ear temperature and the lowest pulse pressure recorded in the first 3 minutes after tilting to an upright position has statistically significant value in predicting fainting. A simplified tilt test is described and its possible value as a test for "g" tolerance is discussed.

3,058

Landis, E. M. 1948 THE EFFECTS OF ACCELERATION AND THEIR AMELIORATION. In Advances In Military Medicine. (Boston: Little, Brown & Company, 1948), Vol. I, Chap. 21.

3,059

Lane, M.H., P.M. Fitzpatrick and J.J. Murphy 1962 ON THE REPRESENTATION OF AIR DENSITY IN SATELLITE DECELERATION EQUATIONS BY POWER FUNCTIONS WITH INTEGRAL EXPONENTS. (Air Force Proving Ground Command, Eglin Air Force Base) Rept. no. AFGC TDR 62-15; ASTIA AD 273 680.

ABSTRACT: The scale height in height-bands between 150 and 400 km is assumed to vary linearly with height. Integration of the hydrostatic equation for an ideal gas above a spherical earth then leads to a power function representation of the air density over the band. With integral exponents such power laws give better fits to several proposed model atmospheres over altitude ranges of several hundred kilometers than those provided by the usual exponential representation of air density. The representation of air density in satellite deceleration equations by power functions with integral exponents reduces them to elementary forms. It was possible with such density distributions to obtain simplified formulas which may be useful for (a) computing atmospheric densities from satellite accelerations, (b) comparing proposed model atmospheres with observations, and (c) developing the theory of satellite orbits in the presence of air drag. As is possible with the exponential form, these power functions may be modified to take account of the effect of an oblate, rotating atmosphere. Their use may, therefore, permit the development of a simplified, accurate orbit theory for satellites with perigee heights below 300 km. Certain preliminary results are discussed and compared with previous theory and observations. (Author)

3,060

Langberg, M.F. 1960 A PRIMER OF SPACE MEDICINE (Amsterdam: Elsevier Publishing Co., 1960)

ABSTRACT: Specific physical, physiological, and psychological problems of manned space flight are presented. Also included is a description of the dynamic conditions of life in a space cabin and man's acceleration tolerance during passage to and from the space station.

3,061

Langdon, D. E. & G. E. Reynolds 1961 POSTFLIGHT RESPIRATORY SYMPTOMS ASSOCIATED WITH 100 PERCENT OXYGEN AND G-FORCES.
Aerospace Medicine 32(3):713-714.

ABSTRACT: To explore the problem of postflight respiratory symptoms after 100 percent oxygen and high g-force missions, a study was made of a group of student and instructor pilots whose flying mission entailed the above conditions. Questionnaires with flight surgeon follow-up revealed some frequency statistics and the flight conditions that preceded the symptoms. A series of tests followed on 35 randomly selected pilots and two of the invariably symptomatic pilots in which an effort was made to delineate the various factors involved and to pinpoint the differences between those who regularly developed symptoms and those who did not. (Tufts)

3,062

Langeron, A. 1937 LE MEDECINE, L'INGENIEUR, LE CHEF (The Doctor, the Engineer and the Pilot)
Ailes (Paris) 17(333): 13

3,063

Langslow, M.C. 1941 LETTER FROM ROYAL AUSTRALIAN AIR FORCE F.P.R.C., OCTOBER 3, 1941: ACCELERATION. (Royal Australian Air Force, Flying Personnel Research Committee) F.P.R.C. Report 158 3.

3,064

Lansberg, M.P. 1963 THE FUNCTION OF THE VESTIBULAR SENSE ORGAN AND THE CONSTRUCTION OF A SATELLITE. Aerospace Med 34:1-7

3,065

Lansberg, M. P. 1963 ON THE ORIGIN OF THE UNPLEASANT SENSATIONS ELICITED BY HEAD MOVEMENTS DURING AFTER-SENSATIONS. Aerospace Med 34:7-11

3,066

Lansberg, M. P. 1957 THE FUNCTION OF THE VESTIBULAR SENSE ORGAN AND THE CONSTRUCTION OF A SATELLITE. In Aeromedical Acta; Special Edition, containing the Scientific Communications of the First European Congress of Aviation Medicine, Scheveningen (the Hague) 31 Oct. - 1 Nov. 1956 (Scheveningen: National Aeromedical Centre, 1957) pp. 74-77

3,067

Lansberg, M. P. 1961 THE PHYSIOLOGIC ACCELEROMETERS.
Aeromed. Acta, 6:37-43, 1961-2.

3,068

Lansberg, M. P. 1962 THE PHYSIOLOGIC ACCELEROMETERS
In Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Aeromedical Bibliography (National Academy of Sciences, National Research Council) Publication No. 1077. Pp. 27-34

ABSTRACT: Physiological accelerometers under conditions of weightlessness were investigated. Three important contradictions existing are that (a) the head is held in an inclined position relative to the vertical, (b) the head is rotating around a horizontal axis, and (c) the head is moved along a horizontal path. During weightlessness, it will be man's visual framework that will dominate his spatial orientation. Against this background, the three contradictions arise. In the situation where the head is held in an inclined position relative to the vertical, the otoliths signal a symmetric status. About a symmetric of zero gravity, and for the higher centers a symmetry means perpendicularity, which is backed by the visual reference. Probably the voice of the otoliths will not be very strong in this instance, and the visual cue will dominate. The reason is that the otoliths respond to change in acceleration rather than to acceleration. In the situation where the head is rotating around a horizontal axis, matters become worse. There is not only a conflict between otolithic information and visual framework but, worse still, the semicircular canals report a change in attitude which should be incorporated in the message from the otoliths which, however, was initiated. A disagreement now develops between the two parts of the labyrinth. This disagreement would not arise if the head movement had occurred around a vertical axis, vertical to the man's subjective framework of orientation. The situation where the head is moved along a horizontal path will probably be of less importance because such linear movements do not seem likely to occur.

3,069

Lansberg, M. P. 1963 CANAL-SICKNESS: FACT OR FICTION. Industr. Med. Surg. 32.21-24, Jan. 1963.

3,070

Lanz, R.C. 1948 KINETIC MEASUREMENTS ON A PILOT-DUMMY EJECTED FROM A P-82 AIRPLANE
(Air Materiel Command, Wright-Patterson AFB, Ohio) Rept. MCREX 3-45341-3-4; 11 March 1948; ASTIA ATI 22 026

ABSTRACT: Tests were made to obtain data relative to the forces experienced by a pilot-dummy when ejected upward from high-performance aircraft by means of a catapult. Tests were made with a P-28 airplane. The measuring instrumentation consisted of a multi-channel recording oscillograph in conjunction with resistance type acceleration, air pressure, and position transmitters. It was concluded that rearward accelerations become more critical at airspeeds above 430 knots and that armor plate should be attached to the ejection seat rather than the fuselage to reduce this acceleration. (ASTIA)

3,071

Lappin, A.N. 1949 DESIGN OF ROTATABLE SEAT FOR ACCELERATION ALLEVIATION (Cornell Aeronautical Laboratory, Inc., Buffalo, New York) December 1949; Report BC-531-S-16; ASTIA ATI 125 505

ABSTRACT: The rotatable seat, described in this report, is an acceleration sensitive device which automatically causes the pilot's or passenger's body to be oriented into a position which greatly increases his tolerance to high acceleration.

3,072

Larkins, R. L., J. H. Roberts, & F. J. Calkum 1962 SURVEY AND ALIGNMENT OF THE HOLLOMAN TRACK FROM 1956 TO 1961 (Air Force Missile Development Ctr., Holloman AFB, N. Mex.) MDC TDR 62-1; ASTIA AD-273 058; Feb. 1962

ABSTRACT: A survey was made of the Holloman Track, Holloman AFB, New Mexico. In 1956 and 1957 the track was extended from a length of 5,000 to 35,000 ft. The reliability of a construction of this type, consisting of a continuous concrete foundation with a total length of almost 7 miles was not known. The instruments used and the results of the many repeated surveys of the Holloman Track from 1956 until 1961 are described. Some settlement of the track took place during the first year after construction; however, the greater part of the track remained

essentially stable. The reported surveys show that the Holloman Track is built on stable soil. Based on a five-year span of observations and experience it can be stated that the Holloman Track can be maintained to the precision with which it was built. (AUTHOR)

3,073

Large, N. A. 1961 ENVIRONMENT AND ITS EFFECT ON MAN-MACHINE DESIGN
In Vol Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D. C. (Mt. Prospect, Ill.: Institute of Environmental Sciences, P. O. Box 191) pp. 305-310

3,074

Lasky I., & J. F. Davis 1961 CARDIAC INJURY IN BODILY TRAUMA; A CLINICAL STUDY. California Medicine 94(2):79-82, Feb. 1961

3,075

Latham, F. 1951 MEDICAL ASPECTS OF SUPERSONIC FLIGHT (MANCHESTER UNIVERSITY MEDICAL SCHOOL GAZETTE, JULY 1951)
(Flying Personnel Research Committee, Air Ministry) F.P.R.C. Memo. 28, July 1951

3,076

Latham, F. 1955 MAN-CARRYING CENTRIFUGE
Nature (London) 175:1057-1059, 18 June 1955.

3,077

Latham, F. 1957 ACCELERATING THE HUMAN FRAME.
Aeroplane 92(2373):273, Feb. 22, 1957.

ABSTRACT: Summary of a lecture by Wg. Cdr. F. Latham to the British Interplanetary Society on 'The effects of acceleration on the human frame", on February 2. There are, according to the lecturer, six factors to be taken into account: magnitude, duration, site, area, and rate of application.

3,078

Latham, F. 1957 LINEAR DECELERATION STUDIES AND HUMAN TOLERANCE (Flying Personnel Research Committee, Gt. Brit.) FPRC Rept. No. 1012; June 1957; ASTIA AD 141 044

ABSTRACT: The limits of physiological tolerance to linear deceleration lasting 0.2 to 0.4 secs. have been assessed for subjects wearing four types of Service torso-restraining harnesses without limb restraint. A combined harness alone, which is proposed for use in Service aircraft, should give protection up to 17 g, but above this figure serious injury is likely. If additional leg-restraint is employed, it is considered that the safe limit may be raised to at least 20 g. Above this figure arm, leg and head restraint, and a jerk in harness should give protection up to 25 g. Attention is drawn to the possible mechanism of injury to the larynx, face and chest. Peak intra-abdominal pressures of 450 mm. H_g, at 12 g have been recorded in a test subject. When the test subjects were relaxed prior to impact a protective extensor response in the lower limbs tending to brace the subject against the rudder pedals was not detected less than 100 milliseconds after impact. (Author)

3,079

Latham, F. 1957 A STUDY IN BODY BALLISTICS. SEAT EJECTION. Proc. Roy. Soc. B. 197: 121-139, Aug. 1957
See also: (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. No. 1016, Jan. 1957. A reprint.

ABSTRACT: To define the upper limits of tolerance for short-duration accelerations acting through the vertical axis of the body, subjective reactions from tests in vertical ejection rigs were assessed. Accelerometers on the head and waist recorded up to 30 g lasting 0.01 to 1.0 sec. Frequency and damping characteristics of the man-seat system were determined by vibrating the system over the frequency range of 1 to 20 c/sec., and by use of sledge-hammer and seat-drop experiments. Tolerance was found to be conditioned by the force-time function of the ejection gun, the alignment of the body and seat, and the dynamic characteristics of the seat pack. For minimum overshoot of acceleration in the body the optimum duration of force was 0.23 sec. Low-frequency response of the man was the important variable. Previously defined limits of thrust should be adhered to as anatomical limits. Maximum overshoot in the body would result with a rate of acceleration change increased to 400 g/sec.
might be increased to 20 g with additional leg restraint, and to 25 g with a jerkin harness and arm, leg, and head restraints.

3,080

Latham, F. 1958 LINEAR [illegible] AND HUMAN TOLERANCE.
Clin. Sci. 17(1):121-130, Feb. 1958.

ABSTRACT: The physiological effects of decelerations up to 16 g, with a maximal rate of change of 300 g/second, were studied in human subjects on a rocket-propelled trolley apparatus. Four types of restraining harness were compared, including a conventional Royal Force "Z" harness comprised of shoulder and lap straps, a four-point harness incorporating leg (crotch), lap, and shoulder straps, and two three-point variations of the latter harness. Decelerations up to 12 g were found to produce no undue discomfort or bruising with any harness tested, provided that the head was flexed to an angle of 45° prior to impact. Above 12 g, bruising in the region of the lap belt and shoulder straps occurred, particularly in the absence of crutch straps. Location of the feet in aircraft rudder pedals resulted in a noticeable reduction in lap belt load, although no reflex leg muscle action could be distinguished until 100 milliseconds after the start of deceleration. Peak intra-abdominal pressures of 200-450 mm. Hg were recorded during deceleration. Electrocardiograms were normal immediately following impact, and pulse rates returned to normal resting rates (from 100-140 beats/minute during runs) within several minutes. It is concluded that the leg, lap, and shoulder harness gives protection up to 17 g but that serious injury is likely above this level. It is suggested that the safe limit of deceleration

3,081

Latham, R. & P. Howard 1958 MECHANISM OF INJURY DURING WHOLE BODY LINEAR DECELERATION.
(RAF Institute of Aviation Medicine, Farnborough) FPRC Rept. No. 100, Sept. 1958. ASTIA AD 217 225.

ABSTRACT: Experiments were carried out on the changes in venous pressure at head level resulting from violent blows to the torso.

The results suggest a possible mechanism for the conjunctival and soft tissue hemorrhages observed during whole body linear decelerations.

3,082

Latner, A. L. 1942 LOW PRESSURE PHASE OF BLAST
Lancet 2:303-304, September 12, 1942.

[illegible] 1959 VERTICO.
[illegible] 71:925-32, 4 December 1959

3,084

Laughlin, C. P. 1962 IN-FLIGHT MEASUREMENT, TRANSMISSION, AND ASSESSMENT OF ASTRONAUT PHYSIOLOGIC RESPONSES
Aerospace Engineering 21(1):40-43, 1962

SUMMARY: The manned space flight programs have stimulated considerable interest in human physiologic response-monitoring techniques. The responses sensed (pulse, respiratory rate, blood pressure, etc.) remain unchanged from routine clinical "vital signs." These responses have sharp limitations in adequately reflecting basic physiologic processes. A critical function in adequately conveying physiologic status is the voice transmissions of subjective sensations. In medical-safety monitoring, the physician must integrate these data to arrive at a decision and appropriate action.

The complexity of the in-flight investigation program contemplated for the earth-orbiting missions requires information exceeding that available from biosensor devices. It will be more reliable and productive for a scientific crew member to make first-hand observations using standard clinical techniques.

Bio-instrumentation utilization is dependent on flight-mission objectives, and application will be varied in each mission phase.

3,085

Laughlin, C. P., E. P. McCutcheon, R. M. Rapp, D. P. Morris, Jr. and W. A. Augerson 1962 PHYSIOLOGICAL RESPONSES OF THE ASTRONAUT. (In Results of the First U. S. Manned Suborbital Space Flight, February 20, 1962) (NASA Manned Spacecraft Ctr. Pp. 93-103.

3,086

Lavrent'ev, M. A. 1960 THE PROBLEM OF PIERCING AT COSMIC VELOCITIES. In L. V. Kurnosova, ed., Artificial Earth Satellites, (New York: Plenum Press, Inc., 1960), III, 85-91.

ABSTRACT: It is known from the theory of cumulative charges that the mechanism of puncturing of metallic plates by cylinders or by balls differs greatly at 3-10 km/sec from the mechanism at velocities up to 1000 m/sec. Two stages take place at high velocities: (a) the ball or cylinder, penetrating into the obstacle, flows over the surface of the punched out crator; (b) inertia expansion

[illegible] gravity forces place after the "[illegible] related". The first part [illegible] calculated [illegible] incompressible liquid [illegible]. Much less investigated is [illegible] 100 km/sec; the experimental difficulties at such [illegible] particular caution as regards the main hypothesis made in [illegible] of each phenomenon.

3,087

Lawton, A. H. 1952 HUMAN FACTORS IN THE OPERATIONS AND DESIGN OF AIRCRAFT. J. Aviation Med. 23(3):254-258, 306. June 1952.

ABSTRACT: Human factors in aviation embrace three broad divisions: (1) aviation medicine, which familiarizes pilots with their equipment, safety measures, and preventive medical aspects; (2) human engineering, which analyses limitations of human response to the aircraft and its equipment; and (3) human resources which relate to selection, classification, aptitude measurement, training, and human relations, taking into the account the diversified nature of human beings. Psychophysiological aspects of noise, vibration, use of pressurized cabins, use of ejection seats and all kinds of protective equipment, and the impact of speed are discussed. Animal experiments have a great value in furthering research but ultimately each device, method, and principle has to be tested by "human guinea pigs".
Surgeon is perhaps the best known to flyers. The Flight Surgeon's aim is to prevent disease or disaster and to cure that which cannot be avoided.

3,088

Lawton, A.H. 1953 THERE'LL ALWAYS BE A MAN.
J. Aviation Med. 24(6):532-535

ABSTRACT: For a long time to come, the human engineer must strive to keep the cockpit and the crew positions optimally habitable and humanly functional; the psychological scientists must constantly improve the selection, classification, and training procedures of men to fly or to support the aircrews; and the biological scientists must constantly seek to protect those who fly against increasing environmental stresses and to keep them mentally and physically sound.

For various administrative reasons the Human Factors of flying are divided for research and development purposes into three areas: (1) Human Engineering, (2) Human Resources, and (3) Aero Medical Sciences. Human Engineering consists of relating man to his machine or, in the Air Force, of fitting the man, the airframe, the power plant, the electronic devices, and the armament into an operational unit designated as the weapon system.

Human Resources research has revealed the sources of flying personnel and analyzed the jobs that each man may be called upon to perform in the Air Force. From these studies selection and classification methods are now becoming available to fit the man and job advantageously. Of the Human Factors team the Flight

3,089

Lawton, R. W. 1951 HEAD TOLERANCE TO IMPACT BLOWS. In Whitney, A. A., et al., Head Impact & Helmet Investigation (Cornell Aeronautical Lab., Inc., Buffalo, N. Y.) Contract No. N6-ori-11917, Rept. No. CG-675-D-5, 30 April 1951

3,090

Lawton, R. W., R. Crosbie, & C. Clark 1954 THE VISCOELASTIC BEHAVIOR OF ISOLATED AORTIC STRIPS STUDIED BY MEANS OF A PARALLEL SPRING AND DASHPOT ANALOGUE (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5412; 12 Oct. 1954

3,091

Lawton, R. W., R. Crosbie, & C. Clark 1955 ELASTIC PROPERTIES OF MAMMALIAN TISSUE. PHASE I - INSTRUMENTATION. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 315; 31 Dec. 1955

ABSTRACT: Automatic cam-controlled G programs which will produce short acceleration stresses of various amplitudes and forms have been designed. Because of the shortness of the periods of acceleration required, phase lag and distortion in the human centrifuge were revealed in preliminary tests of these cams. Animal experimentation using these programs was suspended pending further study of the centrifuge characteristics under Phase II, NM 001 100 303.

An automatic programming mechanism for the 8 foot animal centrifuge has been constructed and is at present undergoing preliminary tests. Animal experimentation is proceeding on the small animal centrifuge utilizing a turntable which converts lateral to positive G in 0.6 second.

3,092

Lawton, R. W., R. Crosbie, C. Clark, L. Greene, & Kydd 1955 ELASTIC PROPERTIES OF MAMMALIAN TISSUE. PHASE II. ARTERIAL BLOOD PRESSURE RESPONSES TO POSITIVE G IN THE MONKEY. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 315; 31 Dec. 1955

ABSTRACT: Positive G experiments using an automatic cam-controlled G program (5 second sine wave) have been suspended. The results to date have been analyzed and a report is in preparation. Experiments on the small animal centrifuge are continuing. For a nearly "square wave" acceleration, the response time of the blood pressure fall which occurs in the aorta is under study. Data obtained in this way will augment the results obtained on the human centrifuge.

3,093

Lawton, R. W., R. Crosbie, & C. Clark 1955 ELASTIC PROPERTIES OF MAMMALIAN TISSUE. PHASE III. DYNAMIC MECHANICAL BEHAVIOR OF ISOLATED TISSUES. (Naval Air Development Ctr., Johnsville, Pa.) Project RM 001 100 315; 31 Dec. 1955

ABSTRACT: Studies of isolated tissue specimens, principally those of the vascular system, have continued. Theoretical computations have been carried out with the help of the Aeronautical Computer Laboratory of NADC to test the hypothesis that the elastic behavior of these tissues parallels that of a rubber-like material.

3,094

Lawton, R. W., R. Crosbie, C. Clark, & L. Greene 1955 ELASTIC PROPERTIES OF MAMMALIAN TISSUE. PHASE IV. A STUDY OF THE MECHANICS OF THE INTACT AORTA IN DOGS BY MEANS OF SLOW MOTION PICTURES. (Naval Air Development Ctr., Johnsville, Pa.) Project RM 001 100 315; 31 Dec. 1955

ABSTRACT: The mechanical properties of the intact aorta have been studied by means of a frame-by-frame analysis of slow motion pictures. Measurements of diameter and length of a short aortic segment are made and plotted with respect to pressure. The results will be analyzed in terms of simple mechanical models.

3,095

Lawton, R. W., R. Crosbie, & C. Clark 1955 MEASUREMENTS ON THE ELASTICITY AND DAMPING OF ISOLATED AORTIC STRIPS OF THE DOG. Circ. Res. 3:403-408

3,096

Lawton, R. W., R. Crosbie, C. Clark, & L. Greene 1955 SOME ASPECTS OF RESEARCH IN BIOLOGICAL ELASTICITY (Introductory Remarks, Conference on "Tissue Elasticity", Dartmouth College, September 1955)

3,097

Lawton, R. W. 1956 ARTERIAL BLOOD PRESSURE RESPONSES TO G FORCES IN THE MONKEY.
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-5611, 24 September 1956. ASTIA AD 118 268.
See also; J. Aviation Med. 29:97-105, 1958.

ABSTRACT: This study describes arterial blood pressure responses in monkeys subjected to psotive acceleration. The three principal factors affecting the blood pressure are shown to be (a) the height of the fluid column in the G

beds, (2) the venous bed, and (3) the distensibility of the arterial vascular tree. In addition to pressure changes due to the physical effect of acceleration on the blood column, a decrease in arterial volume, and thus a pressure fall, occurs because of a change in the dynamic equilibrium of inflow and outflow in the system.

3,098

Lawton, R. W. 1957 ARTERIAL BLOOD PRESSURE RESPONSES TO ABRUPT POSITIVE ACCELERATION.
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-5704, Rept. No. 4, 1 March 1957. ASTIA AD 127 961.

ABSTRACT: This study describes arterial blood pressure responses in 12 anesthetized monkeys exposed to abrupt, positive acceleration produced by the 90° rotation of an animal board mounted on a small 8-foot centrifuge. The time constant for the exponential fall in carotid blood pressure was determined. Its average value was 0.34 sec^{-1}. Extrapolated log pressure-time curves yielded an average intercept of -0.2 second, suggesting the absence of a finite lag period in the carotid pressure response. Changes in arterial distensibility were suggested by measurement of pulse wave velocity. The data were discussed in terms of a simple hydraulic analogue.

3,099

Lawton, R.W., G.H. Kydd, R. Fenichel, R.J. Deforest, & C.C. Collins 1958 ACCELERATION TOLERANCE STUDIES OF OBESITAL AND SPIN FLIGHT.
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-[illegible], July 1, 1958

ABSTRACT: This report concerns a preliminary study of the effects of spinning on rat mortality. The study was undertaken to ascertain whether rats would survive spin rates associated with the launching of certain satellite vehicles. Fifteen unanesthetized rats were used at spin rates which were varied from 100 to 750 rpm. In general, runs lasted for 15 minutes. Animals which were removed from the spin table alive showed characteristic behavior. Those which had been spun in the central container showed no other effects than salivation. Those spun in the peripheral chamber, in general, reacted in accordance with the direction in which they had been rotated. Performance studies carried out with other animals suggest that, although rats will survive spinning on the central axis up to nearly 700 rpm and to 250 rpm at a 1 foot radius, such stress may be associated with a marked decrement in performance.

3,100

[illegible]
[illegible], February 1958

ABSTRACT: This study describes arterial blood pressure responses in subjects exposed to positive acceleration. The three principal factors affecting the blood pressure are shown to be (1) the height of the fluid column in the body, (2) the volume within, and (3) the distensibility of the arterial vascular tree. In addition to pressure changes due to the physical effect of acceleration on the fluid column, a decrease in arterial volume, and thus a pressure fall, occurs because of a change in the dynamic equilibrium of inflow and outflow in the system. These two factors tend to balance each other in the region of the diaphragm so that blood pressure changes are minimal in this area.

3,101

[illegible]
([illegible]) SAM-TR-64-4 April 11, 1964

ABSTRACT: This is a review of the so-called "open" literature on the cardiovascular and respiratory effects of rotary acceleration in man and animals. The material has been abstracted and presented in tabular form and a selective bibliography is included. The older literature has been [illegible] and is not included in the tables.

3,102

[illegible] MANNED SPACE [illegible].
[illegible], Feb. 1960.

ABSTRACT: This article describes [illegible] to be encountered during early manned [illegible] and offers solutions [illegible] problems.

[illegible] ARTERIAL BLOOD PRESSURE RESPONSES TO POSITIVE ACCELERATION [illegible].
In [illegible], O. E. & G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine. (Boston: Little, Brown, and Co., 1961). Pp. 29-38.

3,104

Lawton, R. W. 1961 THE HYDROSTATIC PRESSURE IN THE ARTERIAL TREE. In Gauer, O. H. & G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine. (Boston: Little, Brown, and Co., 1961). Pp. 260-261.

3,105

Lawton, W. H. 1957 PHYSIOLOGICAL INVESTIGATIONS IN THE FLYING SAFETY PROGRAMS OF THE FLYING TRAINING AIR FORCE. U. S. Armed Forces Med. J. 8:937-944

3,106

Lease, G. O. & F. G. Evans 1959 STRENGTH OF HUMAN METATARSAL BONES UNDER REPETITIVE LOADING.
J. Appl. Physiol. 14:49-51.

3,107

Leavitt, W. 1958 MAN IN SPACE
Air Force 41(3):109-117, 120-123. April 1958.

ABSTRACT: A description of tests of men under space-flight conditions.

3,108

Lecca, Gmo. Garrido 1963 EL ACCIDENTE DE JORGE CHAVEZ (THE ACCIDENT OF JORGE CHAVEZ)
(Lima: Instituto Peruano de Fomento Educativo, 1963)

3,109

LeCount, E. R., et al. 19 PATHOLOGIC ANATOMY OF TRAUMATIC FRACTURES OF CRANIAL BONES AND CONCOMITANT BRAIN INJURIES.
Journal of American Medical Association 74(8):501-511. Feb. 21, 1920.

ABSTRACT: This attempt to consider the injuries of the brain and cranial bones when the latter are broken by external violence is based on conditions encountered in 504 postmortem examinations made by one of us during the years 1911 to 1918. It does not include all the postmortem examinations during that period of the bodies of persons with such traumatic fractures, for in about sixty instances the measurements and other steps necessary in the interests of precision were not so detailed as in the 504 here

reviewed. The patients were cared for in the Cook County Hospital or the Hospital of the House of Correction, and some post mortem examinations were of bodies of persons who were found dead or who died in route to a hospital.

3,110

Lederer, J. & R.M. Woodham 1955 SAFETY THROUGH STEEP GRADIENT AIRCRAFT. (The Daniel and Florence Guggenheim Aviation Safety Center, Cornell University)

3,111

Lederer, Jerome 1962 PERSPECTIVES IN AIR SAFETY
(Presented at the 1962 ASME Aviation & Space Division Conference, Shoreham Hotel, Washington, D. C. 27 June 1962)
The Daniel & Florence Gugganheim Aviation Safety Center at Cornell University.

3,112

Lederer, L.G. 1956 THE AEROMEDICAL ASPECTS OF TURBO-PROP COMMERCIAL AIRCRAFT. A STUDY OF VISCOUNT PASSENGER OPERATIONS IN THE UNITED STATES. J. Aviation Med. 27(4):287-300

SUMMARY: The aeromedical characteristics of the VISCOUNT turbo-prop airliner have been discussed as related to operation in commercial aviation in the United States. The differences between turbo-prop and conventional piston powered aircraft have been demonstrated particularly in the field of noise and vibration. The level of cabin pressurization has been discussed and shown to be more physiologically acceptable than other commercial aircraft operating in the United States.

Pilot transition training has been discussed and a new type of flying in commercial operation, have been cited, such as "hull life," and "metal fatigue." It is hoped that as new better commercial aircraft are developed, the aeromedical aspects such as have been covered in the presentation will also be reported.

3,113

Lederman, M. 1962 REPORT ON TEST ON C16 2406 001 TRANSMITTER-ACCELEROMETER (Kearfott Div., General Precision, Inc., Little Falls, N. J.) Jan. 1962 Rept. no. K-265; IDEP Rept. no. 851.20.01.40-R8-01, ASTIA AD-275 237

ABSTRACT: Accelerometer S/N 231 satisfactorily met the requirements of the Inspection Tests and Qualification Tests. Accelerometer S/N 350 satisfactorily met the Inspection Tests and Qualification Tests. Accelerometer S/N 350 satisfactorily met the Inspection, Vibration High Temperature Tests. The unit satisfactorily met the Low Temperature requirements after cleaning and recalibration. With the exception of the damping ratio, which remained constant throughout all the tests, the S/N 95 unit satisfactorily met the Inspection and Qualification Test requirements. (AUTHOR)

3,114

Ledley, R S. 1957 FUNCTIONAL CRITERIA FOR BIO-MEDICAL DIGITAL ELECTRONIC COMPUTER DESIGN
(National Bureau of Standards, Washington, D. C.) NBS Report No. 5667, 6 December 1957.

3,115

Ledley, R.S. 1960 COMPUTING FACILITY
(George Washington U., Washington, D.C.) Project 9777(805), Contract AF 49(638)-715; AFOSR, DLS.

ABSTRACT: A flac II computer, surplus to Air Force operational needs, has been loaned to George Washington University for use in developing a program of research in medical and biological problems. Some of the research will result from collaboration with scientists in other laboratories. The facility will represent one of the few having its potential capability devoted entirely to biomedical research.

3,116

Lee, R. H., F. I. Whitten, and F. W. Brown, III 1959 THE EXPLOSIVE DECOMPRESSION COMPONENT OF AIR BLAST. (Navy Mine Defense Lab., Panama City, Fla.) Medical research rept. no. 4; ASTIA AD 219-712.

ABSTRACT: The equations $P_i = Po(1 + T_c/t_m)$ and $\theta_i = \theta_o(1 + t_c/t_m)$ derived from the study of a biophysical analog presumed to simulate the mechanical action of explosive decompression on living animals, are applied to the data from a series of experiments in which mice were exposed to rapid decompression under a wide range of pressures and decompression times. Estimates of the

average values of the time constants, tm, of the mice at constant mortality are compared with estimates based on physical measurements of lung volumes and tracheal diameters. The primary objective was to demonstrate that engineering formulae can be applied to the biophysical aspects of explosive decompression in exactly the same manner that such formulae were applied to the physical aspects. Biophysical parameters are estimated which correspond in every way to their physical counterparts. Emphasis is to be placed on the existence of these parameters, and on the methods for their estimation, rather than on accuracy of the numerical values given. (Author)

3,117

Lees, L., F. W. Hartwig & C. B. Cohen 1958 THE USE OF AERODYNAMIC LIFT DURING ENTRY INTO THE EARTH'S ATMOSPHERE.
(Space Technology Laboratories, Ramo-Wooldridge Corp., Los Angeles, Calif.) GM-TR-0165-00519, November 20, 1958.

ABSTRACT: By employing aerodynamic lift during entry into the earth's atmosphere at either orbital or escape velocity, the range of allowable entry angles for a prescribed peak deceleration is greatly increased, while the total heat energy transferred to the vehicle can be held to about the same value as that for a nonlifting vehicle. Only modest lift-drag ratios are required beyond peak g to prevent the deceleration from exceeding the peak value or to prevent the vehicle from skipping out of the earth's atmosphere. Thus the difficult guidance and control problem is greatly alleviated; in particular, for return from the moon or from other planets the necessity for multiple-pass dragbraking is eliminated.

3,118

LeGalley, D. P. 1963 SPACE SCIENCE (John Wiley, Publ.)

ABSTRACT: Based on a series of 16 lectures presented at the Univ. of California in the Fall semester of 1961, this latest entry in the Wiley Space Technology Series provides a full-scale review of the theoretical and experimental scientific data obtained during the first five years of the space age. After an introductory chapter by the Editor on space exploration, 15 nationally recognized authorities offer straightforward and lucid accounts of progress made in their own areas of research.

Included is a chapter on bioastronautics by General Don Flickinger with references to acceleration problesm.

3,119

Lehmkohl, J. C. 1947 SPINAL ACCELERATION MEASUREMENTS ON A PILOT-DUMMY EJECTED FROM A P-61 AIRPLANE IN FLIGHT. (Army Air Forces, Materiel Command, Engineering Division) Serial No. TSEAC12A-45341-2-5, 1 July 1947; ATI-10 794

CONCLUSIONS & RECOMMENDATIONS: It is concluded that the existence of a vibrating system; consisting of the ejection seat, the cushioning media, and the dummy; which induces the high peak accelerations is further substantiated by the results of these tests. The peak values of spinal acceleration, as recorded, exceed the present known physiological tolerances of a human subject. The weight of the ejection charge has a very small effect on the peak value of spinal acceleration. The primary factor effecting the magnitude of the spinal acceleration peak is the angle of ejection. Within 0.15 seconds after the catapult separation the spinal acceleration of the dummy stabilizes at approximately -2g for the duration of the record. It is recommended that ground tests be conducted to obtain additional data concerning the effect of ejection angle. Corrective action be taken towards the modification of the means of cushioning in order to eliminate or reduce the excessive peak accelerations. (AUTHOR)

3,120

Leman, J., W. Demeshak, A. Myerson & D. Goldman 1936 EFFECT OF ALTERATIONS IN POSTURE ON THE INTRA-ARTERIAL BLOOD PRESSURE IN MAN. I. PRESSURE IN THE CAROTID, BRACHIAL, AND FEMORAL ARTERIES IN NORMAL SUBJECTS. Arch. Neurol. Psychiat. (Chicago) 35:1216-1224.

3,121

Lemon, H. H. 1947 FROM GALILEO TO THE NUCLEAR AGE. (Chicago: The University of Chicago Press, 1947)

3,122

Lenggenhager, K. 1936 DIE GENESE DER LUFTSEE UND EISENBAHN-KRANKHEIT IN NEUENR LICHT. (The Origin of Air, Sea, and Car Sickness from a New Point of View) Schweiz Med. Wchnschr., 66: 354-357

ABSTRACT: According to the present writer, air, sea, and car sickness are not due to labyrinthine disorder, but to variations in pressure and traction on the great sympathetic nerve plexuses of the upper abdomen. Therapeutically he recommends horizontal posture, tight binding of the abdomen and administration of Bayer's sedative, "Seasick Cure," which contains atropin, scopolamin, luminal and papaverin. ABSTRACT: Journal of Aviation Medicine 7(4): 212, December 1936

3,123

Lennox-Buchthal M., F. Buchthal and P. Rosenfalck 1960 CORRELATION OF ELECTROENCEPHALOGRAPHIC FINDINGS WITH CRASH RATE OF MILITARY JET PILOTS. Epilepsia (Amster.) 1:366-72, June 1960

3,124

Lentz, E.C., and A.F. Zeller. 1962 AIRCRAFT ACCIDENT POTENTIAL RELATED TO PILOT AGE AT TIME OF GRADUATION. (Directorate of Flight Safety Research, Norton AFB, Calif.) ASTIA AD-286 479; 2 July 1962

ABSTRACT: The overall findings offer support for the hypothesis that younger pilot graduates have a better subsequent accident record than the older. The fact that younger pilots experienced a higher accident rate during their early hours of rated flying than did the pilots who received their wings when 25 years of age or older, is apparently the result of the previous experience of some of the pilot graduates. When those pilots who had had previous rated, though non-pilot, experience were eliminated from consideration the anticipated results appear. The reversal of trend with the previously rated individuals included results from the fact that on the whole those who had received prior training were older and had been exposed to a period of screening which resulted in a superior group. This demonstration of the fact that dual training with the dual screening leads to a better end product is of theoretical interest, but because of the expense and time involved would not appear to be practically feasible as a standard procedure.

3,125

Lestard, R. F. 1946 [ACCELERATION AND CENTRIFUGATION] Rev. de Informaciones Aeronaut. 15:249-278. April 1946.

3,126

Levedahl, B. H. 1961 SOME NOTES ON THE PHYSIOLOGICAL TOLERANCE TO ACCELERATION (Douglas Aircraft Co., El Segundo, Calif.) ES 40253; ASTIA AD-257 737; 20 Feb. 1961

ABSTRACT: The report contains eleven tables and graphs dealing with the duration and time-tolerance of negative acceleration and transverse acceleration.

3,127

Levedahl, B. 1962 NOTES ON THE EFFECTS OF HUMAN ACCELERATION TOLERANCES ON DESIGN FOR THE TERRAIN FOLLOWING AIRCRAFT. (Douglas Aircraft Co., Inc., El Segundo, Calif.) Rept. No. ES 40621; Contract Nonr-107600; ASTIA AD-278 653 Jan. 1962

ABSTRACT: Accelerative forces acting on the pilot serve as a severe limitation on low level, high speed terrain following operations. The physiological restrictions imposed by acceleration forces essentially define the flight path permitted and hence restrict the altitudes that can be maintained over any defined terrain. While some benefit can be derived by the use of anti-g suits for positive g forces, the physiological limitations are not apparent when an attempt is made to control over-shoot after passing over a barrier. At this time negative g forces are applied to the pilot. Some evidence is available to show that repeated application of g-forces may effect physiological parameters other than tolerance and may thus be of importance in defining performance characteristics or limits. More work must be done on the effects of g-loading on these parameters before a reasonable assessment can be made. (AUTHOR)

3,128

Leverett, S. D. MEASUREMENT OF THE CONTRACTION FORCE OF THE HEART. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) Proj. 7220; RPO - 805

ABSTRACT: This work involves the measurement of the contraction force of an experimental animals heart when the subject is exposed to prolonged positive acceleration. The objective is the determination of the causes of the variation in human tolerance to accelerative forces.

3,129

Leverett, S.D., and G.D. Zuidema 1957 STANDARDIZATION OF HUMAN CENTRIFUGE TECHNIQUES. Meddelanden fran flyg - och naval-medicinska namnden (Stockholm), 6(2): 33-39

ABSTRACT: Standardization of experiments conducted in different centers on human centrifuges is proposed along the following criteria: (1) rate of onset 1.5 g/sec (2) Maximum time at peak g in a rapid onset run, 15 sec.; (3) lights in room, darkened or dimmed; (4) distance from subject's eyes to light panel, 30 inches; (5) distance between right and left peripheral lights, 28 inches; (6) type lights for subject, to be determined (however, some standard white light would be most desirable): (7) central observer, this is definitely desirable, (8) television monitor, optional, but desirable; and (9) end-point criteria, blackout (peripheral light loss, central light loss) at any point in the run. Certain other recommendations are made.

3,130

Leverett, S.D., & G.D. Zuidema 1957 STANDARDIZATION OF HUMAN CENTRIFUGE TECHNIQUES. (Paper, Meeting of Aero Medical Association, Denver, Colo., May 6-8, 1957)

ABSTRACT: There are eight centers in the world actively reporting studies on the human centrifuge and several others are either under construction or being planned. With increased speed and altitude of aircraft, the problem of human tolerance and reaction to acceleration becomes more complex. Although many centrifuges have been in operation as long as fifteen years, there has been no standardization of operation. This tends to make results reported by one group invalid for another group using a different set of operating criteria. These criteria include the type of lights used for subject response, central observer, closed-circuit TV monitor, end-point criteria, maximum time at peak G during a rapid-onset run, rate of acceleration to peak G, type of lights in room, and distance between subject's eyes and signal lights. A standard run based on the above criteria is suggested. (J. Aviation Med. 28(2):208, April 1957.)

3,131

Leverett, S. D., S. Endurant, & M.B. Riley 1957 VENOUS CONSTRICTION IN MAN DURING EXPOSURE TO POSITIVE G FORCE. Federation Proceedings, 16(1,part I):80. March 1957

ABSTRACT: Five subjects were studied during 15 second exposure to 3 g (positive) on the human centrifuge. Pressure in the venous segment isolated between two occlusive pneumatic tourniquets increased in every instance beginning 1-10 seconds after the onset of acceleration. It reached a peak after 10-30 seconds and slowly returned to the original level during the subsequent 20-45 seconds. The group mean maximum pressure increase was 12.5 ± 4.8 mm. Hg. Reflex venous constriction occurred during positive acceleration, presumably contributing to circulatory compensation. The functional significance of this reflex remains to be determined.

3,132

Leverett, S.D., & N.P. Clarke 1958 CHANGES IN FORCE OF CONTRACTION OF THE HEART DURING POSITIVE ACCELERATION.
(Paper, 1958 Meeting of Aero Medical Association, Statler Hotel, Washington, D.C., March 24-26)

ABSTRACT: Using the strain gage arch technique, qualitative changes in the force of contraction of the left ventricle of dogs were observed simultaneously with the arterial pressure at head level and the EKG when the animal was exposed to varying positive force fields on the centrifuge. The arterial pressure overshoot following a 20 mm. Hg. The Valsalva maneuver was used as one of the prerun indexes of the responsiveness of the autonomic nervous system in affecting the cardiovascular reflexes. Drugs known to affect the contractility and rate of the heart were selectively administered to qualitatively test the responsive-

ness of the strain gage pick-up unit sutured to the myocardium. Preliminary experiments indicate: (1) a reflex increase in force of contraction of the heart during steady, short-duration (15 seconds) positive G runs: (2) positive G runs of either a prolonged low level G or high level G (above 5 G) but of shorter duration resulted in a degradation of the initial cardiovascular collapse; and (3) a complete loss of all of the above reflex compensatory mechanisms following the administration of a post-ganglionic sympathetic blocking agent. (J. Aviation Med. 29(3):240, March 1958)

3,133

Leverett, S. D., and N. P. Clarke Nov. 1959 A TECHNIQUE FOR DETERMINING CHANGES IN FORCE OF CARDIAC CONTRACTION DURING ACCELERATION. Aerospace Medicine 30(11):832-839. Nov. 1959
See also (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADD TN 60-116; ASTIA AD-238 275; April 1960

ABSTRACT: A technique is described for measuring changes in force contraction of the heart during positive acceleration in intact, anesthetized dogs. It employs a modification of the Walton-Brodie strain gage arch. The post-Valsalva arterial overshoot was used as a pre-run test of cardiovascular responsiveness. Three g rapid onset accelerations of 15 sec duration caused an initial decrease in both arterial pressure and force contraction. Six to 10 sec later, reflex increase in force contraction to 25% above control level apparently contributed to a concomitant rise in arterial pressure. Dibenzyline reduced by one-half the acceleration required to reduce systolic blood pressure at head level to zero in gradual onset experiments. The post-Valsalva arterial overshoot was absent following administration of this drug. In prolonged exposures to accelerations of 3 g, a decrease in arterial pressure and force contraction appeared between 3 and 7 min, accompanied by significant electrocardiographic changes. The depression of arterial pressure and force contraction lasted longer than a 10-min post-run observation, but force contraction returned to normal within 24 hr. (AUTHOR)

3,134

Leverett, S. D., & N. P. Clarke 1960 A TECHNIQUE FOR DETERMINING CHANGES IN FORCE OF CARDIAC CONTRACTION DURING ACCELERATION. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADD TN 60-116; ASTIA AD-238 275; April 1960
See also Aerospace Medicine 30(11):832-839, Nov. 1959

ABSTRACT: A technique is described for measuring changes in force contraction of the heart during positive acceleration in intact, anesthetized dogs. It employs a modification of the Walton-Brodie strain gage arch. The post-Valsalva arterial overshoot was used as a pre-run test of cardiovascular responsiveness. Three g rapid onset accelerations of 15 sec duration caused an initial decrease in both arterial pressure and force contraction. Six to 10 sec later, reflex increase in force contraction to 25% above control level apparently contributed to

a concomitant rise in arterial pressure. Dibenzyline reduced by one-half the acceleration required to reduce systolic blood pressure at head level to zero in gradual onset experiments. The post-Valsalva arterial overshoot was absent following administration of this drug. In prolonged exposures to accelerations of 3 g, a decrease in arterial pressure and force contraction appeared between 3 and 7 min, accompanied by significant electrocardiographic changes. The depression of arterial pressure and force contraction lasted longer than a 10-min post-run observation, but force contraction returned to normal within 24 hr. (AUTHOR)

3,135

Leverett, S.D., Jr., R.U. Whitney, & G.D. Zuidema 1961 PROTECTIVE DEVICES AGAINST ACCELERATION
In Gauer, O.H. & G.D. Zuidema, Gravitational Stress in Aerospace Medicine (Boston: Little, Brown, and Co., 1961) Pp. 211-220

3,136

Leverett, S. D., Jr. & G. D. Zuidema 1961 STANDARDIZATION OF HUMAN CENTRIFUGE TECHNIQUES.
In Gauer, O. H., and G. D. Zuidema, eds. Gravitational Stress in Aerospace Medicine. (Boston: Little, Brown, and Co., 1961). Pp. 263-270.

3,137

Levi, L. 1961 A NEW STRESS TOLERANCE TEST WITH SIMULTANEOUS STUDY OF PHYSIOLOGICAL AND PSYCHOLOGICAL VARIABLES: A PRELIMINARY STUDY. Acta Endocrinologica. (Copenhagen) 37(1):38-44. May 1961. (In English).

3,138

Levine, D. 1961 ACCELERATION-COMPENSATING PRESSURE TRANSDUCERS FOR SURFACE-PRESSURE MEASUREMENTS.
(Naval Ordnance Lab., White Oak, Md.) Ballistics Research Rept. 27, NAVORD Rept. 6834, August 1961. ASTIA AD 26[illegible] 415.

ABSTRACT: An acceleration-compensating pressure transducer was developed for use in the U. S. Naval Ordnance Laboratory high-performance shocktube wind tunnels to operate at pitot pressures as high as 1,000 psi. The transducer consists of two polarized barium titanate elements whose outputs are closely matched. The elements are connected electrically to cancel mechanical forces simultaneously detected by both elements. Only one element is exposed to the flow. Tests in the 6-in. Shocktube, and in the Shocktube Wind Tunnels have shown that the transducer gives accurate pressure information for the aerodynamic conditions generated in these facilities. (Author)

3,139

Levings, N.T. Jr., 1961 LAUNCHING AND ALIGHTMENT SYSTEMS FOR AERO-SPACE VEHICLES. (Cleveland Pneumatic Industries, Inc., Grand Rapids, Mich.) WADD TR 60-857, ASTIA AD-263 472, May 1961

ABSTRACT: The purpose of this study was to investigate and derive concepts for alightment, attachment, and departure of advanced, extremely high-altitude flight vehicles. The following report describes the investigatory work, problems encountered, methods by which concepts were selected, and results of preliminary design integrity testing as applicable to specifically selected concept models. Results indicate that valuable data have been derived on the relative efficiency of the various types of shock mitigation systems as originally conceived through the efforts of this project. The basic framework for an evaluation technique by which the shock mitigation systems can be rated as to energy-absorbing capability and efficiency with regard to percentage of total mass of the system, has been provided. Additionally, through precision application of the laws of similitude in developing models of the most promising concepts, evidence has been provided as to the value of utilizing dynamic scaling as an important adjunct to the analytical techniques for preliminary design. (Author)

3,140

LeVora, N. W. & E. C. Wortz 1962 PULMONARY EFFECTS OF ACCELERATION AFTER BREATHING 100 PERCENT OXYGEN.
(Garrett Corp. AiResearch Manufacturing Div., Los Angeles, Calif.) Rept. No. 4381, May 25, 1962.

ABSTRACT: Studies have been made of pilots who have developed atelectasis and pulmonary edema after undergoing high "G" maneuvers preceded by breathing 100 per cent oxygen.

3,141

Levy, E. Z., G. E. Johnson, J. Serrano, Fr., V. H. Thaler, et al. 1961 THE USE OF SKIN RESISTANCE TO MONITOR STATES OF CONSCIOUSNESS
Aerospace Medicine 32(1):60-66, Jan. 1961.

ABSTRACT: The technique of recording the absolute level of skin resistance continuously on a highly compressed record is described as a tool for studying consciousness. Recent experimental work at the USAF Aero Medical Laboratory in isolation research and crew compartment studies in which the technique was used are described. The usefulness of the tool as a monitoring device for alertness is discussed along with its limitations in its present form.

3,142

Levy, L. L. Jr. 1961 THE USE OF DRAG MODULATION TO LIMIT THE RATE AT WHICH DECELERATION INCREASES DURING NONLIFTING ENTRY.
(National Aeronautics and Space Administration, Washington, D.C.) NASA TN No. D-1307, Sept. 1961. ASTIA AD 263 196.

ABSTRACT: The method developed in NASA TN D-319 for studying the atmosphere entry of vehicles with varying aerodynamic forces has applied to obtain a closed form solution for the motion, heating, range, and variation of the vehicle parameter for nonlifting entries during which the rate of increase of deceleration is limited. The solution is applicable to vehicles of arbitrary weight, size, and shape, and to arbitrary atmospheres. Results have been obtained for entries into the earth's atmosphere at escape velocity during which the maximum deceleration and rate at which deceleration increases were limited. A comparison of these results with those of NASA TN D-319, in which only the maximum deceleration limited, indicates that for a given corridor depth, limiting the rate of increase of deceleration and the maximum deceleration requires an increase in the magnitude of the change in vehicle parameter and results in increases in maximum heating rate, total heat absorbed at the stagnation point, and range. (Author)

3,143

Levy, P. M., D. J. Sekinger & R. S.Stone 1961 A DISCUSSION OF THE NATURE AND SOURCE OF INJURY EXPERIENCED BY AVIATORS EJECTING FROM F9F-8T COUGAR UTILIZING MK-45 SEAT.
(Paper, Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Material Center, Philadelphia, Pa. 14-15 June 1961)

ABSTRACT: An analysis of nine aviators ejecting in the MK-45 seat revealed that the more serious injuries were related to the ejection per se and were back injuries. Analysis of the MK-45 seat revealed inadequacies relating to improper positioning of the aviators and application of increased ejection forces to the ejecting aviator.

3,144

Levy, P. M., E. A. Jaeger, R. S. Stone, & C. T. Doudna 1962 CLINICAL PROBLEMS IN AVIATION MEDICINE: AEROATELECTASIS: A RESPIRATORY SYNDROME IN AVIATORS. Aerospace Medicine 33(8):988-994, Aug. 1962

SUMMARY: Ten cases of basilar subsegmental atelectasis occurring in aviators flying high performance jet aircraft are presented. The lesions usually but not invariably are unaccompanied by any clinical signs or symptoms. Thus, cough, pleuritic-like pain, chest constriction sensation and basilar rhonchi may be noted. The condition is self-limited with symptoms and x-ray clearing within 48 hours, more often sooner.
Multiple etiologic factors which may be implicated in the development of this atelestasis are discussed. These include the effects of high oxygen concentration, "g" forces, active respiratory disease, oxygen toxicity, and chest constriction during flight.
Treatment and prevention are also discussed.
The term aeroatelectasis appears to appropriately describe this entity. (AUTHOR)

3,145

Levy, S., A. E. McPherson & E. V. Hobbs 1948 CALIBRATION OF ACCELEROMETERS. J. Research of the National Bureau of Standards 41:359-369.

ABSTRACT: This paper describes three accelerometer calibrators developed to provide a convenient means for calibrating lightweight accelerometers of the types used for measuring accelerations on airplanes in flight. The first calibrator is a shaking table having a sinusoidal motion with frequencies of 20 to 110 cycles per second and accelerations up to 80 gravity; the second is a portable calibrator producing a known pulse of acceleration with a peak value between 1 and 20 gravity; and the third is a centrifuge, which develops a maximum steady acceleration of about 1,000 gravity.

3,146

Levy, S., & W.D. Kroll 1950 RESPONSE OF ACCELEROMETERS TO TRANSIENT ACCELERATIONS. J. Res. of the National Bureau of Standards. 45(4): October, 1950.

3,147

Levy, T. 1943 OBSERVATIONS ON AIR SICKNESS. Mil. Surgeon, 93:147-51

3,148

Lew, J. 1949 REVIEW OF PROBLEMS OF EMERGENCY ESCAPE BY PARACHUTE JUMP AND EJECTION SEAT (Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.) Report No. BC-531-5-12, Dec. 1949. ASTIA ATI 125 336.

ABSTRACT: To obtain an understanding of the status of the problems of escape from an airplane at high speeds and altitudes, a search was made of pertinent literature. The existing literature covered only the normal parachute jump and the catapult seat ejection, methods of egress which are satisfactory at maximum speeds of 350 and 550 mph, respectively, and at a maximum altitude of 50,000 feet.

Information is presented on:

the conditions imposed upon the human by the two methods during egress and the descent to earth, and

the reactions of the human body to these conditions.

3,149

Lewis, B. M., & J. W. Taylor 1952 EFFECTS OF ACCELERATION UPON THE CEREBRAL METABOLISM AND CEREBRAL BLOOD FLOW. DEVELOPMENT OF A NEW METHOD FOR CONTINUOUS MEASUREMENT OF CEREBRAL BLOOD FLOW IN HUMANS UNDER ACCELERATION. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5202; 15 Aug. 1952

3,150

Lewis, B. M., & J. W. Taylor 1955 THE EFFECTS OF ACCELERATION UPON CEREBRAL METABOLISM AND CEREBRAL BLOOD FLOW. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 301; 31 Dec. 1955

ABSTRACT: Cerebral blood flow has been measured in 14 studies in 10 normal males by the use of Kr^{79}. The radiations of Kr^{79} can be detected through the intact skull, hence the Fick principle can be applied to intervals of one minute or less. The average value obtained was 1246 cc/min with a standard deviation of 258 cc. Minute-to-minute stability was good. The sensitivity to changes in cerebral blood flow was as great as with the N_2O method. When corrected for endocranial volume, the Kr^{79} method gave systematically higher values than simultaneously performed N_2O studies. This difference may be due to (1) scattered radiation from the chest and change in background during the study (2) inclusion of extracerebral tissues, including air spaces in the counter path. The first factor has been evaluated and has been shown to be small.

3,151

Lewis, D.H., 1955 AN ANALYSIS OF SOME CURRENT METHODS OF G-PROTECTION. J. Aviation Med. 26(6):479-485

SUMMARY: In 415 centrifuge runs on four experienced subjects the time to peripheral light loss was recorded for g levels from 2.5 to 7.0 g. Using the runs in which the subject was relaxed and unprotected as a baseline, comparison was made of the effect of straining, the standard Navy Z-2 suit, and two types of experimental full pressure half suits. The protection afforded by these various measures was as follows:

Straining	1.1 g
Z-2 suit	1.2 g
A-2 suit plus straining	2.2 g
Full pressure half suit	2.4 g

For the Z-2 suit, the pressure required to protect is of the order of 3 psi per g above the subject's minimum tolerance level unprotected. For the full pressure half suit the maximum limit of protection was defined by the discomfort of the suit.
The maximum protection obtained by our subjects with the full pressure half suit was about the same as that obtained by the combination of the Z-2 suit plus straining.

3,152

Lewis, D. H., H. N. Hunter, & P. R. Edwards 1955 THE EFFECT OF ACCELERATION ON THE ELECTRICAL ACTIVITY OF THE RETINA. (Naval Air Development Ctr., Johnsville Pa.) Project NM 001 100 317; 31 Dec. 1955

ABSTRACT: Electroretinogram records were obtained on human subjects under G. The electroretinogram persisted during blackout with only a slight decrement. In addition, the consensual light reflex was noted at the blackout level in the opposite shielded eye. The findings have been reported.

3,153

Lewis, D. H., & T. D. Duane 1955 THE ELECTRORETINOGRAM IN MAN DURING BLACKOUT. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5514; ASTIA AD-83 491; 1 Dec. 1955 NOTE: CARI P&S 2.11
See also J. Appl. Physiol. 9:105-110 , 1956

ABSTRACT: "Electroretinograms from 5 subjects were recorded on the human centrifuge under varying degrees of accelerative stress up to and including blackout and unconsciousness. These findings were correlated with changes in the retinal circulation and with the consensual light reflex. It was found that the electroretinogram could not be employed as an objective measurement of blackout since it persisted throughout all the experiments, as did the consensual light reflex. These findings indicate a likely origin of blackout in or near the ganglion cell layer of the retina." (AMAL)

3,154

Lewis, D.H. 1955 THE G-PROTECTION PROVIDED BY THE FULL PRESSURE HALF SUIT (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5511, 23 Sept. 1955. ASTIA AD 79 881

ABSTRACT: An evaluation was made of the g protection provided by the full-pressure half suit, and a comparison was made with the protection provided by straining, by the Z-2 suit, and by a combination of the Z-2 suit and a straining. The mean protection which was obtained by 4 experienced subjects in 415 centrifuge runs was 2.4 g with the full-pressure half suit, 1.1 g with straining, 1.2 g with the Z-2, and 2.2 g with the Z-2 plus straining. Maximum suit pressures of 7 and 9 psi were obtained for the full-pressure and Z-2 suits, respectively. No cardiac arrhythmias or circulatory embarrassment was observed at 7 psi with the full-pressure half suit. For the Z-2 suit, straining, and the combination of the two, the g level at which peripheral light loss occurred was selected as the limiting g level. For the full-pressure half suit, abdominal pain due to suit pressurization limited the g level; voluntary straining was not possible, apparently because of respiratory difficulty. For the full-pressure half suit, the pressure required for protection against peripheral light loss was 2 psi/g above the g level at which light loss occurs without the suit; for the Z-2 suit, the value is 3 psi/g. Acceptability of the full-pressure half suit is limited by excessive cumbersomeness, difficulty in donning,the presence of abdominal pain at maximum suit pressures, and lack of improvement over the combination of the Z-2 suit plus straining.

3,155

Lewis, D. H., & T. D. Duane 1956 ELECTRORETINOGRAM IN MAN DURING BLACKOUT. J. Appl. Physiol. 9:105-110
See also (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5514; ASTIA AD-83 491; 1 Dec. 1955

ABSTRACT: "Electroretinograms from 5 subjects were recorded on the human centrifuge under varying degrees of accelerative stress up to and including blackout and unconsciousness. These findings were correlated with changes in the retinal circulation and with the consensual light reflex. It was found that the electroretinogram could not be employed as an objective measurement of blackout since it persisted throughout all the experiments, as did the consensual light reflex. These findings indicate a likely origin of blackout in or near the ganglion cell layer of the retina." (AMAL)

3,156

Lewis, D. H. 1957 THE EFFECTS OF EXTERNAL PRESSURIZATION UPON THE CARDIO-VASCULAR SYSTEM IN DOGS. I. PHYSIOLOGICAL ASPECTS.
(U.S. Naval Air Development Center, Johnsville, Pa.) TED ADC AE 1401, Project NM 11 01 12.1, Rept. No. 3; July 1957. NADC-MA-5709.

ABSTRACT: Studies of the effects of external pressurization on the cardio-vascular system were carried out in 16 anesthetized dogs. Observations were made of applied pressure at the surface of the abdomen, of rectal pressure, and of various vascular pressures during inflation of a bag type of "suit" which encased the entire lower half of the animals body up to the sternum.

3,157

Lewis, E. R. & H. Horn 1919 MEDICAL STUDIES ON THE "FEEL OF THE AIRSHIP." DEAF-MUTES AND NORMALS.
Laryngoscope 29(2):65-81, Feb. 1919.

ABSTRACT: A physiologic function of the inner ear, which is peculiarly important to aviation, is that of motion-sensing in equilibration. Nothing could better illustrate this peculiar importance of the inner ear than a comparative study of individuals with normal inner ears as contrasted with those of destroyed inner ear—deaf-mutes. A series of experiments was conducted in actual flights. Those with normal inner ears, when blindfolded, were able to detect motion changes during the flight, whereas blindfolded deaf-mutes with destroyed labyrinths were not.

3,158

Lewis, E. R. 1919 STUDIES OF THE EAR AS A MOTION SENSING ORGAN.
Ann. Otol. Rhin. & Laryng. 38:10-28

3,159

Lewis Flight Propulsion Laboratory, Cleveland, Ohio 1956 AIRPIANE CRASH-IMPACT LOADS, CRASH INJURIES, AND PRINCIPLES OF SEAT DESIGN FOR CRASH WORTHINESS
(Paper, NACA Conference, April 17, 1956)

3,160

Lewis Flight Propulsion 1957 ACCELERATIONS IN FIGHTER AIRPLANE CRASHES. (Lewis Flight Propulsion Lab., Cleveland Ohio) NACA RM E57G11, Nov. 4, 1957

3,161

Lewis, H.O. 1961 SHOCK TESTING WITH ELECTRODYNAMIC SHAKERS
In 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D.C. (Mt. Prospect, Ill.: Institute of Environmental Sciences) Pp. 267-276

SUMMARY: This report should be considered solely as a preliminary description of shock tests conducted with electrodynamic shakers. Because of the marked limitations in time, this technique has been developed only to the point of making testing possible.

In the Polaris Missile System Test Services Laboratory, shakers are employed extensively to shock-test articles weighing from 200 to 1000 pounds within the pulse durations described above. Plans are currently underway to extend the use of this technique to all items requiring pulse durations up to 14 milliseconds. There are several areas which need further development before the technique can be considered "of age". First, an effective and repeatable method of producing the desired pulses must be developed. Then, if this technique receives sufficient acceptance, the shaker manufacturers should market the exciters with longer stroke capabilities. This would permit the particular method of conducting a shock test to be extended over a wider range of pulse duration. Finally, effective control of all shaker system gain settings is mandatory if repeatable data is to be obtained. It is hoped that other testing agencies will participate in the development of this technique, so that it may become an accepted part of environmental testing. (Author)

3,162

Lewis, S.T. & J.P. Stapp EXPERIMENTS CONDUCTED ON A SWING DEVICE FOR DETERMINING HUMAN TOLERANCE TO LAP BELT TYPE DECELERATIONS. ARMDC TN 57-1, ASTIA AD 135 005

3,163

Lewis, S.T. and J.P. Stapp 1957 EXPERIMENTS CONDUCTED ON A SWING DEVICE FOR DETERMINING HUMAN TOLERANCE TO LAP BELT TYPE DECELERATIONS. (Air Force Missile Development Ctr., Air Research and Development Command, Holloman AFB, New Mexico) AFMDC TN 57-1, Dec. 1957. ASTIA AD 135 005

ABSTRACT: Anthropomorphic dummies and human volunteer subjects were decelerated while seated in a swing-seat device, facing forward, and being restrained by lap belts three inches wide. The swing consisted of an aircraft seat, suspended by cables forming a swing-pendulum, which could be raised and dropped through a measured vertical component and arrested by a steel cable. Rate of onset, magnitude, and duration are tabulated for 21 dummy tests and 19 human tests.

3,164

Lewis, S.T. & J. Stapp 1958 HUMAN TOLERANCE OF AIRCRAFT SEAT BELT RESTRAINT. J. Aviation Med. 29:187-196

ABSTRACT: Human volunteer subjects were decelerated while restrained by a lap belt three inches in width while seated forward-facing in three experimental devices:

1. An aircraft seat hanging by 20-foot cables forming a swing-pendulum, which could be raised and dropped through a measured vertical component and arrested by a steel cable;
2. A sled, on a 120-foot track, propelled by an ejection seat M1-A1 catapult and decelerated by water inertia brakes; and
3. A catapult accelerating a seat by means of rubber shock cords in an 18-foot distance and decelerating it with mechanical friction brakes in thirty inches or less.

Rate of onset, magnitude and duration of force are tabulated for 30 human experiments. Air transport crash protection is discussed as well as tolerance limits to the application of crash-type mechanical forces of the magnitude investigated by these experiments.

3,165

Ley, Willy 1928 DIE MÖGLICHKEIT DER WELTRAUMFAHRT: ALLGEMEINVERSTANDLICHE BEITRAGE ZUM RAUMSCHIFFAHRTS-PROBLEM (The Possibility of Space Flight: General Agreement of Contributions to the Space Travel Problem) (Leipzig: Hachmeister und Tahl, 1928)

3,166

Ley, Willy 1957 ROCKETS, MISSILES AND SPACE TRAVEL
(Viking, New York, 1957)

ABSTRACT: Said, by the author, to be complete as far as publications in book or pamphlet form are concerned. No periodical articles are included.

Arrangement is by language - English, French, German, Italian, Russian, Dutch and Danish.

Separate listings are devoted to historical works; books on related themes; and imaginative literature on space travel.

3,167

Ley, Willy 1958 THE LONG HISTORY OF SPACE TRAVEL.
In Ten Steps Into Space, The Franklin Institute, Philadelphia, Pa., Monograph No. 6, pp. 1-11, Dec. 1958.

3,168

Ley, W. 1961 G FORCES
Space World 1:44-45, Aug. 1961

3,169

Libber, L. M. 1957 SOME THRESHOLDS OF INJURY FROM APPLICATION OF HIGH LINEAR ACCELERATIVE FORCE TO RATS.
J. Aviation Med. 28(2):166-170, April 1957.

CONCLUSIONS: In spite of the difficulties involved, some generalized conclusions can be drawn from this study on rats:

1. Increasing the duration of applied linear acceleration lowers the threshold peak G necessary to produce bone fracture.
2. Increasing the duration of applied linear acceleration has little effect on the threshold peak G necessary to produce either intraventricular or subdural hemorrhages.
3. Increasing the duration of applied linear acceleration lowers the peak G necessary to produce corneal reflex loss considerably.
4. The threshold peak G necessary to produce corneal reflex loss is considerably higher than those necessary for intraventricular and subdural hemorrhages.
5. The thresholds for intraventricular and subdural hemorrhage are very similar and are probably somewhat lower than those reported.
6. It is possible that the sequence of injury which would occur with increasing level of G is: intracranial hemorrhage, fracture and loss of corneal reflex.

3,170

Libbey, B. W. 1958 EVALUATION MEASUREMENTS OF ENERGY ABSORBING BUMPERS ON TEST VEHICLES. (Master's Thesis for MS in ME, University of Minnesota) Aug. 1958

3,171

Lichtenstein, J. H. & T. M. Carney 1961 ANALYTICAL INVESTIGATION OF AN ACCELERATION AUTOPILOT FOR CONTROL OF THE IMPACT POINT OF A BALLISTIC MISSILE DURING REENTRY.
(National Aeronautics and Space Administration, Washington, D. C.)
NASA TN D-416, September 1960.

3,172

Lidvall, H. F. 1961 VERTIGO AND NYSTAGMUS RESPONSES TO CALORIC STIMULI REPEATED AT SHORT INTERVALS.
Acta Oto-laryngol. 53:33-44.

ABSTRACT: Repeated monoaural caloric stimulations with water of constant temperature at intervals of 10 minutes brought about a progressive decline of the vertigo and nystagmus responses as measured by the mean values of the latency, duration and maximum intensity of the vertigo, the duration of the nystagmus and the total number of nystagmic beats.

The calorization series were paired so that they differed in regard to (1) only the labyrinth (left or right), (2) only the temperature of the water (warm or cold), or (3) both the labyrinth and the temperature of the water. The maximum intensity of the vertigo in the second of a paired series appeared to be independent of that in the first series, regardless of the type of pairing. The decline in the vertigo response thus appeared to show a directional specificity linked to the direction of the cupular deflexion in the individual lateral semicircular canal.

3,173

Lidvall, H. F. 1961 VERTIGO AND NYSTAGMUS RESPONSES TO CALORIC STIMULI REPEATED AT SHORT AND LONG INTERVALS.
Acta Oto-laryngol. 53:507-518.

ABSTRACT: Experiments on 50 young, and, from an otoneurological point of view, "normal" subjects, showed a decline of the average vertigo and nystagmus responses to repeated monoaural caloric stimulations with water at 30° C.

This response decline (R.D.) occurred both at short (8 min) and long (24 hours or more) interstimuli intervals, which indicates that a central mechanism was responsible for this phenomenon. Statistical analysis disclosed some traits in the response pattern characteristic of habituation.

Of practical interest is the observation that, even when an interval of two weeks elapsed between the first and second irrigations the nystagmus response to the second irrigation was significantly weaker. This R.D. was more marked in latency, total number of beats and dysrhythmia than in the duration of the nystagmus response.

3,174

Lieber, P. & R. Duffy 1954 A STUDY OF THE ACCELERATION DAMPER BASED UPON AN EXACT THEORY AND THE ELECTRIC ANALOG.
(Rensselaer Polytechnic Institute, Troy, N.Y.)
Rept. No. TR AE-5410, 30 Dec. 1954. ASTIA AD 55 831.

ABSTRACT: An analysis was made by means of an analog computer of a single unit acceleration damper attached to a non-uniform cantilevered beam. The accuracy of these calculations was limited by the approximate representation used for the nonuniform beam and also thru the process by which the mechanism of impact is described. The choice of 4 elastically coupled stations for representing the beam resulted in a close approximation to the true mode. The effects of the following parameters were evaluated: coefficient of restitution, mass ratio, and the ratio of amplitude of oscillation to the free path of the impacting mass. These results proved helpful in guiding the application of an acceleration damper to controlling the vibration of specific systems.

3,175

Lieberman, J., I. I. Lasky, S. I. Dulkin & O. E. Lobstein 1957
SERUM GLUTAMIC-OXALACETIC TRANSAMINASE ACTIVITY IN CONDITIONS ASSOCIATED WITH MYOCARDIAL INFARCTION. I. BODILY TRAUMA.
Annals of Internal Medicine 46(3):485-596, March 1957.

3,176

Lilienthal, J. L. 1944 THE EFFECT OF HYOSCINE ON MOTION SICKNESS IN AIRCRAFT.
(Naval School of Aviation Medicine, Pensacola, Fla.) Research Rept. X-252.
1., 1 May 1944

3,177

Lilienthal, J. L. 1945 THE EFFECT OF HYOSCINE ON MOTION SICKNESS IN AIRCRAFT: INDIVIDUAL THERAPY OF MOTION SUSCEPTIBLE SUBJECTS. (Naval School of Aviation Medicine, Pensacola, Fla.) Research Rept. X-252.2., 2 March 1945 ATI-70 114

SUMMARY: 1) Forty-five individuals who had experienced a disabling degree of airsickness were studied with reference to the efficacy of hyoscine hydrobromide (0.6 mgm. perorally) as a preventive of airsickness. 2) The previous flight experience of members of the test group ranged from totally inexperienced aerial photography students to veteran personnel with more than 2000 hours of flight time 3) The experienced members were well protected from airsickness by 0.6 mgm. of hyoscine whether exposed to turbulence or acrobatics. Among the inexperienced group there were several complete or partial failures, but in the majority hyoscine proved to be a potent preventive. 4) There was no evidence that hyoscine delayed or prevented adaptation to motion in flight.
CONCLUSIONS: 1) Hyoscine is a safe and effective preventive of airsickness in susceptible individuals. 2) The efficacy of hyoscine suggests a wider usefulness in effecting a rapid adaptation to motion in aircraft in certain phases of aviation training. (AUTHOR)

3,178

Lilienthal, J. L. 1945 MOTION SICKNESS.
(Naval School of Aviation Medicine, Pensacola, Fla.) Research Rept. X-72, 22 Jan. 1945

3,179

Lincoln Laboratory 1956 BIBLIOGRAPHY OF SCIENTIFIC AND ENGINEERING PAPERS 1954-1956
(Lincoln Laboratory, Massachusetts Institute of Technology)Contract No. AF 19(122)-458. ASTIA AD 24972

ABSTRACT: This bibliography is composed of journal articles, meeting papers, and theses concerning science and engineering.

3,180

Lincoln Laboratory 1960 ABSTRACTS, SCIENTIFIC AND ENGINEERING PAPERS, JUNE 1960
Lincoln Laboratory, Massachusetts Institute of Technology Contract No. AF 19(604)-5200

ABSTRACT: This publication lists, by Lincoln Laboratory author, abstracts of articles published in the technical journals and papers presented at meetings of the scientific societies.

Included also are abstracts of work performed under Lincoln sponsorship or by consultants to the Laboratory, and, in Section A, of theses submitted for advanced degrees.

The period covered by this report is July 1, 1956 - April 15, 1960. An earlier edition, published in 1956 and now out of print, includes abstracts from the period July 1, 1954 - June 30, 1956.

3,181

Lincoln Laboratory 1961 UNCLASSIFIED PUBLICATIONS OF LINCOLN LABORATORY Lincoln Laboratory, Massachusetts Institute of Technology Contract No. AF 19(604)-7400 ASTIA AD 264 714

ABSTRACT: This reports lists all technical reports, G-reports, journal articles, meeting speeches, technical memorandums, Lincoln Manuals, special reports, and translations published by Lincoln Laboratories.

3,182

Lindberg, E. F., W. F. Sutterer, H. W. Marshall, R. N. Headley, & E. H. Wood 1960 THE EFFECT OF HEADWARD ACCELERATION ON CARDIAC OUTPUT. Abstract.

ABSTRACT: Measurements of cardiac output by dye dilution and of heart rate, stroke volume, mean arterial pressure at heart level, and systemic vascular resistance were made in six subjects in the seated position during a total of 51 1-minute exposures to 2, 3, and 4 g levels of headward acceleration produced by a human centrifuge. Comparison of the average values obtained 20 to 40 seconds after the onset of acceleration with data from 31 interspersed control determinations when the centrifuge was stationary revealed decreases of 7, 18, and 22 per cent in cardiac output and of 24, 37, and 49 per cent in stroke volume; systemic vascular resistance increased 17, 41, and 59 per cent during accelerations of 2, 3, and 4 g, respectively. Inflation of an anti-g suit to a pressure of 200 mm. of mercury during accelerations had no systematic effect except for an average increase in mean arterial pressure of 15 mm. of mercury above the values obtained without inflation. In five of the same subjects acceleration was lengthened to 10 minutes and measurements were made at 2-minute intervals 25, 24, and 17 times at the levels of 2, 3, and 3½ g, respectively. After the initial effects of these exposures, systematic alterations from the values obtained during the first minute were not observed. (The Physiologist 3(3):105, Aug. 1960)

3,183

Lindberg, E. F., W. F. Sutterer, H. W. Marshall, R. N. Headley & E. H. Wood 1960
MEASUREMENT OF CARDIAC OUTPUT DURING HEADWARD ACCELERATION USING THE DYE-DILUTION TECHNIQUE.
Aerospace Medicine 31(10):817-834.

SUMMARY: Measurement of Cardiac output, heart rate, stroke volume, mean arterial pressure and systemic vascular resistance were made in six subjects in the seated position during a total of fifty-one exposures for one minute to 2, 3 and 4 G levels of headward acceleration produced by a human centrifuge. The determinations of cardiac output by the indicator-dilution technique as well as measurement of the other variables mentioned were made during the period twenty to forty seconds after the onset of acceleration. Although there was a wide variability in the results, comparison of the average values during acceleration with data from thirty-one interspersed control determinations when the centrifuge was stationary revealed decreases of 7, 18 and 22 per cent in cardiac output and decreases of 24, 37 and 49 per cent in stroke volume during accelerations of 2, 3 and 4 G, respecitvely. Increases in heart rate of 14, 35 and 56 per cent, in mean aortic pressure of 9, 21 and 27 per cent in systemic vascular resistance of 17, 41 and 59 per cent were demonstrated during the 2, 3 and 4 G accelerations, respectively. It should be emphasized that these results are pertinent only to the period twenty to forty seconds after the onset of acceleration. They cannot be used as an indication of changes taking place during other periods of an exposure, particularly not during the initial fifteen seconds of acceleration when blood pressure at head level is severly reduced and dramatic cardiovascular alterations are taking place.

Inflation of the g-3A anti-g suit to 200 mm. Hg pressure during acceleration did not produce a significant systematic difference in the parameters measured except for the mean aortic pressure which was elevated to an average of 15 mm. Hg above the values obtained during exposures without inflation of the suit. The levels of acceleration associated with equivalent degrees of visual impairment in these six subjects were elevated approximately 1 G by inflation of the g-3A suit during the exposure. The results support the concept that this protection against development of visual symptoms is related to the degree of hypertension at heart level produced by inflation of the suit chiefly as a result of an increase in systemic vascular resistance and that an increase in cardiac output is not a major factor in this regard. (Author)

3,184

Lindberg, E. F. W. F. Sutterer, H. W. Marshall, R. N. Headley & E. H. Wood 1960
THE MEASUREMENT OF CARDIAC OUTPUT DURING HEADWARD ACCELERATION USING THE DYE-DILUTION TECHNIQUE.
(Paper: 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960)

ABSTRACT: The cardiac outputs of six trained centrifuge subjects in the seated position were determined twenty-seven times at 1 G and at interspersed intervals during seventeen, twenty-two and twelve one-minute exposures to 2, 3 and 4 G headward accelerations, respectively, by means of the Mayo Clinic centrifuge. After accelerating to 1.5 G, a 2 G per second rate of onset was achieved. Twenty

seconds after reaching the desired level of acceleration, a "slug" injection of cardio-green dye was made into the right atrium via a No. 5 Lehman catheter which was advanced into the heart from the left arm after percutaneous puncture of an antecubital vein. Both radial and atrial pressures were recorded continuously except during injection of dye or sampling. The electrocardiogram, respiratory rate, ear opacity, ear opacity pulse, esophagela pressure and reaction times to central and peripheral light signals also were recorded. Results indicate wide variations and inconsistent changes in cardiac outputs. Inflation of a G-4A anti-G suit to 200 mm. of mercury increased the range of alterations in cardiac output.

3,185

Lindberg, E.F., H.W. Marshall, W.F. Sutterer, T.F. McGuire & E.H. Wood 1961
STUDIES OF CARDIAC OUTPUT AND CIRCULATORY PRESSURES IN HUMAN BEINGS DURING FORWARD ACCELERATION.
(Paper, 32nd Annual Meeting of the Aerospace Medical Assoc., Palmer House, Chicago, Illinois, April 24-27, 1961)

ABSTRACT: Six healthy physicians were exposed to varying periods of forward acceleration of up to 10 minutes' duration at plateau levels of 3, 3.5 and 5 g produced by a human centrifuge. The subjects were supported in the supine seated position by a nylon net stretched tightly over a contoured metal frame, with the back elevated 21 degrees in the direction of acceleration. Measurements of cardiac output on the basis of dye-dilution curves recorded at the radial artery with injections of dye into the right atrium were made a total of 29, 30, and control (1g) determinations of cardiac output were done prior to and after the 80 determinations carried out during rotation in the centrifuge. In addition, five of the six subjects' output were done prior to and after the 80 determinations carried out during rotation in the centrifuge. In addition, five of the six subjects' outputs were determined five separate times in rapid succession during a 10-minute period in which the centrifuge was stationary. Continuous recordings of right atrial and aortic pressures as well as respirations, heart rate, ear opacity, ear opacity pulse and oxygen saturation of arterial blood were made in the control situation and during exposures to acceleration. Results indicate relatively little change or slight increases in cardiac output up to levels of 5 g forward acceleration when compared with control determinations performed at 1 g. When these accelerations were prolonged up to 10 minutes' duration, the cardiac output remained stable and there were no overt signs of decompensation. Forward acceleration produced significant increases in right atrial pressure from the average of 8 mm. mercury during control conditions (1g) up to an average of 22 mm. mercury at the onset of exposure to 5 g. Consistent increases in intraesophageal pressure of similar magnitude were noted in the three subjects in whom this variable was recorded; likewise, a consistent increase in mean aortic pressure was recorded in all subjects during exposure to acceleration. (Aerospace Med. 32(3):239, Mar. 1961)

3,186

Lindhard, J. 1913 EFFECT OF POSTURE ON THE OUTPUT OF THE HEART. Skand. Arch. Physiol. 30:395-408

3,187

Lindsley, D. B., & G. R. Wendt 1944 STUDIES IN MOTION SICKNESS: II. AN INVESTIGATION INTO THE RELATIONSHIP OF THE ELECTROENCEPHALOGRAM TO MOTION SICKNESS SUSCEPTIBILITY. (Civil Aeronautics Administration, Washington, D. C.) Dec. 1944; Rept. No. 40.

SUMMARY: In the following study an analysis was made of the occipital, pre-central and frontal EEG's of 10 motion-sickness susceptible male college students and 10 non-susceptibles selected by means of a motion-sickness history questionnaire. Susceptibles were those who were subject to one or more forms of motion sickness at the time of taking the questionnaire; all were in the most susceptible 5 per cent of the total group. Non-susceptibles were those who had experience on all vehicles and devices listed on the questionnaire and who had never been motion sick; 7 per cent of the total population of students fell in this category. The expectation was that if susceptibility is the result of a deviant condition of higher nervous activity, then those two groups, selected from the extremes of the population, might be clearly differentiated by their EEG's. The results, however, did not confirm this expectation. The EEG's of the two groups did not differ significantly with respect to normal characteristics of the EEG (alpha frequency, amplitude, and per cent time) or in abnormal tendencies (5-7 sec. activity from pre-central loads and abnormal response to hyperventilation). From the findings it may be concluded that susceptibility to sickness from motion is not accompanied characteristically by a deviant condition of high nervous activity as represented by the electroencephalogram. (CAA)

3,188

Linnell, R. D. 1958 VERTICAL RE-ENTRY INTO THE EARTH'S ATMOSPHERE FOR BOTH LIGHT AND HEAVY BODIES
Jet Propul. 28:329-330, May 1958

ABSTRACT: A solution for the velocity of a body during vertical re-entry into the earth's atmosphere is presented.

3,189

Lipkin, M., & H. L. Ratcliffe 1954 SOME EFFECTS OF CYCLIC ACCELERATION IN RHESUS MONKEYS. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5404; 4 May 1954 ASTIA AD-36 626
See also Aviation Med. 25(6):594-599.

ABSTRACT: The effects of cyclic accleration on rhesus monkeys were compared with the effects of positive and negative acceleration. Animals exposed to cyclic acceleration exhibited no change in external appearance, but tissue damage to internal organs was present. This damage could be grouped into 3 categories: (1) vascular congestion, edema, and hemorrhage; (2) formation of hyaline thrombi, and (3) separation of parenchymal liver cells. Details are included concerning the procedure, the final results, and the significance of the experiments. Postmortem examinations are presented in a report of each monkey. Each report outlines the gross and microscopic findings of each organ. (ASTIA)

3,190

Lipkin, M. and Ratcliffe, H. L. 1954 SOME EFFECTS OF CYCLIC ACCELERATION IN RHESUS MONKEYS. J Aviation Med. 25(6):594-599.

SUMMARY: In this study, eighteen rhesus monkeys (Macaca mulatta) were subjected to acceleration forces of either 25 G or 35 G, which were combined with from 30 to 150 rotations per minute. Two monkeys were accelerated to 25 and 35 G, then allowed to decelerate while being rotated at 110 turns per minute. All animals were sacrificed with intravenous Nembutal within one to six hours after exposure.

Post-mortem examination revealed tissue damage in internal organs of all animals exposed to this type of acceleration. The damage could be grouped in three categories: (1) vascular congestion, edema, and hemorrhage; (2) formation of hyaline thrombi, and (3)separation of parenchymal liver cells.

A comparison is made with rhesus monkeys unexposed to acceleration, and with others exposed to positive and negative acceleration of 40 G. It is suggested that the above-mentioned effects of cyclic acceleration are the result of more profound changes than can be accounted for on the basis of intravascular pressure rise due to the acceleration forces. It is recommended that the possible implications of these studies to the man in high performance aircraft be given further study.

3,191

Lippisch, A.M., R. Noble 1948 TRAJECTORIES OF UPWARD SEAT EJECTION (Naval Air Material Center, Aeronautical Medical Equipment Lab., Philadelphia, Pa.) TED NAM 256005, Report No. 6, Nov. 1948. ASTIA ATI 57 511

ABSTRACT: A method for determining the trajectory of a man and seat ejected upward from a moving aircraft when the initial conditions of flight and ejection are known has been derived. The mathematical derivation is highly complex, but the solution of the differential equations of motion yields a set of equations from which the position of the ejected body with respect to ground or to a point in space can be easily determined when the seven parameters which comprise

the initial conditions necessary for accurate calculation are airplane speed, direction and angle of inclination of flight, flight altitude, ejection velocity, angle of the seat guide rails with respect to the vertical, weight of the ejected mass, and air resistance of the mass. A particular form of the method presented can be used to determine the initial conditions of flight and ejection which are necessary for specified clearance of aircraft for particular dimensions. A preliminary investigation of the effect of the variation of four of the seven parameters is presented. The method for calculating the space and time trajectories of the ejected mass is given, and a comparison of available flight test trajectory data with theoretical calculations is shown. This analysis of trajectories and of the effects of the variable on the path of the ejected body is able to serve as a check and assurance of the validity and completeness of the aero-medical and engineering studies.

3,192

Lissner, H. R., E. S. Gurdjian & J. E. Webster 1947 MECHANICS OF SKULL FRACTURE Proc. Soc. Exp. Stress Analysis 7(1):61-70.
See also: Paper presented at the annual meeting of the Society for Experimental Stress Analysis, New York, Dec. 4, 1948.

3,193

Lissner, H. R., E. S. Gurdjian and J. E. Webster 1948 MECHANICS OF SKULL FRACTURE
(Paper, annual meeting of the Society for Experimental Stress Analysis, New York, 1948)
See also: Proc. Soc. Exp. Stress Analysis, 7 (1):61-70.

3,194

Lissner, H. R. 1952 EXPERIMENTAL AND CLINICAL SKULL FRACTURES. Instructional Course Lectures, Amer. Acad. Orth. Surg. 9:277-281

3,195

Lissner, H. R. and F. G. Evans 1956 ENGINEERING ASPECTS OF FRACTURES. Clinical Orthopaedics. 8:310-322.

3,196

Lissner, H. R., M. Lebow & F. G. Evans 1960 EXPERIMENTAL STUDIES ON THE RELATION BETWEEN ACCELERATION AND INTRACRANIAL PRESSURE CHANGES IN MAN. Surg., Gynec., & Obstet. 111(3):329-338, Sept. 1960.

ABSTRACT: The problems primarily investigated in the present studies are: (a) whether or not the body weight augmented the impact of the head against an automobile instrument panel, i.e., whether the fact that the body was attached to the head produced a more severe impact to the head than if the head alone were dropped on the instrument panel as in previous investigations; (b) the relationship between acceleration and intracranial pressure produced when the head struck a thin steel plate, an automobile instrument panel, and a large steel block; (c) the time duration of the pressures and accelerations occurring during impact of the head; and (d) the probable intracranial pressure and its time duration accompanying concussion.

Twenty-three drops, divided into 5 series of tests, were made with the embalmed bodies of 4 adult white male cadavers. The apparatus and instrumentation, as well as the method of making the drops, are described and illustrated.

3,197

Lissner, H. R. Mar. 1961 BIOMECHANICS RESEARCH. Journal of Engineering Education 51(7):594-598.

ABSTRACT: The author describes the tests conducted by the Biomechanics research center at Wayne State University on the strength characteristics of human bone during impact and acceleration.

3,198

Lissner, H. R. 1961 EFFECTS OF ACCELERATION ON THE HUMAN SKELETON (Wayne State University, Detroit, Michigan) June 1961

3,199

Lissner, H. R., & E. S. Gurdjian 1961 EXPERIMENTAL CEREBRAL CONCUSSION. American Society of Mechanical Engineers, New York, New York) Report No. 60-WA-273.

3,200

Lissner, H.R. 1961 IMPACT STUDIES IN UNITED STATES UNIVERSITIES (Paper, Symposium On Impact Acceleration Stress, Brooks Air Force Base, San Antonio, Texas, November 27-29, 1961)

3,201

Lissner, H.R. 1961 AN OUTLINE OF CURRENT RESEARCH AND OBJECTIVES OF FUTURE CONTRIBUTIONS TO INVESTIGATIONS OF IMPACT INJURIES BY UNITED STATES UNIVERSITIES
(Paper, Wayne State University, November 22, 1961)

ABSTRACT: It is futile to attempt to obtain a generalized approach to impact injury. The mechanism of injury due to impact in all regions of the body, and the mechanism of injury of all bodily organs and their attachments must be studied individually; and impact can be provided by objects of various sizes and shapes which will have a significant effect on the injury produced. In order to determine the type of injury, it will be necessary to devise instrumentation of a particular and special sort for making measurements within the body of living animals. All data obtained in impact investigations must be evaluated statistically. Another problem which should be investigated concurrently with injury production is how best to provide protection against injury under various impact conditions. Since research of this type must be undertaken by teams from various disciplines involved in the problem, I believe that universities are particularly well suited to conduct such investigations. One problem is to get people to work together in a team effort.

3,202

Lissner, H. R. 1962 BIOMECHANICS - WHAT IS IT?
(Paper, Winter Annual Meeting, New York, N. Y., Nov. 25-30, 1962, of the American Society of Mechanical Engineers) ASME Paper No. 62-WA-232

3,203

Lissner, H. R. 1962 DEFORMATION STUDIES OF THE BONES OF THE FACE
(Wayne State University, Detroit, Michigan) May 1962

3,204

Lissner, H.R. 1962 HUMAN AND ANIMAL IMPACT STUDIES IN U.S. UNIVERSITIES
Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, pp. 61-68)

ABSTRACT: Questionnaires were sent to the Deans of 158 engineering colleges and 83 medical schools in the United States to determine to what extent their institutions were engaged in studies involving impacts to animals and humans. The results of this survey will be presented.

The research being conducted can be classified into three separate categories. In the first category are the investigations covering planned automobile collisions. In the second category are the surveys being conducted to determine the actual injuries resulting in highway automobile collisions. In the third category we find investigations being conducted with impacts applied directly to animals and humans.

3,205

Livingston, P. C. 1939 THE PROBLEM OF BLACKOUT IN AVIATION. (Amaurosis Fugax), Brit. J. Surg. 26:749-756.

ABSTRACT: The first impression derived from the terrific impact of the aircraft against the resistance of the air at the point of turn is one of intense bodily strain producing what might be described as a "concertina sensation".

Loops out of a dive may produce only discomfort with a suspicion of visual uncertainty at 200 m.p.h. There may be dimness of perception of the ground and a sensation may be caused as though the accomodation had been overtaxed by bringing print too near the eyes.

A favored view of causation of "black-out" is one based on the compressing influence of intra-ocular pressure upon the central retinal artery and its branches. The vessels are believed to colapse because the systolic drive in the ophthalmic artery is seriously impaired, and the intra-ocular tension of 20 mm. of mercury provides an impassable resistance. Thus, retinal nutrition is brought to a standstill. (The author does not agree fully with this view).

The retina is peculiar in so much as it is more dependent upon oxygen for the maintenance of its vitality and function than any other tissue within the body. It was found that the oxygen demmand represents a four-fold value over that of other structures. Were the retina deprived completely of its blood supply and were the vessels actually compressed to extinction, there would be a definite risk of permanent damage to the visual receptor mechanism. This has never been recorded. The process may not be one of complete vascular denudation, but rather retardation of the existing flow.

Free use of oxygen has little effect on the onset of black-out, while CO_2 seems to be beneficial.

3,206

Livingston, P.C. 1942 FLYING PERSONNEL RESEARCH COMMITTEE APPARATUS FOR INVESTIGATING VISUAL REACTIONS IN RELATION TO AIRSICKNESS (RAF, Institute of Aviation Medicine, Farnborough) F.P.R.C. 463; May 1942, ASTIA AD-206 852

ABSTRACT: Fifteen personnel from A.C.R.C. selected at the National Hospital from among those examined for sickness on swings were sent to the Northampton Polytechnic to undergo the visual test. No records accompanied them, so that the experiment was uninfluenced by previous knowledge of their reactions to swinging, in which they might or might not have been affected.

The results of the vision test were graded according to their performances when putting the loop over the pin; that is to say during the second half of the full test. Notes were made with regard to the onset of swaying and any indication of pallor, or sweating. Where such signs appeared to be sufficiently marked to merit mention those added weight to any shown assessment as indicated from the use of the loop and pin test. The results at the Northampton Polytechnic (Visual Tests) are compared with those obtained at the National Hospital (Swinging Tests) in this report.

3,207

Livshits, G. SH., 1956 O VOZMOSHNOSTI MEZHPLANETNYKH POLETOV. (ON THE FEASIBILITY OF INTERPLANETARY FLIGHT) (Alma-Ata: Kazakhskoe gosudarstvennoe izdatel'stvo, 1956)

ABSTRACT: Space travel and problems connected with its realization are depicted in popular language to acquaint the layman with the tremendous difficulties of achieving space flight. A chapter entitled "Preparation for the Realization of Interplanetary Flight" reviews historical progress of astronautics from the first rocket flights to modern animal rocket experiments and sputniks. It also summarizes the findings related to overcoming effects of acceleration and deceleration forces, weightlessness, creation of cabin atmosphere, solar and cosmic radiation, etc.

3,208

Llano, G. A. July 1956 THE ART OF SURVIVAL. Flying Safety, 1: 6-10.

ABSTRACT: This article discusses abandoning of aircraft by parachute, especially over the sea. The mental and physical aspects are considered, especially in survival from great heights, when required survival equipment includes special maintenence of temperature and pressure. The "flotation gear" is discussed.

3,209

Lockheed Aircraft Corp. 1962 HUMAN CAPABILITIES IN THE PRONE AND SUPINE POSITIONS: AN ANNOTATED BIBLIOGRAPHY. (Lockheed Aircraft Corp., Sunnyvale, Calif.) Report no. 3-80-62-8; ASTIA AD-278 653; May 1962

3,210

Lockheed Missiles & Space Company 1961 SPECIAL BIBLIOGRAPHIES (Lockheed Missiles & Space Company, Sunnyvale, California) ASTIA AD 267868

ABSTRACT: This publication presents a compilation of special bibliographies from the Lockheed Missiles & Space Company for the years 1959-1961.

3,211

Loeb, A.A. 1955 STUDY OF THE IMPACT OF A SPHERE ON A SEMI-INFINITE SLAB FOR USE IN DROP-TOWER (Samuel Feltman Ammunition Labs., Picatinny Arsenal, Dover, N.J. Technical rept. no. 2173, proj. no. TA1-2707; July 1955; ASTIA AD-68 347.

ABSTRACT: "A mathematical analysis has been developed to describe the physical variations of deflection, load, velocity, and acceleration which take place during the impact of a sphere on a horizontal surface. The analytical expressions have been modified by experimentally determined constants to make them specifically useful in the interpretation of impact results secured with a drop tower which is utilized in the testing and evaluation of ammunition components and complete rounds. Expressions have been obtained which make possible the determination of peak acceleration, or setback, to an accuracy of 20% with variations in the height of drop, weight of the falling body, and geometrical configuration of the impacting surfaces as well as in the material used for the impacting surfaces. Experimental tests have been performed to verify the analytical equation and to evaluate the modifying constant used to correlate the theoretical and the experimental results. On the basis of this development and investigation, several extensions of this project appear desirable. A determination of coefficients of restitution, a dynamic analysis of the impact problem considering the nodes of vibration, and further refinement of the experimental equipment all appear to be desirable extensions of this work." (SFAL summary)

3,212

Logan, J. ed. 1953 THE COMPLETE BOOK OF OUTER SPACE (New York: Maco Magazine Corp., 1953)

ABSTRACT: A short collection of non-technical articles and lectures on space flight by authorities on rocket propulsion and space medicine.

3,213

Loginov, Bladislav & Leinoid Salmanov 1962 ON THE PREPARATION OF MAN FOR FLIGHTS INTO THE COSMOS
(Translation Services Branch, Foreign Technology Div., Wright-Patterson AFB, Ohio) FTD-TT-62-1592/1+2+4 20 Nov. 1962. ASTIA AD 292 615
Original Source: Kommunist, September 8, 1962, P. 3

ABSTRACT: The immediate preparation of man for flight into the cosmos began with the creation in our country of heavy cosmic ships. Scientists of biology and medicine, together with engineers, began an intensive study of the influence of the factors of cosmic space on the organisms of human beings and animals. In cosmic flight a man encounters many effects different from those on earth. These factors of cosmic flight may be divided into three groups. In the first group are extremely low barometric pressure, the absence of molecular oxygen, cosmic radiation, severe temperature conditions, the danger of meteors, etc. In the second are included the noise, vibration, and accelerations experienced over the powered portions of the ascent and descent of the craft, and also the weightlessness during the time of orbital flight. The third group consists of the effect of the artificial atmosphere of the cabin, the work and rest schedule without the 24-hour time periods to which man is accustomed, the peculiarities in eating, restriction of movement, psychological strain, etc. This article contains details on the selection of the pilot-cosmonauts and their scientifically based preparation and training.

3,214

Loman, J., W. Dameshek, A. Myerson, & D. Goldman 1936 EFFECT OF ALTERATIONS IN POSTURE ON THE INTRA-ARTERIAL BLOOD PRESSURE IN MAN. I. PRESSURE IN THE CAROTID, BRACHIAL AND FEMORAL ARTERIES IN NORMAL SUBJECTS. Arch. Neurol. Psychiat. 35:1216-1224 (Chicago)

3,215

Lombard, C.F., and D.R. Drury 1941 THE INFLUENCE OF POSITIVE FOOT-TO-HEAD RADIAL ACCELERATION UPON THE ABILITY OF A SUBJECT (PILOT) TO MANIPULATE A CONTROL STICK. (University of Southern Calif., School of Medicine, Los Angeles) Contract N60ri77, Task 1, 31 March 1941

ABSTRACT: By the use of an airplane control stick, modified and spring loaded, subjects were tested for their ability to manipulate the control stick in tracing a six-lobed clover leaf pattern while under the influence of increased positive radial acceleration (G) directed from foot to head. The positive G was obtained by the use of a human centrifuge of 25-foot radius.

The time to trace the pattern, with stick loading constant, decreased progressively from 23 seconds at 1 G to 17 seconds at 4 G, with no further change up to 6 G.

The time to trace the pattern at a constant radial acceleration of 3 G did not vary significantly as the elevator loadings for pull, or push, or the aileron loadings were varied one at a time.

There is an apparent change in psychomotor performance of the subjects as the radial acceleration is increased up to 4 G with no further change up to 6 G.

The actual pull on the stick, by subjects applying an estimated 20-lb. pull, increased uniformly with increasing positive accelerations.

It is recommended that both the apparent change in psychomotor performance with increased radial accelerations and the effects of radial acceleration upon the masses of the extremities of the body, in regard to airplane controls, be further determined.

3,216

Lombard, C. F. and D. R. Drury 1947 THE INFLUENCE OF POSITIVE (FOOT TO HEAD) RADIAL ACCELERATION UPON THE ABILITY OF A SUBJECT (PILOT) TO MANIPULATE A CONTROL STICK.
(Office of Naval Research, Washington, D.C.)
July 1947 Contract Noori77

SUMMARY: By the use of an airplane control stick, modified and spring loaded, subjects were tested for their ability to manipulate the control stick in tracing a six-lobed clover leaf pattern while under the influence of increased positive radial acceleration (G) directed from foot to head. The positive G was obtained by the use of a human centrifuge of 25-foot radius.

The time to trace the pattern, with stick loading constant, decreased progressively from 38 seconds at 1 G to 17 seconds at 4 G, with no further change up to 6 G.

The time to trace the pattern at a constant radial acceleration of 3 G did not vary significantly as the elevator loadings for pull, or push, or the aileron loadings were varied one at a time.

There is an apparent change in psychomotor performance of the subjects as the radial acceleration is increased up to 4 G with no further change up to 6 G

The actual pull on the stick, by subjects applying an estimated 20-lb. pull, increased uniformly with increasing positive accelerations. The actual pull of .3 lb. at 1 G increased to 30 lb. to 3 G, 34 lb. at 4 G, 36 lb. at 5 G and 38 lb. at 6 G. Five tests at 7 G and two tests at 8 G showed 50 lb. and 54 lb. respectively The increase in actual pull with increased G while estimating a 20-lb. pull appears to be caused by the radial acceleration acting on the mass of the arm through its lever system to produce an "involuntary pull" which is additive to the estimated or "effort pull."

It is recommended that both the apparent change in psychomotor performance with increased radial accelerations and the effects of radial acceleration upon the masses of the extremities of the body, in regard to airplane controls, be further determined.

3,217

Lombard, C. F. et al 1948 THE EFFECTS OF NEGATIVE RADIAL ACCELERATION ON LARGE EXPERIMENTAL ANIMALS (GOATS).
(Office of Naval Research, Washington, D. C.)
January, 1948 Contract N6ori77

SUMMARY: The effects of negative radial acceleration (centrifugal force acting from tail to head) upon 11 goats were studied on the human centrifuge at the University of Southern California, at levels of -5 G and -8 G.

In addition to routine gross examination for presence of hemorrhages, etc., observations were made on respiration and cardiac function. In selected cases, ophthalmological examinations were made, electrocardiograms recorded, chest X-rays taken and blood samples collected.

Autopsies were conducted on all animals, and specimens taken for histopathologic study.

A motion picture was prepared which records both gross and microscopic pathologic findings as well as typical experimental procedures.

These experiments indicate that repeated exposures to -5 G tend to produce considerable edema and numerous hemorrhages, both petechial and frank, in the tissues of the head and neck. In contrast, however, only one animal showed cerebral hemorrhage, this a small one on the dorsal surface of the medulla. Heart action was slowed and respiration depressed. Some subpleural hemorrhages were found in the lungs. Subendocardial hemorrhages of dubious origin were frequently noted.

Negative G seems to offer greater danger of strangulation by edema of the glottis and surrounding tissues than of cerebral hemorrhage.

3,218

Lombard, C.F. 1948 HUMAN TOLERANCE TO FORCES PRODUCED BY ACCELERATION (Douglas Aircraft Company, Inc., El Segundo, Calif) Report No. ES-21072 27 Feb. 1948.

ABSTRACT: Human tolerance to acceleration is reviewed and discussed in a manner relatively free from medical terminology in an effort to make the current knowledge on the subject more usable. A chart is presented which shows on a log grid the approximate human tolerances to forces produced by acceleration in relation to velocity, stopping distance and time.

3,219

Lombard, C. F., A. A. Canfield, R. C. Wilson, N. D. Warren, & D. D. Drury 1948 THE INFLUENCE OF POSITIVE (HEAD TO FOOT) CENTRIFUGAL FORCE UPON SUBJECT'S (PILOTS') ABILITY TO EXERT MAXIMUM PULL ON AN AIRCRAFT CONTROL STICK. (Research Report to the Office of Naval Research) Contract N6ori77, Task Orders I and III, Jan. 1948

3,220

Lombard, C. F., H. P. Roth and D. R. Drury 1948 THE INFLUENCE OF RADIAL ACCELERATION (CENTRIFUGAL FORCE) ON RESPIRATION IN HUMANS (Office of Naval Research, Washington, D. C.)
February 1948 Contract N6ori77
Also see J. Avia. Med., 19(5), October 1948

SUMMARY: The effects of centrifugal force applied positively (head to seat) and negatievely (seat to head) upon respiration were studied on a human centrifuge of 25-foot radius. Results were as follows:

Negative acceleration up to -3 G (without protective gear).
- a. Slight increase in respiratory rate.
- b. Decrease in tidal volume.
- c. Decrease in lung volume at end of expiration.
- d. Decrease in vital capacity.

Positive acceleration up to +5 G without protective pneumatic suits or tight belt.
- a. Slight increase in respiratory rate.
- b. Increase in tidal volume.
- c. Increase in the lung volume at end of expiration.
- d. Decrease in vital capacity.

Positive acceleration up to + 6 G with protective pneumatic suit.
- a. Moderate increase in respiratory rate.
- b. Decrease in tidal volume.
- c. Decrease in the lung volume at end of expiration.

Positive acceleration up to + 4 G with tight abdominal belt.
- a. Insignificant increase in respiratory rate.
- b. Increase in tidal air volume.
- c. Increase in the lung volume at end of expiration.

3,221

Lombard, C. F., H. P. Roth and D. R. Drury 1948 THE INFLUENCE OF RADIAL ACCELERATION (CENTRIFUGAL FORCE) ON RESPIRATION IN HUMANS. J. Aviation Medicine, 19(5):355-364.

ABSTRACT: The effects of centrifugal force applied postively (head to seat) and negatively (seat to head)upon respiration were studied on a human centrifuge of 25-foot radius. Results were as follows:

Negative acceleration up to -3 G (without protective gear).

a. Slight increase in respiratory rate.
b. Decrease in tidal volume.
c. Decrease in lung volume at end of expiration.
d. Decrease in vital capacity

Positive acceleration up to + 5 G without protective pneumatic suits or tight belt.

a. Slight increase in respiratory rate.
b. Increase in tidal volume.
c. Increase in the lung volume at end of expiration.
d. Decrease in vital capacity.

Positive acceleration up to + 6 G with protective pneumatic suit.

a. Moderate increase in respiratory rate.
b. Decrease in tidal volume.
c. Decrease in the lung volume at end of expiration.

Positive acceleration up to + 4 G with tight abdominal belt.

a. Insignificant increase in respiratory rate.
b. Increase in tidal air volume.
c. Increase in the lung volume at end of expiration.

3,222

Lombard, C.F., H.P. Roth and D.R. Drury 1948 THE INFLUENCE OF RADIAL ACCELERATION (CENTRIFUGAL FORCE) ON RESPIRATION IN HUMANS. (University of Southern Calif., School of Medicine, Los Angeles) Contract N60ri77, Task 1, 31 March 1951
See also J. Aviation Medicine, 19(5):355, October 1948

ABSTRACT: The effects of centrifugal force applied positively (head to seat) and negative (seat to head) upon respiration were studied on a human centrifuge of 25-foot radius. Results were as follows:

Negative acceleration up to -3 G (without protective gear)

a. Slight increase in respiratory rate.
b. Decrease in tidal volume.
c. Decrease in lung volume at end of expiration.
d. Decrease in vital capacity.

Positive acceleration up to + 5 G without protective pneumatic suits or tight belt.

a. Slight increase in respiratory rate.
b. Increase in tidal volume.
c. Increase in the lung volume at end of expiration.

d. Decrease in vital capacity.

Positive acceleration up to + 6 G with protective pneumatic suit.

a. Moderate increase in respiratory rate.
b. Decrease in tidal volume.
c. Decrease in the lung volume at end of expiration.

Positive acceleration up to + 4 G with tight abdominal belt.

a. Insignificant increase in respiratory rate.
b. Increase in tidal air volume.
c. Increase in the lung volume at end of expiration.

3,223

Lombard, Charles F. 1949 HOW MUCH FORCE CAN THE BODY WITHSTAND? Aviation Week, 50(1):20-21;23-25;27-28. 17 Jan 1949

3,224

Lombard, C.F. 1949 PHYSIOLOGICAL, BIOCHEMICAL AND ANATOMICAL EFFECTS OF ACCELERATION ON THE BODY RELATIVE TO PILOT POSITION IN HIGH-SPEED AIRCRAFT. (University of Southern Calif., School of Medicine, Los Angeles) USN Contract no. N6ori77, Task Order 1, Project no. 161-014 July 1949

3,225

Lombard, C.F., A.A. Canfield, R.C. Wilson, N.D. Warren and D.R. Drury 1951 THE INFLUENCE OF POSITIVE (HEAD TO FOOT) CENTRIFUGAL FORCE UPON A SUBJECT'S ABILITY TO EXERT MAXIMUM PULL ON AN AIRCRAFT CONTROL STICK. (University of Southern Calif., School of Medicine, Los Angeles) Contract N6ori77, Tasks 1 & 2, 31 March 1951

ABSTRACT: Two series of experiments were performed on the human centrifuge to determine the effects of various levels of positive G (Gravitational or centrifugal force acting from head to foot) upon the maximum pull which a seated subject could exert on a simulated airplane control stick, using both arms simultaneously. An "isometric" stick, having negligible deflection with applied force, was used. G protection was used to avoid grey-out or black-out.

The maximum pull which a subject can exert upon a simulated airplane control stick does not increase with increased G. The mean maximum pull was the same at 1 and 2 G, and decreased there after with increased G up to and including 5 G.

Variation in arm position, measured by the angles of the members in relation to the direction of the G force, did not significantly influence maximum pull at 4 G. This implies that the arms are acting as rigid, non-jointed members during maximum pulling effort.

The involuntary pull of the subject's arms, at 1 G, due to their own mass and leverage system, increases as the angles of the members increase in relation to the direction of G force.

Involuntary pull for two arms, at 1 G, was found to exceed 10 lbs. in more than 50% of the arm angles tested in those experiments.

3,226

Lombard, C. F., S. W. Ames et al 1951 STUDIES WITH THE EPICYCLIC CENTRIFUGE ON ANIMALS AND HUMANS
(Paper Twenty-second annual meeting of the Aero Medical Association in Denver, Colorado, May 1951.)
(Office of Naval Research, Washington, D. C.)
May 1951 Contract N6ori77

SUMMARY: In order to better understand the effects of tumbling during exposure to high accelerational forces, such as might be encountered during escape from high speed aircraft, a small centrifuge was mounted on the large University of Southern California centrifuge. Anesthetized goats and apes were repeatedly exposed to accelerations up to 5 G while being rotated either about the head, heart or hips, at speeds up to 72 RPM. One human subject was exposed on several occasions to 2 G at 40 RPM. Motion pictures were taken to study the problem of holding the body.

It was found that it is extremely difficult to strap an animal or human such that they will not work out of the straps. The ever changing direction of acceleration with respect to the body makes it a writhing, flopping aggregate of discordant masses. Rotation about the heart appeared to be the best position.

Blood pressures measured at level of base of skull and only in the animals showed, at the higher stress loads, extremely high transient pressures (900 plus mm HG) which did little or no observable damage.

More nearly normal blood pressure and more rapid return to the normal was observed while rotating the animal about the heart.

Apes, after recovery from the effects of the anesthetic, showed no apparent alteration in behavior or faculties.

The human subject reported no dizziness but some questionable gastric distress several hours after one series of exposures.

3,227

Lombard, C.F., S.W. Ames, and S. Rosenfeld 1951 VOLUNTARY TOLERANCE OF THE HUMAN TO IMPACT ACCELERATIONS OF THE HEAD. (Depart. of Aviat. Med., Univ. of Southern Calif., School of Med., Los Angeles, Calif.) Contract N6ori77, Task 1, 31 March 1951
See also J. Av. Med. 22(2):109-116

ABSTRACT: Voluntary tolerances to impact blows to the head of humans have been determined while using available protective head of humans have been determined while using available protective headgear to reduce or minimize the local bruising effects.

Voluntary limits were always found to be other than the effects of acceleration upon the head (or brain); neck pain, local bruising, etc.

Accelerations of equal pendular masses shows that the human voluntarily tolerated up to 34 G from a top blow, 38 G from a frontal blow, 25 G from a blow by the side of the head and 35 G from a back blow.

The averages of voluntary tolerances showed for the top 23 G for 6.0 ft lbs at 5.8 ft per sec at 4,800 g.p.s., for the front 22 G for 4.1 ft. lbs at 4.9 ft per sec at 5,600 g.p.s.; for the side 20G for 5.7 ft at 5.6 ft per sec at 3,500 g.p.s.; and for the back blows 18 G for 4.9 ft lbs at 5.2 ft per sec at 3,700 g.p.s.

An approach has been made to this multifaceted problem of head injury in which an attempt to study the effect only one factor namely impact acceleration. Some data has been obtained but much more is indicated and a much greater effort by biologists in the use of engineering terms is indicated if their data is to be useful.

3,228

Lombard, C. F., S. W. Ames and S. Rosenfeld 1951 VOLUNTARY TOLERANCE OF THE HUMAN TO IMPACT ACCELERATIONS OF THE HEAD
J. of Aviation Medicine 22(2):109-116, April 1951.

SUMMARY: Voluntary tolerances to impact blows to the head of humans have been determined while using available protective headgear to reduce or minimize the local bruising effects.

Voluntary limits were always found to be other than the effects of acceleration upon the head (or brain); neck pain, local bruising, etc.

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An approach has been made to this multifaceted problem of head injury in which an attempt to study the effect only one factor namely impact acceleration. Some data has been obtained but much more is indicated and a much greater effort by biologists in the use of engineering terms is indicated if their data is to be useful.

3,229

Lombard, C. F., P. Close, & F. Larmie 1963 PATHOLOGY PRODUCED BY IMPACT ACCELERATION APPLIED TO GUINEA PIGS. (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 29-May 2, 1963)

ABSTRACT: In contemporary aerospace vehicles the possibility of exposure of astronauts to impact at any angle has increased the need for experimental data relating to tolerance, pathology and the value of various protective device concepts. To obtain such information, anesthetized male guinea pigs were placed on a small impact acceleration sled in form fitting fiberglass reinforced plastic support and restraint device. The device was gimbal mounted on the carriage of the sled so that accelerations could be applied to the animals at any of a wide variety of selected angles. Animals were exposed to forces of 80 to 90 g peaks with onset rates of about 11,000 to 14,000 g/sec. Animals placed in the close fitting support-restraint tolerated the transverse impact accelerations even when repeatedly exposed. A type of sub-clinical damage was observed in some of these animals which resembled air blast. The guinea pigs oriented on the sled in a tail first direction tolerated the impact well. However, animals oriented on the sled the opposite direction, head first, showed little tolerance to the exposures and frequently indicated vertebral injury, ranging from the head tailward to the mid-thoracic vertebrae. The need for improved restraints is indicated.

3,230

LoMonaco, C. T. 1947 INFLUENZA DIALCUNI FATTORI SULLA RESISTENZA UMANO ALLE ACCELERAZIONE. (EFFECTS OF VARIOUS FACTORS ON HUMAN RESISTANCE TO ACCELERATIONS). Rivista D. medicini Aeronautica 10:609-611, Oct.-Dec. 1947.

3,231

LoMonaco, T. 1948 L'ORGANISMO UMANO RESISTERA ALLE VARIAZIONI AMBIENTALI DI UN VIAGGIO INTERPLANETARIO? (WILL THE HUMAN ORGANISM BE ABLE TO WITHSTAND THE ENVIRONMENTAL CHANGES OF AN INTERPLANETARY JOURNEY?) Riv. med. aeronaut. 11:84-87

3,232

Lomonaco, T. 1950 ALCUNE PROBABILI MANIFESTAZIONI DELL'ORGANISMO UMANO NEL FUTURO VOLO INTERSIDERALE (SOME PROBABLE REACTIONS OF THE HUMAN ORGANISM IN FUTURE INTERPLANETARY FLIGHT) In L'Uomo in volo (Rome: Abruzzini, 1950) pp. 469-476

3,233

Lo Monaco, C. T., 1950 L'UOMO IN VOLO: MANUALE DI MEDICINA AERONAUTICA PER IL PERSONALE AERONAVIGANTE. (Man in Flight: An Aeromedical Manual For Flyers) (Rome: Abruzzini Editore, 1950). ASTIA ATI 132 428.

3,234

LoMonaco, C. T. 1951 INFLUENZA DEL MODERNO VOLO VELOCE SULLE FUNZIONI PSICOFISIOLOGICHE DEL PILOTA (Effect of Modern High Speed Flight on the Psycho-physiologic Functions of the Pilot) Rivista di Medicina Aeronautica, Rome 14:209-229, April-June 1951.

3,235

LoMonaco, T. 1952 ALCUNI PROBABILI FENOMENI FISIO-PATOLOGICI DELL 'UOMO DURANTE I FUTURI VOLI SIDERALI (Some Probable Physiopathological Phenomena In Man During Future Interplanetary Flights) Riv. med. aeronaut. (Roma), 15(1):3-12

ABSTRACT: Physiopathological aspects of interplanetary flight are discussed, falling in three main categories: (1) changes in speed or direction of a moving body exert forces on the organism which are tolerated best if they are of short duration; (2) reduction of the apparent weight beyond the zone of gravitation would affect the labyrinthic rather than the cardiovascular system and would interfere with muscular coordination; and (3) problems of the environment include maintenance of air supply, temperature, and food, and avoidance of cosmic radiation. Space medicine cannot, at present, give any assurance as to the survival of humans in a space ship.

3,236

Lo Monaco (Croce), T. 1952 PRIMI STUDI SUGLI EFFECTTI FISIOPATOLOGICI CAUSATI DALLA SUB-GRAVITA IN ANIMALI LANCIATI, DENTRO MISSILI, NELL'ALTO ATMOSFERA (First Studies on the Physiopathological Effects Caused by the "Sub-Gravitation" in Animals Propelled in Rockets into the Upper Atmosphere) Rivista di Medicina Aeronautica (Rome) 16(2): 192-199.

3,237

LoMonaco, T. 1956 IL CENTRO DI STUDI E RICERCHE DI MEDICINA AERONAUTICA DI ROMA. (CENTER OF STUDIES AND RESEARCH IN AVIATION MEDICINE OF ROME) Rivista aeronautica (Roma) 32 (8):833-866, Aug. 1956.

ABSTRACT: The mission of the Center of Studies and Research in Aviation medicine, Rome, is to (1) engage in studies and experimental research dealing with the physiology, physiopathology, psychology, and psychotechnique of man in flight; (2) develop methods for increasing man's resistance to modern flight; (3) teach aviation medicine to medical officers, flight surgeons, and other physicians; and (4) train flying personnel in aviation physiology. The center is divided into departments of physiology and physiopathology, aviation hygiene, and biochemistry, and applied psychology. Also included are a library and documentation and statistical offices. Discussion is presented on the research programs of the Center, along with multiple illustrations on the apparatus (human centrifuge, decompression chamber, manometric and oximetric apparatus, etc.) utilized in research.

3,238

LoMonaco, T., ... Strollo, & L. Fabris 1956 COMPORTAMENTO DELLA COORDINAZIONE MOTORIA IN SOGGETTI SOTTOPOSTI A VALORI DI ACCELERAZIONE VARIANTI DA 3 A 0 G. (Behavior of Motor Coordination in Subjects Exposed to Acceleration Values Varying from 3 to 0 G) Proc. International Astronautical Congress, VIIth, (Rome) Pp. 825-839, Sept. 12-22, 1956.

ABSTRACT: Thirty subjects with normal labyrinthine function were exposed, by means of a subgravity tower, to accelerations varying from 3 to 0 G for a total time of 8 seconds, of which 4 were spent in subgravity. Under these conditions studies were made of eye-hand coordination and body equilibrium. During the experiment the subjects showed motor incoordination. Under subgravity conditions there was evidenced an increase of muscle tonus, a sense of levitation, bewilderment and distration, and various unpleasant sensations. Twenty of the thirty subjects exposed to various consecutive tests demonstrated improvement in the coordination test and a decrease in unpleasant sensations, indicating possible adaptation to experimental conditions.

3,239

LoMonaco, T., A Scano, M. Strollo, & F. Rossanigo 1957 ALCUNI DATI SPERIMENTALI FISIOPSICHICI SUGLI EFFETTI DELLE ACCELERAZIONI E DELLA SUB-GRAVITA PREVISTI NELL 'UOMO LANCIATO NELLO SPACIO.
(Some Physiopsychic Experimental Data On the Effects of Accelerations and Gravity Predicted for Man Launched Into Space)
Riv. med. aeronaut. (Roma), 20(3):363-390. July-Sept 1957.

ABSTRACT: Thirty subjects with normal labyrinthine functions were exposed to accelerations ranging from 3 g (for fractions of a second) to zero g (4 seconds) in a 14-meter-high subgravity tower. The eye-hand coordination was studied by means of an aiming test. Slight but well defined motor incoordination was observed. During weightlessness the majority of subjects experienced a lifting sensation or a feeling of levitation, an increase in muscle tonus, and various unpleasant sensations. Five subjects exposed to several consecutive runs showed an improvement in coordination performance and less severe subjective sensations, indicating an adaptation to the experimental conditions. In 10 subjects, most of whom had already been exposed to the latter experiment, the CF and CF5 leads of the electrocardiogram during controlled apnea before, during, and after gravity variations showed a marked increase in heart rate which rapidly returned to normal. The coordination test was repeated on five deaf mute subjects whose labyrinthine function was completely failing, and demonstrated good eye-hand coordination during the tower experiments.

3,240

Lomonaco, T., M. Strollo, & L. Fabris, 1957 SULLA FISIOPATOLOGIA DURANTE IL VOLO NELLO SPAZIO: COMPARTOMENTO DELLA COORDINAZIONE MOTORIA IN SOGGETTI SATIOPOSTI A VALORI DI ACCELERAZIANA VARIANTE DA 8 A ZERO G
(Physiopathology During Space Flight: Behavior of Motor Coordination in Subjects Exposed to Acceleration Values Varying From 3 G tc 0 G)
(Presented at Seventh International Astronautical Congress, Rome, 1956)
Rivista di Medicina Aeronautica 20(1):76-96 (Suppl. to No. 1, Jan.-Mar.)

3,241

Lomonaco, T., A. Scano, M. Strollo & F. Rossanigo 1958 ALCUNI DATI SPERIMENTALI FISIC-PSICHICI SUGLI EFFETTI DELLE ACCELERAZIONI E DELLE SUBGRAVITA PREVISTI NELL'UOMO LANCIATO NELLO SPAZIO (Some Physio-psychic Experimental Data on the Effects of Accelerations and Sub-gravity Predictable for Man in Space)
Minerva medica (Torino) 49: 61-62, 4 Aug. 1958
See also: Riv. Med. aero. (Rome) 20(3): 363-390, July-Sept. 1957

3,242

LoMonaco, T.C., A. Scano, and F. Rossanigo 1958 VARIATIONS OF PSYCHO-PHYSIOLOGICAL DATA IN MAN SUBJECTED TO CHANGES IN ACCELERATIONS BETWEEN 3 AND ZERO G. Rivista di Med. Aero. 21(4):691-704 (In Italian with English summary).

ABSTRACT: Studies were carried out concerning psychophysiologic effects of weightlessness on human subjects (zero G, after an initial acceleration of 3 G) States of subgravity were achieved by drops from a tower 14-m high, which is described in detail. The authors made radiograms of the thorax and electronystagmographic recordings during the zero G state. Sensations experienced during the experiment were described by the test subjects upon termination of the experiments. The results show that weightlessness is accompanied by displacement of the heart and the diaphragm. Zero gravity, however, does not induce nystagmus or modify previously induced nystagmus. Among the sensations reported, the feeling of being lifted and of falling into the void was considered unpleasant; some subjects reported loss of the sensation of being tied to the seat. Two subjects who had kept their eyes shut reported that they felt like taking successive upward jumps after the actual fall, which was not perceived as such.

3,243

Lomonaco, T., A. Scano, & F. Rossanigo 1959 COMPORTAMENTO DI ALCUNI DATI FISIO-PSICHICI NELL'UOMO SOTTOPOSTO A VARIAZIONI DI ACCELERAZIONE COMPRESE FRA 3 E ZERO G (BEHAVIOUR OF CERTAIN PHYSIO-PSYCHOLOGICAL FEATURES IN SUBJECTS SUBMITTED TO VARIATIONS OF G BETWEEN 3 AND ZERO) Minerva Medica 50(31):1134-1138
NOTE: Reel 11, Flash 6

ABSTRACT: The authors have studied some physio-psychological effects of subgravity in human subjects (zero g after an initial acceleration of 3 g). By means of a 14 m high tower, which is described in detail, chest roentgenograms and electronystagmografic recordings were taken during zero g state. An analytical study was also made of the subjective sensations of a number of subjects possessing a greater capacity of auto-observation. The results show that subgravity is associated with displacements of the heart and diaphragm but is unable to determine nystagmus or to modify it when previously provoked. The subjects examined described peculiar sensations and illusions felt during the test. These sensations differ according to whether their eyes were open or closed. (Minerva Medica 50(31):1157, 1959)

3,244

LoMonaco, T. 1959 PREVISIONI SUL COMPORTAMENTO PSICO-FISIOLOGICO DELL'UOMO LANCIATO NELLO SPAZIO (PREDICTIONS ON THE PSYCHO-PHYSIOLOGICAL BEHAVIOUR OF MAN IN SPACE) Minerva Medica 50(31):1122-1134, April 1959
NOTE: Reel 11, Flash 6

ABSTRACT: The main physiological and psychological problems concerning man travelling through space in an especially designed vehicle are considered and discussed on the basis of the most recent discoveries. These problems concern the effects of acceleration on the body, the microclimate aboard the space-ship, the defense from noxious radiations and meteorites, the psycho-physiological effects of speed and of remotion from the Earth, the effects of isolation in a confined, sealed cabin and, finally, the effects of sub and zero-gravity conditions The results are presented of researches in this field, carried on in Italy and abroad, and in particular the results of a series of experiments, performed in the "Centro di Studi e Ricerche di Medicina Aeronautica" of Rome, by means of a specially constructed device: the so-called "subgravity tower". These experiments have shown that, in subjects submitted to sub and zero-gravity conditions, motor incoordination and displacement of thoraco-abdominal viscera occur. (Minerva Medica 50(31):1157, 1959)

3,245

LoMonaco, T., A. Scano & F. Rossanigo 1960 COMPORTAMENTO DI ALCUNE FUNZIONI PERCETTIVO-MOTORIE DURANTE IL PASSAGGIO DA CIRCA 2 A 0 G ED INFLUENZA DELL ALLENAMENTO: ESPERIMENTI ESEGUITI CON LA TORRE DI SUBGRAVITA. (Behavior of Some Perceptual-Motor Functions During the Transition from About Two to Zero G and the Effect of Training: Experiments Executed with the Subgravity Tower) Riv. med. aeronaut. (Rome), 23(4):439-456 Oct. - Dec. 1960. (In Italian)

ABSTRACT: Tests were conducted on a group of six subjects in order to establish the degree of performance during hyper- and zero gravity. The subjects were required to execute a repetitive task with electrical switches following a pre-established pattern while at rest and when launched on a subgravity tower to various states of gravity. Film was taken during the test for observation at a later time. After mild rectilinear acceleration, the normal subjects could tolerate several short and frequent exposures during weightlessness. Moreover, the subjects could perform simple perceptual-motor tasks. The subjects with restraint devices performed with greater ease and were more accurate than those without restraint devices. Repetition of the task during launches also led to greater accuracy in performance. Although the greater part of the test was only slightly affected provided that the relation between his body and the surrounding objects remained fixed.

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Lomonaco, T. 1960 PROBLEMS OF SPACE MEDICINE
Missili (Roma) 2(1):5-20, Feb. 1960

ABSTRACT: The main psycho-physiologic problems which concern man traveling in space are considered and discussed on the basis of recent research and discoveries. Included are the effects of acceleration on the body. Particular reference is made to a series of experiments on weightlessness performed in the "Central di Studi e Ricerche di Medicina Aeronautics", Rome, by means of a specially constructed device, the so-called "subgravity tower".

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Lomonaco, T. 1961 IL FATTORE UMANO, CAUSA DI INCIDENTI DI VOLO (The Human Factor, Cause of Flight Accidents)
Rivista di Medicina Aeronautica e Spaziale (Rome) 24(1): 5-28. Jan.-March 1961

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Lomonaco, T. 1962 LINEAMENTI DI UNA SELEZIONE PSICOFISICA DEL COSMONAUTA (Psycho-Physical Criteria for Selection of an Astronaut)
In Antonio Ambrosini, Ed. RENDICONTI DEL CONGRESSO INTERNAZIONALE--L'UOMO E LA TECNICA NELL'ERA NUCLEARE E SPAZIALE, 18-21 APRILE 1962, (Proceedings of the International Congress--Man and Technology in the Nuclear and Space Age, 40th Trade Fair, Milan, April, 18-21, 1962)
(Rome, Italy: Associazione Internazionale Uomo nello Spazio)
Pp. 453-468

ABSTRACT: The physical and psychological stresses of spaceflight are reviewed and the criteria for selecting astronauts are given. (N63-18937)

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Long, F.M. 1962 BIOLOGICAL ENERGY AS A POWER SOURCE FOR A PHYSIOLOGICAL TELEMETERING SYSTEM. IRE Internat. Convention Record, 10 (9):68-73

ABSTRACT: A brief study of three biological energy sources, biological potentials and chemical gradients, blood pressure and flow, and muscular activity and motion, revealed that the first two possibilities presented difficult problems in electrode and tissue reactions and that the third possibility might have more immediate application. A theoretical study of an accelerometer system, utilizing relative motion, indicated that several milliwatts could be delivered to the damping mechanism. A test model employing a piezo-electric crystal as the mechanical to electrical converter and a tunnel diode oscillator was successfully operated at power levels of approximately one microwatt. (Author)

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Longmore, D. V. 1950 TRAVEL SICKNESS.
Guys Hosp. Gazette, 64 :237

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Lord, C. D. and J. W. Coutts 1944 A STUDY OF PARACHUTE INJURIES
Bull. Army med. Dept. (78):57-67. 1944.

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Lord, C. D. and J. W. Coutts 1944 A STUDY OF TYPICAL PARACHUTE INJURIES OCCURRING IN TWO HUNDRED AND FIFTY THOUSAND JUMPS AT THE PARACHUTE SCHOOL
J. Bone Joint Surg. 26:547-557.

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Lorente de No, R. 1932 RESEARCHES ON LABYRINTH REFLEXES Trans. Amer. Otol. Sec. 22:287-303

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Lottig, 1937 GRENZEN DER PHYSIOLOGISCHEN BELASTUNGSFAHIGKEIT IM FLUGZEUG (LIMITS OF PHYSIOLOGIC ENDURANCE IN AVIATION) Zentralbl. f. Hals. --Nasen--und Ohrenheilk. 28:105-107

ABSTRACT: Trained aviators may lfy to altitudes of 6000-7000m without additional oxygen. The most dangerous effect of these high altitudes is the psychic effect which resembles very much that of alcoholic intoxication with loss of powers of concentration and attention, euphoria and a devil-may-care attitude. In many persons circulatory collapse occurs at levels of 5000-6000 m. before the psychic symptoms develop. To overcome these ill effects by administration of oxygen, careful training constitutes an important problem. Short accelerations not exceeding 5-6 times gravity may be endured without injury. In greater centrifugal accelerations visual disturbances and confusion develop as the blood supply to the retina and brain suffer most. Von Diring - shofen has demonstrated that this effect may be prevented by stooping of the aviator. Accelerations beyond 10 times gravity cannot be tolerated in spite of all protective measures. (CARI)

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Loucks, R. B., & T. G. Hermans 1947 ANNOTATED BIBLIOGRAPHY ON THE PSYCHOLOGICAL ASPECTS OF ORIENTATION AS THEY RELATE TO AVIATION. (Aero Medical Lab., Eng. Div., Wright Field, Ohio) TSEAA-694-16a, 1 Dec. 1947

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Lovelace, W.R. 1939 RESEARCH IN GERMAN, ITALIAN AND FRENCH AIR FORCES. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 36, June 1939.

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Lovelace, W.R. II 1944 AVIATION MEDICAL PROBLEMS IN THE EUROPEAN AND MEDITERRANEAN THEATRES OF OPERATION. (War Dept., Air Forces) TSELA5B-697-8, 1 November 1944

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Lovelace, II, W. Randolph, Edward J. Raldes, & Verner J. Wulff 1945 THE EJECTION SEAT FOR EMERGENCY ESCAPE FROM HIGH-SPEED AIRCRAFT
Air Technical Service Command, Engineering Division, Army Air Forces Serial No. TSEAL-3-696-74C August 31, 1945 ASTIA ATI 7245

ABSTRACT: This report presents data obtained from the German, British and Swedish Air Forces on the research and development of the pilot ejection seat and evaluates this information for application to the Army Air Forces pilot ejection seat program. It was found from tests that emergency escape from fighter aircraft, such as the P-38, P-51, P-47 and P-80, while traveling at high speeds is a difficult and dangerous operation. Emergency escape from high-speed bombers such as the A-26 is equally difficult. The ejection seat, as used operationally by the German Air Force, is the most successful method known to date for emergency parachute escape from high-speed aircraft. The following design characteristics of the ejection seat assembly are believed desirable up to speeds of 550 miles per hour for AAF aircraft: (a) Maximum duration of acceleration : 0.1 second. (b) Maximum allowable average acceleration : 20 g with peaking to 25 g for 0.01 second or less, when ejecting the pilot above the aircraft. (c) Minimum allowable ejection velocity into wind stream: 57 ft./sec. in aircraft having a single vertical stabilizer of average height. (d) Minimum piston length: 30 inches, based on the above ejection velocity. In designing an ejection seat the following is required: (a) All parts of the body, especially the head, arms, and legs, must be supported. (b) A shoulder harness must be used, to prevent forward bending of the pilot with consequent fracture of the lower thoracic and lumbar vertebrae. (c) Arm rests must be used to reduce the load on the lower vertebral column.

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Lovelace, W.R. and V.J. Wulff 1945 EVALUATION OF TARGETS INVESTIGATED AND SUMMARY OF INFORMATION OBTAINED PERTAINING TO RESEARCH IN AVIATION MEDICINE FOR THE GERMAN AIR FORCE. (War Dept., U.S. Strat. Air Forces in Europe, Misc.) 4 August 1945

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Lovelace, W.R. 1945 REPORTS FROM EUROPEAN AND JAPANESE TOURS (Aeromedical Lab., USAF, Wright-Patterson AFB, Ohio)

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Lovelace, W.R., II, & A.P. Gagge 1946 AVIATION MEDICINE AND PSYCHOLOGY. (Hdq. Air Materiel Command, Publications Branch, Intellignece T-2, Wright Field, Dayton, Ohio) May 1946. ASTIA ATI 9776

ABSTRACT: This report and its appendices are devoted to an outline of future problems in aviation medicine and the importance of continued research on these problems for an interim air force capable of taking off, landing, and flying any place in the world independently of the weather. Strong support is given to continued use of personnel and research facilities in order to maintain the sciences involved in human engineering on the level to which they have been rightfully raised by the exigencies of war. Much of the knowledge gained in such research will be of value in general physiology.

3,262

Lovelace, W.R., II. & V.J. Wulff 1946 SUMMARY OF GERMAN AVIATION MEDICAL RESEARCH. (U.S. Army Air Forces, Air Technical Service Command, Aero Medical Laboratory, Wright-Patterson AFB, Ohio) Memo Rept. TSEAA-660-9?. Feb. 1946 TIP U 454.

ABSTRACT: Points out emphasis of German Aviation Medical Research on problems related to high speed jet and rocket aircraft. Reviews studies on accelerative forces encountered during flight with modern aircraft and their tolerance by human subjects. Briefly discusses the ram attack (ramming tactic) and the effects of the short-term high accelerative forces that would be encountered. Reviews research on g- protection afforded the pilot by horizontal positioning, and research on parachute design to reduce opening shock. Cites experiments on causes of detonation death (pulsating pressure waves) and on the problem of supersonic vibrations. Mentions human engineering research and experiments in low pressure and high temperature experiments. The report includes six appendices:

I. Hubertus Strughold, abstract, "Speed in Aerial Warfare and Physiologic Reaction Time".

II. Bibliography on Acceleration

III. Abstract from Information Report concerning the Investigation and Developments of the Parachute Division of the Forschungsanstalt Graf Zeppelin, including bibliography.

IV. Interrogation: Physiological effects of intermittent blasts, periodic blasts and supersonic vibrations of great energy, including bibliography

V. Interrogation: Research on medical aspects of aircraft design and on development and application of prosthetic appliance.

VI. List: Reports of Investigation on Effects of Reduced Body Temperatures.

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Lovelace, II, W. R. & A. S. Crossfield 1959 BIOMEDICAL ASPECTS OF ORBITAL FLIGHT. Soc. Exp. Test Pilots, 3(3):41-56, Spring 1959.

ABSTRACT: The biomedical aspects of a manned space flight is the topic of this article. Four stages of performance are required as guides to tolerance needed to obtain an adequate level of functioning of man in the respective phases. The seven phases of an orbit mission and the medical problems of each phase are examined. Also included is a description of the three types of manned orbital vehicles available for use in biomedical research.

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Lovelace, W. R., II and A. H. Schwichtenberg 1961 SPACE MEDICINE AND THE FUTURE
Astronautics, 6:58-59, 98-104, Oct. 1961.

ABSTRACT: Discussion that defines some problems in space medicine and indicates their future trends. These problems include ageing; behavioral science; biomedical data collection, processing, and utilization, environmental cycles; safety and reliability; and extraterrestrial life.

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Lovell, F. Warren and Harrison McMichael 1960
PATHOLOGY AS AN AID TO RECONSTRUCTION OF AIRCRAFT ACCIDENTS
(Armed Forces Inst. of Pathology, Army Medical Center, Washington,D.C.)
Aerospace Medicine, 31:745-748 September, 1960
ASTIA AD 247 847

ABSTRACT: Complete autopsy examination, including photographs and toxicology and x-ray studies, should be performed on all fatalities of aircraft accidents. The flight surgeon member of the board should be present at the autopsies. In the absence of a pathologist, the flight surgeon should do the autopsies himself. The prosecutor should be thoroughly briefed as to all of the accident details available at the time he performs his examination. The person doing the autopsies should make observations that might aid the accident-investigating board in reconstructing the sequence of events, bearing in mind that the questions the board will ask are rarely known at the time the necropsy is done. If this procedure is followed, valuable information will often be obtained that will aid in understanding how or why the accident occurred. (AUTHOR)

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Loving, D. L. 1947 AERODYNAMIC MEASUREMENTS MADE DURING NAVY INVESTIGATION OF HUMAN TOLERANCE TO WIND BLASTS. (National Advisory Committee for Aeronautics, Washington, D. C.) Report No. RM L7C25; 10 March 1947.

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Low, G. M. 1962 SUMMARY OF RESULTS. (In Results of the First U. S. Manned Orbital Space Flight, February 20, 1962) (NASA Manned Spacecraft Ctr.) Pp. 137-138.

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Lowenstein, O. and A. Sand 1940 MECHANISM OF SEMICIRCULAR CANAL RESPONSES OF SINGLE FIBER PREPARATIONS TO ANGULAR ACCELERATIONS AND TO ROTATION OF CONSTANT SPEED. Proc. Royal Soc. 129 B: 256-275

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Lowenstein, O. 1956 PERIPHERAL MECHANISMS OF EQUILIBRIUM. Brit. M. Bull. 12(2):114-118

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Lowi, B.H. & T.J. Gallagher 1961 BIO-ASTRONAUTICS RESEARCH: WHAT SHALL WE SIMULATE? In Bergeret, P., ed., Escape and Survival: Clinical & Biological Problems in Aero Space Medicine. (London; New York; Paris: Pergamon Press, 1961) AGARDograph 52. Pp. 108-114. ASTIA AD 261 881

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Lowrey, R.O. 1960 SPACE FLIGHT SIMULATORS --DESIGN REQUIREMENTS AND CONCEPTS. Aerospace Engineering 19(10):50-56, Oct. 1960.

ABSTRACT: Man's experiences in spaceflight will be represented by the sum of the environmental factors which he perceives. The objective of spaceflight simulation is the representation of the total anticipated environment. Existing facilities are insufficient to provide the simulation capability for full exploitation of man's capabilities.

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Lowrey, R. O. & J. T. Ray 1961 HUMAN FACTORS OF THE LUNAR LOGISTICS MISSION. (Paper SAE International Congress and Exposition of Automotive Engineering, Detriot, Mich., Jan. 9-13, 1961) (Society of Automotive Engineers, Inc, New York, N. Y.) Rep. 302C, Jan. 1961.

ABSTRACT: This paper is one in a series based on "Project Moonbeam--A 10,000-lb. Payload Lunar Vehicle." The area of human factors is considered from the standpoint of the requirements for providing man an acceptable environment within the vehicle and whether these requirements can be met by 1970. The major headings and contents of this paper are as follows: 1) physiological factors--conditions necessary to support man and maintain his well-being; 2) psychological factors--probable trouble areas; and 3) unusual hazards--radiation, meteoroids, and emergency escape system.

3,273

Lowry, R. D. & W. M. Wolff 1961 DESCRIPTION AND PERFORMANCE EVALUATION OF THE AEROSPACE MEDICAL RESEARCH LABORATORIES' VERTICAL ACCELERATOR (Aeronautical Systems Division. Biomedical Lab., Aerospace Medical Research Labs., Wright-Patterson Air Force Base, Ohio) Project No. 7210, Task No. 71703, ASD Technical Report No. 61-743, Dec. 1961 ASTIA AD 287 996

ABSTRACT: The Aerospace Medical Research Laboratories' Vertical Accelerator was developed for bioastronautics research to simulate vibration and buffeting encountered in aerospace operations. The design, motion capabilities, control, and safety features are described. The Vertical Accelerator can be programmed with periodic or random acceleration patterns obtained from actual environmental measurements. It is a complex electromechanical device employing a unique type of friction drive to move a test platform with a 200-lb. load capacity. The accelerator, for continuous operation, can produce peak to peak amplitudes of +5 ft. over the frequency range from 0.5 c.p.s. to 10 c.p.s. The maximum acceleration output is from 2.5 to 3 g depending on load and permissible distortion.

(Author)

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Lowry, R. H. 1953 TEST TRIALS OF G-4A ANTI-BLACKOUT SUITS IN THE HUMAN ACCELERATOR.
(Defence Research Medical Labs.(Canada), Toronto, Ontario.) DRML Rept. No. 157, April 1953. AD 12 422

Summary: Tests in the human centrifuge using 50 jet pilots as subjects indicated that the G-4A Anti-G suit, gave an average improvement in blackout tolerance of 1.0 g. The improvement varied from 0.0 g to 4.0 g, depending on the test subjects. The G-4A Anti-G suit was easy to don, gave freedom of movement, and was comfortable during use in the human centrifuge. In order to obtain the maximum protection from fatigue and blackout, all aircrew must be individually fitted with their respective anti-blackout suits by qualified personnel.

3,275

Lowry, R. H. and W. H. Johnson 1954 PSEUDO MOTION SICKNESS DUE TO SUDDEN NEGATIVE G: ITS RELATION TO "AIRSICKNESS," (Canada, Defence Research Medical Labs., Toronto) Report No. IR 811-54, ASTIA AD-43 007
See also J. Aviation Med., 25(2):103-106, April 1954.

ABSTRACT: "Pseudo" airsickness is the rapid regurgitation of food primarily due to the mass of food in the stomach being suddenly forced into the esophagus. It is brought about by aerobatics involving sudden negative "G".

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Lowry, R. H. and Johnson, W. H. 1954 "PSEUDO MOTION SICKNESS" DUE TO SUDDEN NEGATIVE "G"; ITS RELATION TO "AIRSICKNESS" J Aviation Med. 25(2):103-106.

SUMMARY & CONCLUSIONS:

1. It is suggested that there are two types of airsickness, namely, "true" airsickness and "pseudo" airsickness.

2. "True" airsickness is accompanied by nausea and is due to the stimulation of the non-auditory membraneous fibres. It is induced by rough air and aerobatics.

3. "Pseudo" airsickness is the rapid regurgitation of food primarily due to the mass of food in the stomach being suddenly forced into the esophagus. It is brough about by aerobatics involving sudden negative "G".

4. These two types of airsickness must be differentiated in any attempt to correlate motion sickness, induced in the laboratory, with airsickness.

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Lowry, R. H., M. D. April 1960 LIFE SCIENCES AND HYPER-ENVIRONMENTS 1960 Proceedings of the Institute of Environmental Sciences, C-3--C-7

ABSTRACT: This is a commentary on a paper presented by A. M. Mayo to the Institute of Environmental Sciences in April of 1960. The title of the paper was "Life Sciences and Hyper-Environments."

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Lubinski, T.P. 1962 TRACK TESTS OF CANOPY ESCAPE CAPSULE (Coleman Engineering Co., Inc., Torrance, Calif.) Project 1362, ASD TDR 62-404, Aug. 1962. ASTIA AD 287 281

ABSTRACT: The results of all of the track tests for the Air Force Canopy Escape Capsule are presented. The purposes of these tests were to evaluate the ejection and recovery of the capsule and to obtain aerodynamic, structural, component functioning, and physiological information. Descriptions of the capsule model, test equipment, and test procedure are included in the report. Feasibility of the canopy-type capsule method of escape was not fully demonstrated because the track tests were terminated prior to completing the design range of test velocities and because the test results indicated a need for an evaluation of the stability and impact problems of the capsule for these velocities. The tests showed that unguided separation of the capsule was successful, that proper functioning of the recovery system was demonstrated for the 150-kt run, and that lo-level ejection capability of the escape capsule was indicated. (Author)

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Luchsinger, C W. 1949 ADDITIONAL KINETIC MEASUREMENTS ON A PILOT-DUMMY EJECTED FROM AN F-82 AIRPLANE. (Engineering Division, AMC, Wright-Patterson AFB, Ohio) March 1949. ASTIA ATI 63931.

ABSTRACT: Five ejection seat tests, simulating pilot escape from high performance aircraft, were conducted with an F-82 twin engined fighter. Kinetic measurement intelligence was successfully recording during four of these tests by means of a recording oscillograph in conjunction with acceleration and strain gages. The pilot ejected the test seat, which was loaded with a 185 lb. anthropomorphous dummy, from the right cockpit by closing a switch on the control stick in the left cockpit. The normal maximum acceleration produced by the M-1 (Service) catapult was in the range of 15 g to 17 g units. Average ejection velocity was slightly less than the recommended 60/ft sec. The drag coefficient of the seat and dummy is 1.56 at low Mach numbers, and has a percentage increase equal to that of a sphere with increase in Mach numbers.

3,280

Luchsinger, C W. 1950 KINETIC MEASUREMENTS DURING PILOT EJECTION SEAT GROUND TESTS - AND APPENDIXES I AND IX (Air Materiel Command, Engineering Division, Wright-Patterson AFB, Ohio) Aug. 1950. ASTIA ATI 83 127

ABSTRACT: Kinetic qualities were measured during pilot ejection seat ground tests conducted with various centers of gravity of the ejected components and with various lengths of ejection rails. Sensing and recording of the kinetic quantities was accomplished by the use of resistance-bridge accelerometers, pressure transmitters and multichannel oscillograph, together with bridge balancing controls and appropriate connecting circuits. The normal maximum acceleration produced by the M-1 catapult was in the range of from 12 to 16 G units and the CG location had no consistent effect on the maximum peak value. As the CG was moved forward, the maximum ejection velocity tended to decrease in magnitude and a further decrease in magnitude was encountered when 28-in. ejection rails were used in lieu of the 32 7/8 in. ejection rails.

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Luczak, A. 1945 DZIALANIE PRZYSPIESZEN NA USTROJ CZLOWIEKA (Influence of Acceleration on Human Body)
Lekarz Wojskowy (Warsaw) 36: 17-40, Feb. 1945

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Luhrs, H. N. & H. R. Spence 1961 INFLUENCE OF SHOCK MACHINE LOADING ON SHOCK SPECTRA. (Space Technology Labs., Inc., Los Angeles) Report No. 7103-0018-NU-000, May 1961. ASTIA AD-260 308.

ABSTRACT: The influence of shock machine loading, by the test item, was investigated to determine whether any peaks or notches are introduced into the acceleration shock spectrum which would cause excessive over or under testing at various frequencies. The results showed that the shock spectrum for a terminal peak saw-tooth pulse is quite insensitive to shock machine loading. The very low frequency end (below 100 cps for a 6 millisecond pulse) is most influenced, whereas the higher frequencies are virtually not influenced at all. The results also showed that even for a very high loading condition the primary spectrum is in all cases less severe than the residual spectrum. Curves have been generated to depict both the primary and the residual spectrum for various resonators to shock platform mass ratios, for the case of a terminal peak sawtooth pulse (Author)

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Luiden, R.W. 1961 APPROXIMATE ANALYSIS OF ATMOSPHERIC ENTRY CORRIDORS AND ANGLES. (National Aeronautics and Space Administration) NASA TN D-590, January 1961

ABSTRACT: A simple closed-form approximate solution is developed for corridor depths and entry angles as a function of maximum g load, initial entry velocity and configuration lift-drag ratio, for vehicles operating at constant angle of attack and modulated angle of attack. The vehicle design and mode of operation that result in the deepest corridors are determined, and the effects of hot-gas radiation and a limiting Reynolds number on corridor depth are discussed.

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Luidens, R.W. 1961 FLIGHT-PATH CHARACTERISTICS FOR DECELERATING FROM SUPERCIRCULAR SPEED. (National Aeronautics and Space Administration, Washington, D.C.) NASA Technical note D-1091, ASTIA AD-268 343, Dec. 1961.

ABSTRACT: Characteristics of six types of flight paths for the deceleration from circular and supercircular speeds are developed in closed form. The heating rate, heat input per square foot obtained from an integration over the flight path, the total heat vehicle, and the flight-path histories in terms of path angle, altitude, life coefficient, net acceleration, angle of attack and Reynolds number are discussed as a function of type of flight plan, initial net acceleration, and initial velocity. A flight plan with essentially a point landing capability is suggested. (Author)

3,2[illegible]

Lob'ya[illegible] L D 1962 [RUSS] [illegible]
WHITE RATS IN THE FLIGHT OF T[illegible]
In Akademiya nauk SSSR. Iskusst[illegible]

ABSTRACT: To study the effects of space flight on higher nervous activity, the second Soviet spaceship-satellite contained two male white rats (nos. 12 and 18); five others served as controls. A stereotype consisting of six positive and one differentiated motor-food conditioned reflexes was developed and stabilized in all the animals over a period of several months before flight. Twenty experiments were conducted with each animal to determine the characteristics of its conditioned-reflex activity. The first experiment, conducted on the fourth day after return to earth, showed that the animals had suffered no adverse effects from the space flight. Experiments conducted for 2.5 months to determine the condition of the higher nervous function showed that changes in the test rats differed little from those in the control group. Peripheral blood tests over the same period revealed no essential differences from the initial level or from the control group.

3,286

Lund, D.W. 1946 EFFECT OF POSITIONAL VARIATION ON MAN'S TOLERANCE TO G. (USAF, AMC, Aero Med. Lab., Wright-Patterson AFB, Ohio) Memo Rept. TSEAA-695-72B, 24 June 1947.

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Lund, D.W. 1946 PRELIMINARY STUDIES OF THE EFFECTS OF POSITIVE G UPON INDUCING HEADACHE, UPON PERCEPTION OF PAIN, AND UPON VASCULAR HEADACHE INDUCED BY INTRAVENOUS HISTAMINE.
(USAF, Aero Med. Lab., Wright-Patterson AFB, Ohio) TSEAA-695-72, Nov. 1946.

CONTENTS:
Reports a paper of the same title by E.C. Kunkle, P.J. Maher, Jr. and D.W. Lund.

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Lund, D.W. 1947 MAN'S TOLERANCE TO POSITIVE ACCELERATION IN DIFFERENT ORIENTATIONS OF THE BODY. Fed. Proc., 6:156

Land[illegible] Jr 1947 STUDIES ON ACCELERATION DURING FLIGHT IN AN INSTRUMENTED AIRCRAFT. (Aero Medical Laboratory, Wright-Patterson AFB, Ohio) Rept. No. TSEAA-695-1-94, 1 May 1947, ATI No. 150399

CONCLUSIONS AND RECOMMENDATIONS: The use of an instrumented, two place, highly stressed aircraft, such as the SBD-5, is readily available, practical and reasonably safe means of studying those acceleration problems where rapid approach of high g is desired. Some method other than the present light signal response should be devised for objective studies on blackout for short-time exposure to g. Two pilots, despite much flight experience, required about ten hrs. of specific training in order to reach a predesignated maximum of 7 g or above in one second or less. At the outset they required 3.5 secs. or longer for approach to such values of g from 1.5 g. Preliminary observations indicate that pilots and subjects can withstand approximately 9.0 g for three secs., if the approach to this g is achieved in less than one second. The use of these observations have a direct relationship to flight tactics, pilot training and decisions as to wing loading requirements of fighter aircraft. That consideration should be given to the equipping of some highly stressed aircraft employed in advanced training with time-g recording accelerometers, so that pilot training may be extended to include time-g maneuvers. That if the tactical advantages indicated are further substantiated in an extended number of pilots, consideration should be given to modifying the present low stress point of 7.3 g for all operative aircraft so as to include aircraft which have a much higher maximal wing load factor. (AUTHOR)

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Lundin, I.E. 1946 STATIC LOAD TESTS OF WMCA NO. 347 - PILOT SEAT ARMORED. (Warren McArthur Corporation, Bantam, Connecticut) Report No. 347 19 July 1946, ASTIA ATI 102228.

ABSTRACT: Tests were conducted for the purpose of applying static loads simulating acceleration forces on the Warren McArthur No. 347 Armored Pilot Seat to determine its behavior up to ultimate design loads. As a result of the tests, it was concluded that the seat unit supported the ultimate design loads without failure.

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Lustig, B.T. 1947 BIOPHYSICS WITH SPECIAL REFERENCE TO ELECTROBIOLOGY - AND APPENDIXES I-III (FIAT FINAL REPORT) - L# MAY 1947
ASTIA ATI 68 711

ABSTRACT: This report reviews German development in ultra short wave therapy and research in dielectric constants and specific resistance of animal and human tissue. Sensitive detectors in the field of infra red, visible light,

ultra violet, X-ray and radio activity are described and photostatically illustrated. A new instrument for erythrocyte determinations is described. Several devices of interest to the biophysicist are referred to in this report and instruction as to where they may be obtained is included.

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Lutterloh, C. H. 1937 THE CLINICAL SIGNIFICANCE OF THE EFFECTS OF POSTURE ON BLOOD PRESSURE. THE POSTURAL TEST AS A MEANS OF CLASSIFYING HYPOTENSION. Am. J. Med. Science 193:87-96

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Lutz, W., & H.J. Wendt 1947 ANIMAL EXPERIMENTS SIMULATING PARACHUTE DROP FROM PRESSURIZED CABINS. (Tierversuche zum Fallschirmabsprung aus Uberdruckkabinen.) (Air Materiel Command, Wright-Patterson AFB, Ohio) F-TS-4050, June 1947. ASTIA ATI-32225.

ABSTRACT: The conditions related to free fall from a pressure cabin aircraft were studied by means of animal experiments and the probable outcome of jumping from various altitudes was determined.

The upper limit with a small scatter for jumps without oxygen is 14 km.

Jumps with oxygen equipment can be made safely from surprising altitudes. In this case, the upper limit is above 21 km. but one must remember that in addition to the danger of an accident during the "hypoxemic apparent death" which always occurs during jumps from an altitude of 18 Km and above, the great disturbance and even paralysis of respiration and the peculiar form of slow revival from the severe anoxia must be considered; this condition is called "Posthpoxemic soper" and is described in detail.

The process by which revival occurs and the time it requires after falling from an oxygen-poor altitude are determined and the necessity of using either a Pressurized suit and a parachute with an automatic release, is pointed out.

3,294

Luxenburger, Hans 1946 PSYCHOLOGY OF FLYING (PSYCHOLOGIE DES FLIEGENS) Translation by Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio Report No. F-TS-596-RE, ASTIA ATI-37141

ABSTRACT: A short discussion is given on the psychology of flying. It is stated that all empirical psychology is in the final analysis psychophysiology. The actual psychology of flying, insofar as it is not psychophysiology, has scarecely begun to exist. The theory of method of the psychology of flying is basically that of psychology in general,

namely, introspection, [illegible], objective observation and psychological experiment. Because of the close interconnection of the psychology of flying with physiology on the one hand, and psycho-pathology on the other, it follows that this field of inquiry must be left to psychologically trained physicians who must also be aviators.

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Lyle, D. J., J. P. Stapp & R. Button 1956 OPHTHALMOLOGICAL HYDROSTATIC PRESSURE SYNDROME.
Transactions of the American Ophthalmological Society 54:121-128.

ABSTRACT: Criteria for human tolerance limits during escape from military aircraft are incipient reversible injuries, as well as the subjective evaluation. By this means it has been experimentally established that a human subject seated facing forward, exposed to deceleration perpendicular to the long axis of the body, can sustain a rate of onset of 1,500 G per second or less, a peak magnitude of 50 G, and total duration of forces higher than 25 G but less than 50 G of not more than one second. In two of the 76 human experiments accomplished to date, signs and symptoms suggestive of a syndrome have been found which correspond to those found in three cases of accidental exposure under widely different circumstances. In these five cases the syndrome is caused by high decelerative forces of abrupt onset applied from the rear to the front of the head while the blood vessels of the head and face are congested by high hydrostatic pressure.

Abrupt rise in introthoracic pressure, due to (1) displacement of abdominal viscera against the diaphragm or (2) abrupt compression of the abdomen or lower chest, can be transmitted through the blood vessels to the head and face, causing rise of hydrostatic pressure. Simultaneous application of the decelerative force results in signs of cerebral concussion with confusion, retrograde amnesia, circulatory shock, temporary loss of vision, retinal hemorrhages, subconjunctival hemorrhages, ecchymosis of the eyelids, and periocular edema. The paranasal sinuses are congested and even hemorrhagic.

3,296

Lyle, D. J., J. P. Stapp, & R. R. Button 1957 OPHTHALMOLOGIC HYDROSTATIC PRESSURE SYNDROME. Am. J. Ophthalmology 44:652-657

ABSTRACT: Criteria for human tolerance limits during escape from military aircraft are incipient reversible injuries, as well as the subjective evaluation. By this means it has been experimentally established that a human subject seated facing forward, exposed to deceleration perpendicular to the long axis of the body, can sustain a rate of onset of 1,500 G per second or less, a peak magnitude of 50 G, and total duration of forces higher than 25 G but less than 50 G of not more than one second. In two of the 76 human experiments accomplished to date, signs and symptoms suggestive of a syndrome have been found which correspond to those found in three cases of accidental exposure under widely different circumstances. In these five cases the syndrome is caused by high decelerative

forces of abrupt onset applied from the rear to the front of the body, the blood vessels of the head and face are congested by [illegible] pressure.

Abrupt rise in intrathoracic pressure, due to (1) displacement of abdominal viscera against the diaphragm or (2) abrupt compression of the abdomen or lower chest, can be transmitted through the blood vessels to the head and face, causing rise of hydrostatic pressure. Simultaneous application of the decelerative force results in signs of cerebral concussion with confusion, retrograde amnesia, circulatory shock, temporary loss of vision, retinal hemorrhages, subconjunctival hemorrhages, ecchymosis of the eyelids, and periocular edema. The paransal sinuses are congested and even hemorrhagic

3,297

Lyman, H. W. 1919 VERTIGO AND AVIATION.
Trans. Amer. Laryng., Rhinol. and Otol. Soc. 25:150-156.

ABSTRACT: The author emphasized the importance of the medical problems, arising in the development of aviation, in connection with the causes, behavior and correction of the disabling vertigo or dizziness experienced by aviators.

The vestibular appratus is the most constant in its action; and, because it is a motion-sensing mechanism, pure and simple, it is one of the essential qualifications of the military aviator. Like all special senses, however, it occasionally conveys messages to the brain which, unless correctly interpreted, result in illusions. The illustration in this case is a false sensation of motion, or vertigo.

Various movements of the head have been worked out for the correction of the vertigo induced by the different stunts, and their practical value has been appreciated by the aviators instructed in them.

Vertigo tolerance is the result of practice which educates the brain to interpret correctly these vertigo impulses in all planes, and is not due, as often stated, to any disappearance of vertigo because of constant flying.

3,298

Lyman, J. H. 1953 CHARACTERISTICS OF THE HUMAN OPERATOR. (In Symposium on Frontiers of Man-Controlled Flight presented at Los Angeles, Calif., April 3, 1953) (Los Angeles: Instit. of Trans. and Traffic Engineering, Univ. of Calif.) Pp. 64-67.

3,299

McCabe, B.F. & M. Lawrence 1959 SUPPRESSION OF VESTIBULAR SEQUELAE FOLLOWING RAPID ROTATION. (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: It appears highly probable that man can, upon occasion, alter the functions of his normal vestibular centers. Evidence is taken from a group of individuals who demonstrate this ability quite clearly. Expert figure skaters, without recourse to "spotting" but through some process which is probably central suppression, can avoid all the usual sequelae to brief rapid rotation, viz., staggering, dizziness, disorientation, nausea and nystagmus. This is demonstrated and studied by means of high speed and regular motion picture photography A 15-minute movie will be presented. (J. Aviation Med. 30(3):194, March 1959)

3,300

McCally, M., and D.E. Graveline 1963 URINARY CATECHOLAMINE RESPONSE TO WATER IMMERSION.
(6570th Aerospace Medical Research Laboratories, Aerospace Medical Div., Air Force Systems Command, Wright-Patterson AFB, Ohio)
Rept. No. AMRL TDR-63-20, March 1963. ASTIA DDC 407 741.

ABSTRACT: The urinary excretion of adrenaline and noradrenaline was measured by bioassy for 16 normal human subjects during 6 hours of complete water immersion. The excretion of adrenaline was moderately increased, possibly related to the anxiety associated with the immersion. The excretion of noradrenaline was significantly (p 0.01) reduced during immersion. Six subjects were studied during passive vertical tilt following immersion. Orthostatic intolerance was demonstrated and the increase in pulse rate and decrease in pulse pressure were significantly different from the control tilt. The probable mechanisms of the reduced noradrenaline excretion during immersion and its relation to the postimmersion impairment of orthostatic tolerance are discussed.

3,301

McCarthy, C.D. 1960 GENERAL FLIGHT PROOF TEST PLAN MARK 5 RE-ENTRY VEHICLES. (Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.) Rept. no. RAD-SR-7-60-76; ASTIA AD-269 365 ; Sept. 28, 1960

ABSTRACT: An outline is presented of the flight proof test program to be performed on Mk 5 re-entry vehicles. The environmental testing described will provide, prior to flight test, proof of adequate design integrity. Detail testing requirements for critical components and subas-semblies will be specified in the individual test plan. All components, systems, and re-entry vehicles to be used in the Mk 5 flight test program will be flight proof-tested. (Author)

3,302

McClaughry, R. I., & W. H. Seegers 1952 AN ACCELERATOR OF PROTHROMBIN CONVERSION ARISING IN PURIFIED PROTHROMBIN PREPARATIONS. (Dept. of Physiology & Pharmacology, Wayne Univ. College of Medicine, Detroit, Mich.)

ABSTRACT: Purified prothrombin prepared by the method of Ware and Seegers (J. Biol. Chem. 174:565, 1948), when heated to 53 degrees C. for 2 hours, is free from Ac-globulin. Such preparations may be dried by precipitation with acetone, and they remain stable for many months in the dried state. When dissolved in water or physiological saline solution and stored in a deep freeze, however, the prothrombin concentration progressively decreases over a period of 4-12 weeks. With the decrease in prothrombin activity, there becomes detectable in the purified prothrombin solutions an accelerator of prothrombin activation. This accelerator causes as much as a tenfold increase in the apparent Ac-globulin content of bovine plasma, as determined by the method described by Ware and Seegers (J. Biol. Chem. 172:699, 1948). The accelerator effect could not be demonstrated by attempting to substitute it for thromboplastin or Ac-globulin the ator analysis system; it seems rather to supplement these previously recog- ed activators. The accelerator is probably a derivative of prothrombin itself. The clotting time of fibrinogen solutions with standard thrombin solutions was not affected by the concentration of the prothrombin solution used in demonstrating the accelerator effect, although higher concentrations did cause an equivocal shortening of the clotting time. (Federation Proceedings 11(1):103, 1952)

3,303

McCollom, O.N. 1956 FINAL REPORT (San Diego State College, California) Contract Nonr-126801 Dec. 1, 1956 ASTIA AD 118 905

ABSTRACT: Work involved in compiling a human-engineering guide for equipment design is outlined. Bibliographies, abstracts, translations, experimental studies, and special reports were prepared in the following areas: (1) comparison

and interaction among sensory input channels (AD 95 131); (2) disorientation; (3) effect on human performance of acceleration, motion, and vibration; (4) effect on human performance of ventilation, temperature, and humidity; (5) man-machine integration (AD 106 677); (6) motion sickness (AD 95 139) and therapeutic drugs; (7) simulators and proficiency measuring devices; (8) speech communication; (9) systems considerations; and (10) work and fatigue (AD 95 133, AD 95 137). A special human-engineering bibliography of 5600 entries was assembled and published. (See also AD 95 140, AD 95 298 and AD 106 676)

3,304

McCormick, E., D. Cranmore, & A. Zella 1955 PATHOLOGICAL CHANGES PRODUCED BY STRESS OF ACCELERATION. PHASE III. ADAPTATION TO THE STRESS OF ACCELERATION. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 306; 31 Dec. 1955

ABSTRACT: Experiments completed thus far show that tolerance to negative acceleration may be increased in rats and guinea pigs by repeated exposures to this stress Increasing tolerance (adaptation) has been indicated by continuing increases in body weight, by an appreciable lessening in the degree of peripheral hemorrhage and edema induced by acceleration, and by return of erythrocytes and leukocytes to control values.

3,305

MacCorquodale, K. 1946 THE EFFECTS OF ANGULAR ACCELERATION AND CENTRIFUGAL FORCE ON NON-VISUAL SPACE ORIENTATION DURING FLIGHT. I. METHODOLOGY AND PRELIMINARY RESULTS. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-6001.1.14., 7/13/46
See also J. Avia. Med. 19(3):146-157, June 1948

SUMMARY: Data were collected on the non-visual perception of motion and body position during flight. All observations were made while airborne. The subject was seated in the rear cockpit of an advanced Navy trainer. The maneuvers used were limited to turns at six angles of bank. Twelve observations at each angle of bank were made by each of 3 experienced observers. Visual cues were excluded by a blackout procedure. Reports of his perceptions of turning and tilting, judgments of the direction (left or right) of turn and tilt when possible, estimates of degrees of tilt forward or backward and right or left in degrees and estimates of g force were made verbally by the observers into a wire recorder. These reports were later analyzed in the laboratory and related to the actual behavior of the aircraft as indicated on the same record by the pilot's signals of critical points in the maneuver. (DACO)

3,306

MacCorquodale, K., A. Graybiel, & B. Clark 1946 THE EFFECTS OF ANGULAR ACCELERATION AND CENTRIFUGAL FORCE ON NON-VISUAL SPACE ORIENTATION DURING FLIGHT. II. INFLUENCE OF HABITUATION AND TECHNIQUE OF ASSUMING THE TURN. (Naval School of Aviation Medicine, Pensacola, Fla.) Project NM 001 059-101.15; Rept. No. 15; MR005.13-6001.1.15., 22 July 1946

ABSTRACT: Additional data were collected on the non-visual perception of body orientation during flight. Three observers sat in the rear cockpit of an SNJ-6 aircraft with all visual cues excluded. They reported their sensations of turning, tilting force or aft, and right or left, and of body weight (i.e., centrifugal force) during a series of banked turns. Reports were recorded by an airborne wire recorder and analyzed in the laboratory.

An earlier study indicated that in the absence of visual cues, a subject's sensations of tilting backward during a turn, and tilting forward on recovery from the turn, were usually stronger than his sensations of banking to the right or left. It was thought that this sensation of backward tilt might be accounted for by the fact that, in the original study, the pilot increased the angle of attack of the wing as he was banking to the turn. This resulted in a forward deflection of the direction with which the g force strikes the observer, as well as an increase in the total amount of g, resulting from the centrifugal force of the turn itself.

The hypothesis that the sensation of backward tilt was due to this change in direction in g force was tested by a second series of trials in which the angle of attack remained constant during the turn; the necessary increase in lift was effected by an increase in power setting.

The results indicate that a change in angle of attack is not necessary to produce feelings of backward tilt. Other comparisons show some slight evidence for habituation and learning; in general the perceptions during these two conditions are markedly similar.

Data were collected on a third series of trials in which the constant and variable angles of attack were randomly mixed during successive trials in the same flight, in order to determine whether the lapse in time between the first two series had caused a shift in the observers' subjective scales of estimating backward tilt. Such a shift could have caused the lack of difference observed between the first and second series. These results show that, even when experienced consecutively, the two techniques of banking do not produce significant differences in the amount of backward tilt perceived. (DACO)

3,307

MacCorquodale, K 1948 THE EFFECTS OF ANGULAR ACCELERATION AND CENTRIFUGAL FORCE DURING FLIGHT. I. METHODOLOGY AND PRELIMINARY RESULTS. J. Exper. Psych. 37: 170-177

3,308

MacCorquodale, K. 1948 EFFECTS OF ANGULAR ACCELERATION AND CENTRIFUGAL FORCE ON NON-VISUAL SPACE ORIENTATION DURING FLIGHT. J. Aviation Medicine 19(13):146-157, June 1948.

See also (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005. 13-6001.1.14., 7-13-46

SUMMARY: Data were collected on the non-visual perception of motion and body position during flight. All observations were made while airborne. The subject was seated in the rear cockpit of an advanced Navy trainer. The maneuvers used were limited to turns at six angles of bank. Twelve observations at each angle of bank were made by each of 3 experienced observers. Visual cues were excluded by a blackout procedure. Reports of his perceptions of turning and tilting, judgements of the direction (left or right) of turn and tilt when possible, estimates of degrees of tilt forward or backward and right or left in degrees, and estimates of g force were made verbally by the observers into a wire recorder. These reports were later analyzed in the laboratory and related to the actual behavior of the aircraft as indicated on the same record by the pilot's signals of critical points in the maneuver. (DACO)

CONCLUSIONS: Non-visual spatial orientation during flight is subject both to gross limitations and to illusions. The perception of turning and tilting to the right or left appears after a considerable lag from the actual onset of the maneuver. The direction of the bank and turn may be in error, and the estimates of the amount of bank are markedly depressed. Perceptions of both tilting and turning are transient, and disappear before the plane recovers to the turning attitude. The recovery from the turning attitude is accompanied by sensations of tilting and turning away from the direction of the preceding turn, which persist into the period of straight and level flight following a maneuver. The onset of turn and the turn proper are accompanied by sensations of tilting backward which persist for the duration of the turn. Following recovery the observer feels himself tilting forward [illegible] period of feeling upright. The perceptions of g per se are [illegible] ce. (DACO)

3,309

McCourt, Francis P. 1960 AVIATION CRASH INJURY RESEARCH (Paper, Army Human Factors Engineering Conference, Ft. Belvoir, Virginia) October 3-6, 1960. ASTIA AD 251 312

ABSTRACT: Experience has shown that, under certain conditions, human structure can withstand exposure to impact forces which will normally disintegrate aircraft structure. Therefore, it becomes important to isolate and classify predominant injury producing factors which may be revealed through the crash-injury study of aircraft accidents. Useful crash survival data is produced

through the study of accidents. Excluding crash fire, drowning, etc., injuries sustained are generally produced through any of these five methods: (a) By having structure collapse sufficiently to impinge upon vital body areas; (b) By becoming a far-flung missile; (c) By becoming a near-flung missile; (d) By being struck by a missile; (e) By magnification of the crash force itself.

Another equally important phase of aviation crash injury research involves obtaining precise crash load data from experimental crashes. Testing on this subject utilizes relatively low-cost track-type test facilities on which air vehicles (fully instrumented with anthropomorphic dummies) can be crashed at the velocities and impact angles typical of their low speed operating range. Data derived from tests of this nature will permit precise engineering design for crash-safety without the weight penalties which result from static, rather than dynamic, testing.

3,310

McCourt, F. P. & W. J. Nolan June 1961 AVIATION CRASH INJURY RESEARCH. (U. S. Army Transportation Research Command, Ft. Eustis, Va. TREC Report No. 61-78)
See also: Paper, Symposium on Biomechanics of Body Restraint and Head Protection, MADC, June 14-15, 1961.

ABSTRACT; Because of human error, we can expect occasional accidents, and since some of the newer aircraft types are carrying greater numbers of people, we can also expect more casualties per accident. Accepting the inevitability of an occasional accident, it becomes the joint responsibility of certain medical, engineering, and research groups to provide the safest possible design within the limits imposed by operational and economical consideration. The Department of the Army has increased both the number of aircraft and its emphasis on safety. The emphasis has been directed toward: (1) The prevention of aircraft accidents, and (2) The prevention or reduction of damage or injury that may be expected in those accidents which occur. Tremendous improvements in safety have resulted from these procedures and from the investigation of plane crashes. However, it has become increasingly apparent that one further step is needed which would begin by simulating the deficiencies discovered in the accident investigations and statistical studies, under fully instrumented laboratory controlled conditions. The precise engineering data obtained from such experiments can then be incorporated into the basic aircraft design and can also be used to improve the investigative and analytical techniques used in accident investigation and in statistical studies.

3,311

McCourt, F. P. 1961 AVIATION CRASH INJURY RESEARCH
In Seventh Annual Army Human Factors Engineering Conference. USA Signal Corps Project Michigan, University of Michigan, Ann Arbor, Mich. 3-6 October 1961. Pp. 209-217.
(USA Office of the Chief of Research and Development, Washington, D. C.)
ASTIA AD 267 153

ABSTRACT: A long-range research program to obtain technical crash-performance data for rotary wing and VTOL aircraft has been initiated. This report presented the results of an exploratory, experimental study. A Piasecki Model H-25A helicopter was used to recreate a typical accident approximating an unsuccessful attempt to attain an autorotation from a low-altitude power failure. The helicopter, fully instrumented, was dropped from a moving crane at a height of 30 ft. and a forward speed of 30 mph. The recorded data were analyzed for their validity as actual crash-force measurements. The feasibility of airborne testing and the problems of dynamic testing were discussed. (Tufts)

3,312

McCourt, F. P. and W. J. Nolan June 1961 AVIATION CRASH INJURY RESEARCH.
(Paper, Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Material Center, Philadelphia, Penn. June 14 - 15, 1961)

See also: (U. S. Army Transportation Research Command, Ft. Eustis, Va.) TREC Rept. No. 61-78.

ABSTRACT: Because of human error, we can expect occasional accidents, and since some of the newer aircraft types are carrying greater numbers of people, we can also expect more casualties per accident. Accepting the inevitability of an occasional accident, it becomes the joint responsibility of certain medical engineering, and research groups to provide the safest possible design within the limits imposed by operational and economical consideration. The Department of the Army has increased both the number of aircraft and its emphasis on safety. The emphasis has been directed toward: (1) The prevention of aircraft accidents, and (2) The prevention or reduction of damage or injury that may be expected in those accidents which occur. Tremendous improvements in safety have resulted from these procedures and from the investigation of plane crashes. However, it has become increasingly apparent that one further step is needed which would begin by simulating the deficiencies discovered in the accident investigations and statistical studies, under fully instrumented laboratory controlled conditions. The precise engineering data obtained from such experiments can then be incorporated into the basic aircraft design and can also be used to improve the investigative and analytical techniques used in accident investigation and in statistical studies.

3,313

McCoy, T.M. 1960 HYPERENVIRONMENT SIMULATION.
(Wright Air Development Division, Wright-Patterson AFB, Ohio)
WADD Technical Report 60-785, ASTIA AD-257 775, December 1960

ABSTRACT: This report summarizes the approach, concept, design, and cost of hyperenvironmental simulation facilities for evaluating effects of space vehicle environment on specimens up to 250 pounds. With the objective of combining environmental variables wherever applicable and feasible, four basic facilities have been conceived with several environments each. Detailed design specifications for these facilities are contained under separate covers.

As part of the design back-up, some of the problems, methods and techniques of simulation are discussed. A summary is also given of the pertinent results of some experiments conducted to prove design feasibility in certain critical areas of simulation.

3,314

MacCurdy, J. T. 1934 DISORIENTATION AND VERTIGO WITH SPECIAL REFERENCE TO AVIATION.
Brit. J. Psychol. 25:42-54.

ABSTRACT: Vertigo is produced when the labyrinth is diseased, i.e. when the body is physiologically disoriented; and by disorientation under normal conditons when: (1) the individual is so much distracted by giddiness and nausea, or by efforts to maintain balance, as to make visual judgment ineffective, (2) objects are viewed with difficulty because they are in motion, or at some unfamiliar angle, (3) perception is inaccurate because its posture-balance component is absent or distorted. These three conditions may be acute but temporary, and may be compensated for by the use of an intellectually produced substitute perception. They occur during learning to fly. Nausea and vomiting appear to be produced by reactions of the abdominal muscles to sudden changes in the magnitude and direction of gravitational forces, and can be avoided by completely relaxing these muscles.

3,315

McCutcheon, E.P., C.A. Berry, G.F. Kelly, R.M. Rapp & R. Hackworth 1962
AEROMEDICAL STUDIES: B. PHYSIOLOGICAL RESPONSES OF THE ASTRONAUT
In Results of The Second United States Manned Orbital Space Flight, May 24, 1962. (Houston, Tex., National Aeronautics and Space Adm.)
Rept. No. NASA SP-6, N62-14691, May, 1962.

ABSTRACT: The observations of Astronaut Carpenter's physiological responses to the MA-7 mission are reviewed. Generally, the responses were within physio-

iogical ranges. No disturbing body sensations were reported as a result of the flight. Specifically, the heart-rate response to nominal exercise demonstrated a reactive cardiovascular system. The ECG tracing recorded during reentry was abnormal because of the increased respiratory rate associated with talking during maximum acceleration. Much of the data obtained during the flight is very valuable. For example, the biosensors provided good ECG data. The respiration rate sensor provided good prelaunch but minimal in-flight coverage. The in-flight blood pressure cannot be interpreted at the present time. Because of irregular amplifier behavior, the rectal temperature thermister gave invalid values for one-third of the flight.

3,316

MacDonald, H.D. 1961 DEVELOPMENT OF CATAPULT, AIRCRAFT EJECTION SEAT, XM10. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADC TR 60-452, March 1961. ASTIA AD 270 108

ABSTRACT: Frankford Arsenal was requested to adapt the ballistic geometry of the rocket assisted pilot ejection catapult, RAPEC No. 1, to USAF aircraft requirements, specifically, as a replacement for M4 catapults presently installed in the F104 aircraft.

The existing RAPEC No. 1 catapult has been successfully scaled down to meet the USAF requirements.

The XM10 catapult supplies the necessary thrust and, consequently, ejection height to permit low-level ejections from high performance aircraft. This device is now ready for qualification and analysis tests. (Author)

3,317

MacDonald, H. D. & N. J. Waecker 1961 DEVELOPMENT OF CATAPULT AIRCRAFT EJECTION SEAT, T 20. (Aeronautical Systems Division, Wright-Patterson AFB, Ohio) WADD TR 59-306 Frankford Arsenal Report R-1557. ASTIA AD 299 138.

ABSTRACT: Frankford Arsenal was requested to develop a rocket-assisted catapult that would provide sufficient impulse to accomplish safe low-altitude ejection. Two problems were considered during the program; first, attaining sufficient impulse with the rocket-catapult combination; and second, eliminating the bending of the catapult tubes during ejection. The first problem was solved by using a rocket motor attached to the

bottom of the catapult. In this case, the rocket provides the sustained acceleration necessary to achieve the required final velocity. The problems associated with catapult tube bending in conventional catapults were eliminated by making the power stroke of the catapult section equal to the guided stroke of the seat in the rails. Flight stability and proper trajectory are obtained during ejection by angling the nozzle of the rocket so that the vector of the rocket thrust passes through the effective center of gravity of the seat-man mass and by igniting the rocket at the instant the rocket-catapult is released from the aircraft structure. The T20 catapult is now ready for qualification and analysis testing.

3,318

McDonald, R. K. & V. C. Kelley 1947 THE TYPE AND DEGREE OF INJURY RESULTING FROM ABRUPT DECELERATION: THE QUANTITATIVE DETERMINATION OF PULMONARY HEMORRHAGE. (Air Univ., School of Aviation Medicine, Randolph Field, Texas) Project No. 494, Report No. 1, 11 June 1947.

3,319

McDonald, R. K., V. C. Kelley, et al. 1947 THE TYPE AND DEGREE OF INJURY RESULTING FROM ABRUPT DECELERATION: The Etiology of Pulmonary Hemorrhage in Cats exposed to Abrupt Deceleration. (School of Avia. Med., Randolph AFB Texas) Proj. No. 494, Rept. No. 2; ASTIA AD 217 860, 21 Aug. 1947.

ABSTRACT: Animals exposed to high decelerative forces of short duration frequently sustain marked degrees of pulmonary hemorrhage and during deceleration show increased intra-abdominal pressure. Removing the pressure-transmitting medium (viscera) results in a remarkable mitigation of pulmonary hemorrhage. Applying a counter pressure device in the form of a narrow pressure cuff around the uppermost limits of the abdomen causes a decrease in pulmonary hemorrhage comparable with eviseration. The etiology of pulmonary hemorrhage in animals exposed to abrupt deceleration of short duration is dependent in large part on the generation of large intra-abdominal pressure waves and the transmission of this pressure to the lungs. (AUTHOR)

3,320

McDonald, R.K., V.C. Kelley, and R. Kaye 1948 ETIOLOGY OF PULMONARY HEMORRHAGE IN CATS EXPOSED TO ABRUPT DECELERATION. J. Aviation Med. 19(3:138-145, June 1948.

ABSTRACT:

1. Animals exposed to high decelerative forces of short duration frequently sustain marked degrees of pulmonary hemorrhage, and during deceleration show increased intra-abdominal pressure.

2. Removing the pressure-transmitting medium (viscera) results in a remarkable mitigation of pulmonary hemorrhage.

3. Applying a counter pressure device in the form of a narrow pressure cuff around the uppermost limits of the abdomen causes a decrease in pulmonary hemorrhage comparable with evisceration.

4. The etiology of pulmonary hemorrhage in animals exposed to abrupt deceleration of short duration is dependent in large part on the generation of large intra-abdominal pressure waves and the transmission of this pressure to the lungs.

3,321

McDonough, F.E. 1941 AVIATION MEDICINE: A SURVEY.
Proc. Staff Meet., Mayo Clin., 16:217-219

ABSTRACT: Present examination of candidates for flight training does not tend to select those persons who will necessarily make good aviators. It intends to eliminate those who, because of measurable physical and psychologic defects, should not be taught to fly. To better evaluate the problem, 10 members of the Mayo group of "flight surgeons" underwent pilot training. The group included an ophthalmologist, an otolaryngologist, a cardiologist, a neuropsychiatrist and others.

With regard to the care of the flier, it has been demonstrated that periodic examination of pilots does not protect them, but merely eliminates those unfit to fly.

Investigation of the effects of flying and aerial environment has been advanced remarkably, including the effects of altitude, under which aeroembolism, anoxia and altitude sickness are considered.

3,322

McDonough, F.E. 1942 AIRSICKNESS DURING AN AIRBORNE INFANTRY MANEUVER (School of Aviation Medicine, U.S.A.F. Randolph Base, Texas) Rept. No. 93-1 November 1942.

3,323

McDonough, F.E. 1942 AIRSICKNESS IN THE AIRBORNE INFANTRY (School of Aviation Medicine, USAF Randolph AF Base, Texas) Rept no. 93-2, November 1942.

3,324

McDonough, F.E. 1942 ROENTGENOGRAPHIC STUDIES OF GASTROINTESTINAL MOTILITY OBSERVED IN SWING TEST SUBJECTS (School of Aviation Medicine, USAF, Randolph AF Base, Texas) Rept. No. 102-1, December 1942

3,325

McDonough, F. E. and M. W. Thorner 1942 REGULATION BARANY AND SWING TESTS IN NAVIGATION CADETS (USAF School of Aviation Medicine, Randolph AFB, Texas) Research Report No. 1. Project 100, December 1942.

3,326

McDonough, F. E. 1943 ROENTGENOGRAPHIC STUDIES OF GASTROINTESTINAL MOTILITY OBSERVED IN SWING TEST SUBJECTS (USAF School of Aviation Medicine, Randolph AFB, Texas) Report No. 102-2, July 1943.

3,327

McDonough 1943 AIRSICKNESS IN NAVIGATION TRAINING (School of Aviation Medicine USAF, Randolph AF Base, Texas) Rept. No. 165-1, July 1943

3,328

McDonough, F. E. 1944 THE USE OF DRUGS IN THE TREATMENT OF AIRSICKNESS (School of Aviation Medicine, USAF Randolph AFB, Texas) Rept. N. 194-1, July 1944.

3,329

McEacheron, D., G. Morton, & P. Lehman 1942 SEASICKNESS AND OTHER FORMS OF MOTION SICKNESS; A General Review of the literature. War Med. 2:410-428

3,330

McEvedy, C. P. and P. Howard 1959 THE EEG AND BLACKOUT. (IVth European Congress of Aviation Medicine, Rome, 1959.)

3,331

McFarland, R.A. 1939 A BIBLIOGRAPHY ON THE SELECTION, TRAINING AND PHYSICAL FITNESS OF AVIATION PILOTS. (National Research Council Committee on the Selection and Training of Civilian Pilots, and the Civil Aeronautics Authority, Wash., D.C.) December 1939

ABSTRACT:

This is an extensive bibliography covering the following subjects: psychological studies; sensory tests; physiological studies; the effects of moderate and high altitudes; medical examinations and tests of physical fitness; human factors in aeroplane accidents and a list of aeronautical journals.

3,332

McFarland, R. A. 1941 FATIGUE IN AIRCRAFT PILOTS
New England J. of Medicine 225(22):845-855.

SUMMARY: In this discussion of fatigue in aviation, an attempt is made to analyze some of the more important contributing factors to pilot fatigue. It is shown how the attempts to locate fatigue in certain tissues or organs have not proved to be very revealing in solving practical problems related to subjective fatigue and exhaustion. Likewise, the search for a fatigue toxin, such as lactic acid, has brought to light many significant variables related to fatigue, but the relations have been more restricted than was at first expected. Furthermore, it is shown that a pilot whose muscular activity in flight is limited could hardly exhaust the energy reserves sufficiently to explain the fatigue and exhaustion often observed in airmen. The essential variables in the phenomena of acute or chronic pilot fatigue and exhaustion are ascribed to psychologic factors such as emotional stress, regardless of whether it is related to adverse flying conditions, fear of accidents, economic and social insecurity, and unhappy marital adjustments. The major portion of the discussion is related to an analysis of certain contributing factors in pilot fatigue, especially lack of exercise, the reduced tension of oxygen encountered while in flight at high altitudes, the poor selection of food and the excessive use of alcohol and tobacco. Also, certain physical variables in the cockpits of airplanes are discussed as other contributing factors to fatigue, such as noise, vibration, poor illumination, glare, static from the radio and poor regulation of the ventilation and the temperature. Finally, the results obtained in a study of transoceanic airmen are analyzed to show the effects of long flights at moderately high altitudes.

3,333

McFarland, R. A. 1943 SOME PROBLEMS IN AVIATION MEDICINE
Bull. New Engl. Med. Cent. 5:1-6, 1943.

ABSTRACT: The human problems in aviation may be divided into two parts; (1) relating to placement and selection (gunners, fighters, bombardiers and pilots); (2) to physiologic and psychologic limitations.

Recent research on the effects of alcohol on the organism has revealed, that it diminishes the utilization of oxygen in the tissues. There is a close similarity between the behavior of a person suffering from acute oxygen deprivation and that of a person under the influence of alcohol; in both cases an oxygen deficiency is delivered to the tissues.

The search for a fatigue toxin, such as lactic acid, has brought to light many significant variables related to fatigue. Certain physical variables such as noise, vibration, poor illumination, glare and radio static are important.

The effects of acceleration or "blackout" during dive bombing; variations in temperature encountered at high altitudes; aero-embolism and the difficulty of ridding the blood of the nitrogen during rapid ascents to a great height; alcohol in relation to high altitudes, and the problem of pilot fatigue, due to anoxia, alcohol, poor diet and the effects of nicotine and carbon monoxide from excessive smoking are discussed.

3,334

McFarland, Ross A. 1952 SUMMARY REPORT OF A THREE YEAR RESEARCH PROGRAM ON HUMAN FACTORS IN HIGHWAY TRANSPORT SAFETY
(Harvard School of Public Health, May 20, 1952)

3,335

McFarland, R. A. 1955 HUMAN PROBLEMS IN JET AIR TRANSPORTATION
SAE Transactions 64:437-451, 1956

ABSTRACT: The human problem with jet aircraft begins even before take-off, the author points out, with discomfort and loss of efficiency from ground injuries on the field or in repair shops. In the air, human tolerance is matched against other extreme forces of acceleration direction changes, temperature and pressure variations.

3,336

McGehee, J. R. and V. L. Vaughan, Jr. 1962 MODEL INVESTIGATION OF THE LANDING CHARACTERISTICS OF A RE-ENTRY SPACECRAFT WITH A VERTICAL-CYLINDER AIR BAG FOR LOAD ALLEVIATION. (national Aeronautics and Space Administration, Washington, D. C.) NASA Technical note D-1027, March 1962, ASTIA AD-272 616.

ABSTRACT: Analytical and experimental investigations were made to determine the landing characteristics of re-entry spacecraft equipped with a vertical cylinder air bag for impact load alleviation. Assuming a rigid body and isothermal air compression and expansion, computations were made to determine accelerations for a landing on concrete from a flight-path angle of 90 degrees (vertical flight path) at a contact attitude of 0 degrees. Two models (1/6 and 1/2 scale) dynamic model of a spacecraft--air-bag configuration proposed for manned re-entry was landed on concrete, on sand, and in calm water from various flight paths for a range of contact attitudes. Reasonable agreement between computed and experimental data indicates that the scaling technique developed is satisfactory for prediction of full-scale characteristics from model tests with air bags in atmospheric environment. The maximum accelerations obtained during landings on sand were about 11 g along the X-axis and 8 g along the Z axis. The maximum accelerations obtained during landings in water were about 10 g along the X-axis and about 6 g along the Z-axis. (Author)

3,337

McGowan, W.A. and J.M. Eggleston 1961 A PRELIMINARY STUDY OF THE USE OF FINITE-THRUST ENGINES FOR ABORT DURING LAUNCH OF SPACE VEHICLES. (National Aeronautics and Space Administration, Washington, D.C.) NASA TN D-713, Dec. 1961. ASTIA AD-268 451.

ABSTRACT: Investigations were made of the aborts initiated along a typical launch trajectory in the region of relatively high flight-path angles at suborbital velocities while leaving the atmosphere and along another typical launch trajectory in the region between orbital and near-escape velocity. For aborts at suborbital velocities, the optimum times to apply thrust of given levels are determined from the standpoint of maximum reduction of the peak entry decelerations. For aborts at superorbital velocity the propellant weights required to return the vehicle to earth are established for several thrust levels and for the effect of time delay during separation and orientation.

3,338

McGuire, F. G. 1958 SOVIETS DISCUSS SATELLITE CREW RECOVERY Missiles and Rockets, August 11, 1958, p. 51

ABSTRACT: Isakov has reduced the means of accomplishing the safe return of satellite crews to two possibilities: return of the satellite as an entire unit, and

return of the crew only. According to the article, the second of these is the easier and most practicable method. Acceleration and deceleration problems are under study, Isakov, says, and states that "it has been established that man can withstand a force of 3--5 g's for short periods with no harmful after effects." But he notes that continued acceleration or deceleration to this extent results in serious change in a man's condition which sharply limit his efficiency. Isakov mentions the experiments of Italian scientists who subjected animals to g forces while the animals were submerged in water. The present experiments showed that under these conditions animals could withstand much higher g-loads than under normal conditions. Excessive rotation was also listed by the author as a dangerous phenomena. Rapid and irregular rotation of the body in all places can cause serious effects such as complete unconsciousness if a speed of 2-3 revolutions per second were experienced over a period of 10 to 15 seconds. Russian live-animal ejection experiments are reported to have been highly successful in proving that survival was indeed possible in extreme-altitude ejections, even though the vehicle was not travelling at orbital velocity. (CARI)

3,339

McGuire, T.F. and F.J. Leary 1958 A UNIFIED CONCEPT OF STRESS TOLERANCE: ITS RELATIONSHIP TO DRUGS AND THE AIRMAN AND ITS RELATIONSHIP TO A SYSTEM OF AIRCREW SELECTION BASED UPON PHYSIOLOGIC AND PSYCHOLOGIC CRITERIA. (Paper, 1958 Meeting of Aero Medical Association, Statler Hotel, Washington, D.C., March 24-26)

ABSTRACT: A unified concept of stress tolerance, utilizing all available data plus original experiments, is presented. The relationship of therapy with such drugs as the corticords, tranquilizers, and the amphetamines, is discussed in relationship to stress tolerance. With newer high performance aircraft and increased destructive potential of aircraft lofted weapons, fewer combat aircraft are needed. But the physical integrity of the entire aircrew has become more important to the mission than ever before while the potential stresses to which they may be exposed have increased. Selection of special or "premium" aircrews based on physiologic and psychologic criteria, aside from technical capability, is discussed. (J. Aviation Med. 29(3):242, March 1958)

3,340

McGuire, T. F. & F. J. Leary 1958 TRANQUILIZING DRUGS AND STRESS TOLERANCE. (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC-TR-58-64.

3,341

McGuire, T. F., H. W. Marshall, A. C. Nolan, E. F. Lindgerg & E. H. Wood 1961
COMPARISON OF CHANGES IN ARTERIAL OXYGEN SATURATION DURING TRANSVERSE ACCELERATION AS INDICATED BY EAR OXIMETRY AND BY DIRECT PHOTOMETRY ON ARTERIAL BLOOD.
(Paper, 1961 Meeting of Aerospace Medical Association, Chicago, April 24-27).

ABSTRACT: Six experienced men, twenty-seven to thirty-five years old, were exposed to 2, 3.5, and 5 g for ten-minute periods while reclining in the Mercury Astronaut position in a human centrifuge. Centrifuge axis-to-subject distance was 15.5 feet. A Wood-Geraci oximeter was affixed to the pinna of one ear while and earpiece modified to detect arterial pulsations was attached to the other. Simultaneous cuvette oximetry determinations were made during acceleration via an indwelling needle or small catheter in the left radial artery. Ear-pulse changes during acceleration, useful in the headward (positive) acceleration position as an indicator of a critical decline in blood pressure at ear level, did not show apparent definitive changes in the transverse position. The oxygen saturation values of blood in the heat-flushed ear indicated by the oximeter decrease rapidly during the first minute of exposure to acceleration and then remained relatively stable at this decreased level for the duration of the ten-minute exposure. Arterial oxygen saturation levels below 85 per cent by cuvette oximetry were encountered in some subjects during exposure to 5 g. These decreases could be prevented by breathing 99.6 per cent oxygen. The discrepancy between ear oximeter and cuvette oximeter saturation values during exposure to acceleration is believed due to the retarded blood flow through the ear caused by the acceleration, with consequent increased extraction of oxygen from the ear blood by local-tissue metabolism. (Aerospace Med. 32(3):242, March 1961.)

3,342

McIntyre, A. K. EFFECT OF ANTI-MALARIAL DRUGS ON G TOLERANCE.
(Royal Australian Air Force, Sydney) Report FR-71.

ABSTRACT:
(a) Centrifuge tests were performed on a group of 33 aircrew trainees to determine blackout thresholds before and after anti-malarial drugs (quinine, atebrine, and "A.S.I.") in suppressive doses.
(b) Before treatment, blackout threshold averaged 4.9 "g" for 5 seconds, range 3.6 to 6.2 "g".
(c) No adverse effect on resistance to "g" was observed with any drug.
(d) In most cases, "g" tolerance improved progressively with successive centrifuge run whether or not drugs were taken.

AVERAGE "G" TOLERANCE

	QUININE		ATEBRINE		ATEBRINE & ASI	
	Before	After	Before	After	Before	After
Drug	5.1	5.4	4.7	5.2	4.7	5.5
Control	5.2	5.6	4.2	4.2	4.2	4.7

3,343

McIntyre, A. K. 1941 DISORIENTATION. AIRSICKNESS. Notes on FR-10 (Royal Australian Air Force, Sydney) FPRC Rept. No. 358 (i)

3,344

McIntyre, A. K. 1941 MOTION SICKNESS, PRESENT STATUS OF RESEARCH. (Royal Australian Air Force, Sydney) FR-91, June 1941.

3,345

McIntyre, A. K. 1943 THE EFFECT OF HEAD POSITIONS ON SUSCEPTIBILITY TO MOTION SICKNESS (Royal Australian Air Force, Sydney) Report FR 86.

3,346

McIntyre, A. K. and I. D. R. Gardiner 1943 CORRELATION BETWEEN SWING AND SIR SICKNESS (Royal Australian Air Force, Sydney) Report FR 67.

3,347

McIntyre, A. K. 1944 PRELIMINARY REPORT ON CURRENT ACTIVITIES OF THE R. A. F. PHYSIOLOGICAL LABORATORY, FARNBOROUGH. (Royal Australian Air Force, Sydney)FR-101B, 14 Dec 1944.

3,348

McIntyre, A. K. 1945 SOME SUBJECTIVE EFFECTS OF ANGULAR AND CENTRIFUGAL ACCELERATIONS. (R. A. A. F., Sydney)
(Paper. Meeting of the Physiological Society, 10 February 1945)

ABSTRACT: Different combinations of linear and angular accelerations are encountered with different methods of producing high values of G. Such abnormal environments may produce complex, unfamiliar sensations, the study of which may throw further light on the mechanism of spatial orientation.
In the orthodox type of centrifuge a sequence of apparent changes in gravitational orientation is experienced by the subject who has no fixed visual horizon. With the onset of rotation, a sensation of upward and backward movement is noticed,

which is replaced during constant angular velocity by the general sensations of increased weight; during deceleration, a feeling is experienced of falling with forward rotation around a transverse axis. Vertical nystagmus (quick component downward) is observed at this stage and continues for some seconds after cessation of rotation. These effects are related to the magnitude of the angular acceleration around the axis of the centrifuge.
In the Australian accelerator, the magnitude of G may be varied without the production of associated angular accelerations. This is achieved by moving the subject radially away from or towards the axis during rotation of the machine at constant angular velocity. No sensations of rotation are experienced by the occupants, since the desired angular velocity is attained so slowly that appreciable stimulation of the semicircular canals is avoided.
Variations in radial acceleration in this centrifuge produce illusions of changes in bodily attitude. The resultant between gravity and centrifugal force is accepted as if it were simple gravitational pull, even if its direction is nearly horizontal. Thus a subject, although actually lying on his back, feels as if tilted into the upright position during the application of G, while the observer, seated upright and facing the axis of rotation, experiences the illusion of lying on his back throughout the period of rotation.
The angular momentum of the centrifuge may produce another striking illusion. If the head is tilted in any plane other than that of rotation, strong sensations are experienced of turning in a plane at right angles to the actual head movement, apparently because of precessional phenomena in the labyrinths. The occurrence of nystagmus (in the plane of subjective rotation) indicates that the semicircular canals are involved. This phenomenon may also be observed in spinning aircraft, and may lead to gross spatial disorientation in the absence of visual clues. (J. of Physiology 104:11P-12P, 10 Feb. 1945)

3,349

Mc Iver, J.W. 1950 FULL SCALE MEASUREMENTS OF IMPACT LOADS ON A LARGE FLYING BOAT. PART I. DESCRIPTION OF APPARATUS AND INSTRUMENT INSTALLATION. (Gt. Britain Marine Aircraft Engineering Estab.) F/Res/216 March 1950

3,350

MacKay, R. A., & T. K. W. Ferguson 1951 INFLUENCE OF CERTAIN ANTI-MOTION-SICKNESS DRUGS ON PSYCHOMOTOR AND MENTAL PERFORMANCE. J Aviation Med. 22(3):194-195, June 1951.

3,351

McKenzie, R. E., & B. O. Hartman 1960 AN APPARATUS FOR THE SPIRAL AFTEREFFECT TEST (SAET) (USAF, School of Aviation Medicine, Aerospace Med. Ctr., Brooks AFB, Texas) Research Rept. 60-69, Sept. 1960

3,352

The McKiernan-Terry Corp., Dover, N. J. 1960 FEASIBILITY AND DESIGN STUDY FOR AN ADVANCED HUMAN ENVIRONMENTAL RESEARCH ACCELERATOR (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 60-225; ASTIA AD-236 026; March 1960

ABSTRACT: This study presents an analysis of the engineering problems inherent in the design of a high performance accelerator research device capable of producing controlled high levels of centripetal acceleration, and simultaneously, linear and rotary motion of a payload about various axes. Engineering feasibility is studied and related to various combinations of acceleration parameters, including acceleration level, rate of change of acceleration, radius of rotation, payload mass, and displacement and rotary degrees of freedom. The conclusions resulting from a study of these factors are integrated to yield specifications for accelerators of optimum performance. All significant facets of accelerator concept are treated, including prime mover considerations, arm strength, aerodynamic loss problems, gimbal mechanisms, capsule layout, and basic dynamic and kinematic properties. Automatic control and analogue simulation of the acceleration problem is also discussed. (AUTHOR)

3,353

McKiernan-Terry Corp. 1961 MODIFICATION OF HUMAN CENTRIFUGE AT THE AVIATION MEDICAL ACCELERATION LABORATORY: PROGRESS REPORT CONCERNING (U.S. Naval Air Development Center, Johnsville, Pennsylvania) NADC-MA-L6101, 1 March 1961, ASTIA AD- 251 947

ABSTRACT: A program of modification of the centrifuge at the Aviation Medical Acceleration Laboratory was proposed (reference(a)) based on the experience which had been accumulated during the flight simulation testing of the X-15 research aircraft. References (b) through (g) detail the history of appropriations pertaining to the modification program.

A contract has been let to the McKiernan-Terry Corporation of Dover, N.J. for the following: a. A feasibility study for the entire modification program as presently envisioned. b. A new and completely rewired centrifuge arm which will support a larger and heavier gondola without depreciating the performance capabilities of the present centrifuge drive motor. c. A sperical 10 ft. diameter gondola which is substantially larger than the present 10 ft. X 6 ft. oblate speriod gondola. This new gondola will be capable of having its internal structure removed to allow a completely checked out instrument panel, pilot control system, seat configuration. It will also be capable of continuous relation and have increased slip ring capacity.

3,354

McLaughlin, J., & I. Gray 1956 BIOCHEMICAL RESPONSE TO TRAUMA. II CORTICOSTERONE AND 17 HYDROXYCORTICOSTERONE LEVELS IN PLASMA OF RATS SUBJECTED TO TUMBLING TRAUMA. (Walter Reed Institute of Research, Wash., D. C.) WRAIR-86-56; ASTIA AD-112 801, April 1956

ABSTRACT: Corticosterone and 17-hydroxycorticosterone levels were determined in plasma of normal and traumatized rats. In general, it was found that the plasma levels rose with increasing number of turns at zero time after tumbling. When the corticosterone and 17-hydroxycorticosterone plasma levels of rats were examined over a period of 24 hours from the end of drumming, it appeared that the levels changed markedly. However, these changes were not parallel for the two steroids examined. The fractions separated as corticosterone and 17-hydroxycorticosterone showed the same elution behavior, ultraviolet absorption, fluorescence development and similar Rf by paper partition chromatography as those of known samples of corticosterone and 17-hydroxycorticosterone. (AUTHOR)

3,355

McLaughlin, J., Jr. & I. Gray 1959 BIOCHEMICAL RESPONSE TO TRAUMA. IV. CORTICOSTEROID LEVELS IN PLASMA OF RATS SUBJECTED TO TUMBLING TRAUMA. Am. J. Physiol. 196(4):893-895. ASTIA AD 219 560.

SUMMARY: The effect of tumbling trauma on the concentration of corticosterone (CS) and other corticosteroids (X-steroids) in the plasma of rats has been followed using a fluorimetric method for the analyses of the corticosteroid. Sprague-Dawley rats weighing 225-275 gm were used. The animals were tumbled for 300, 400, 500, 600 and 700 turns giving a 24-hour mortality ranging from 0 to 100%. The corticosterone levels immediately after the tumbling were increased 2-5 times while the X-steroid concentrations increased 5-10 times. When followed in time after tumbling, the corticosterone remained elevated for 1-2 hours and returned toward normal within 24 hours whereas the X-steroids rose to a peak about 1 hour and then fell to near zero between 1 and 2 hours after which a secondary rise occurs which rises about 8 hours and then returns toward normal within 24 hours. (Author)

3,356

McLennan, M. A. 1959 A DATA SYSTEM FOR SELECTIVELY MONITORING PHYSIOLOGICAL SIGNALS
In Proceedings of the Pilot Clinic on the Instrumentation Requirements for Human Comfort and Survival in Space Flight. Ohio State University, Columbus, Ohio. October 26-27, 1959.
(Foundation for Instrumentation Education and Research, New York, N. Y., April 1960.) Pp. 41-50.

ABSTRACT: The "Viability Monitor" telemetry system for selective monitoring of physiological signals is described. The point is made that it is impractical to extend present telemetry practices to cover long-term physiological experiments in the space field because the continuous registry of all signals become too cumbersome. The basic principles for a system that would eliminate noninformative signals are stated. (Tufts)

3,357

McMichael, H. 1961 INJURY PATTERNS AS SEEN IN MATERIAL FROM AIRCRAFT ACCIDENTS AVAILABLE AT THE ARMED FORCES INSTITUTE OF PATHOLOGY. (Paper, Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Material Center, Philadelphia, Penn. June 14-15, 1961)

ABSTRACT: A number of patterns of injury seen in material from aircraft accidents are described and interpreted with respect to the probable causative forces producing the injuries. The injuries commonly seen in passengers fatally injured in commercial airline accidents are described and related to the problem of the design and tie-down of passenger seats. The "rocking seat" type of aircraft passenger seat is described as a possible solution to the seating problem. A number of other injury patterns are described, including visceral ruptures, blast induced injury, and injuries sustained during high speed ejection. The use of the study of traumatic injury in reconstruction the sequence of events occurring in aircraft accidents is illustrated.

3,358

McMichael, A. E. & A. Graybiel 1963 RORSCHACH INDICATIONS OF EMOTIONAL INSTABILITY AND SUSCEPTIBILITY TO MOTION SICKNESS. Paper: 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 28 - May 2, 1963.

ABSTRACT: Almost all studies of motion sickness have referred to "underlying personality factors" but have not included such factors in the variables studied. The present study investigates relationships between aspects of personality, as measured by the Rorschach test, and susceptibility to experimentally indiced motion sickness.

Eleven volunteer normal subjects were administered a battery of psychological tests, of which one was the Rorschach, prior to their exposure to four experimental conditions designed to induce motion sickness. These experimental conditions included exposure to: aerial acrobatics; going to sea in a power boat; a Slow Rotating Room; experiencing zero G. An overall rating on susceptibility to motion sickness was also made by another experimenter as a composite of these four criterion conditions.

Five composite dimensions of the Rorschach test (Bech) were correlated to the results of each of the five criteria. These dimensions were: drive, dependency; rigidity; anxiety; impulsivity. The resulting rank order correlations are presented and discussed in light of the previous findings.

3,359

McNally, W. J., & E. A. Stuart 1942 PHYSIOLOGY OF THE LABYRINTH REVIEWED IN RELATION TO SEASICKNESS AND OTHER FORMS OF MOTION SICKNESS. War Med. 2:683

3,360

McNally, W. J. 1947 THE PHYSIOLOGY OF THE VESTIBULAR MECHANISM IN RELATION TO VERTIGO. Ann. Otol. Rhinol. & Laryngol. 56:514-533

3,361

McNally, W. J. & E. A. Stuart 1955 AN ADDITIONAL FIVE-YEAR REVIEW OF SOME CASES OF VERTIGO REPORTED IN 1949.
Ann. Otol. Rhin. & Laryng. 64:519-536, June 1955.

3,362

McNey, Thomas John 1960 THE ELECTROENCEPHALOGRAM DURING POSITIVE ACCELERATION. (Master's Thesis: University of Southern California, Los Angeles) ASTIA AD-244 235; June 1960

ABSTRACT: The present investigation permits the following conclusions concerning the relationship between the EEG and the clinical state of the individual exposed to positive acceleration: (1) careful study of electrical, electrode and muscle artifact is necessary in order to evaluate properly the electrical activity recorded in the centrifuge environment; (2) given a prominent and particular form of alpha wave activity, it is possible to evoke an alpha wave response during blackout which may constitute an objective measure of blackout; and (3) individual differences, both in the resting EEG and in the EEG recorded during acceleration stress, make it difficult to reach general conclusions concerning the recorded electrical activity and the state of consciousness in the individual. (AUTHOR)

3,363

McNulty, C. F. 1962 SIMULATION TECHNIQUES FOR SPACECREW TRAINING, STATE-OF-THE-ART REVIEW (6570th Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio) MRL-TDR-62-32; ASTIA AD-283 343; April 1962

ABSTRACT: The capabilities of the existing simulation technology are discussed and various government and industrial programs for the development of new techniques required for spacecrew training are described. These techniques are divided into categories and discussed in generalities and specifics. The category most

basic to the simulation of a system is the development of a suitable set of mathematical models for expressing its characteristics to the degree required. Existing equation techniques are based upon simplifications that are not valid for future type vehicles. Classical equations, although not complete, are too complex to be practical for complete simulation. Programs are discussed for the development of new coordinate schemes and generalized aero-dynamic and motion equations. The application of special and general purpose analog and digital computers to simulation problems are discussed, and the development of a real-time digital computer and hybrid analog-digital computers, which appear most promising for future simulation, is reviewed. The requirements for visual capabilities in future training simulation are presented. (AUTHOR)

3,364

McNutt, D. C., S. N. Morrill, A. B. Headley, & H. W. Ades 1963 THE ELECTRO-ENCEPHALOGRAPHIC FINDINGS IN PASSENGERS DURING ACROBATIC FLIGHT. Aerospace Medicine 34(3):218-321, March 1963

ABSTRACT: Three groups, namely, experienced, inexperienced and "clinical referrals were studied while undergoing similar acrobatic sequence. The EEG, ECG, and moving pictures were recorded. Approximately fifty per cent of the "clinical" group were activated by this sequence, whereas only five per cent and fifteen per cent of the other groups were. Unconsciousness was accompanied by high voltage slow waves. These were most frequently found during a loop maneuver. The spiking and other phenomena normally correlated with epilepsy were not seen in any of these records.
From these findings it is concluded that the airborne recording of the encephalogram has a definite place in the workup of aviators who have had some incident of unconsciousness. It would also be of value as a baseline, and as an aid in selection of a small group of astronauts such as prior to space flight. (AUTHOR)

3,365

McPherson, A. E. 1952 THE MEASUREMENT OF FORCES ACTING ON A PILOT DURING CRASH LANDING.
Proc. Soc. Exper. Stress Analysis 9(2):159-162.

ABSTRACT: Instrumentation is described for the purpose of measuring the deceleratory forces to which a pilot is exposed during crash landing. As the commonly used decelerometers were inadequate for this purpose, two forms of a "crash dynamometer" were developed using the deformation of metal rings as a measure of acceleratory forces.

3,366

McPherson, A.E. 1948 THE MEASUREMENT OF FORCES ACTING ON PILOT DURING CRASH LANDING
In: Marcus, Henri et al, Shock and Vibration Bulletin No. 7, Naval Research Lab. Rept. No. S-3229, pp. 59-63. ASTIA ATI 75 153

ABSTRACT: This paper describes the development of a dynamometer for recording the maximum loads reached in a pilot's lapstrap and shoulder harness during a crash landing. The work is sponsored by the Airborne Division of the Bureau of Aeronautics as part of their program to determine the force acting on pilot restraining harness during a crash.

3,367

McRuer, D. T., I. L. Askenas, & E. S. Krendel 1958 A POSITIVE APPROACH TO MAN'S ROLE IN SPACE. (Systems Technology Inc., Inglewood, Calif.) 28 Nov. 1958

3,368

McShera, J. T. & J. W. Keyes 1961 WIND-TUNNEL INVESTIGATION OF A BALLOON AS A TOWED DECELERATOR AT MACH NUMBERS FROM 1.47 to 2.50. (National Aeronautics and Space Administration, Washington, D. C.) NASA TN D-919, Aug. 1961. ASTIA AD 261 700.

ABSTRACT: A wind-tunnel investigation has been conducted to study the characteristics of a towed spherical balloon as a drag device at Mach numbers from 1.4 to 2.50 Reynolds numbers from 0.36 times 10 to the 6th power to 1.0 times 10 to the 6th power, and angles of attack from -15 to 15 degrees. Towed spherical balloons were found to be stable at supersonic speeds. The drag coefficient of the balloon is reduced by the presence of a tow cable and a further reduction occurs with the addition of a payload. The balloon inflation pressure required to maintain an almost spherical shape is about equal to the free-stream dynamic pressure. Measured pressure and temperature distribution around the balloon alone were in fair agreement with predicted values. There was a pronounced decrease in the pressure coefficients on the balloon when attached to a tow cable behind a pay load. (Author)

3,369

McShera, J. T., Jr. 1963 AERODYNAMIC DRAG AND STABILITY CHARACTERISTICS OF TOWED INFLATABLE DECELERATORS AT SUPERSONIC SPEEDS. (National Aeronautics & Space Administration, Langley Research Ctr., Langley Station, Va.) NASA TN D-1601; N63-13716; Mar. 1963

ABSTRACT: A wind-tunnel investigation has been conducted to study the possibility of inflating balloon and cone devices to give the same drag and stability characteristics as their solid counterparts over the Mach number range from 2.00 to

4.65. The results include some effects of Mach number, tow-cable length, and inlet configurations on the drag and stability of these inflatable decelerators. Both the closed pressure-inflatable and self-inflatable (ram-air) decelerator configurations were fully inflated and had approximately the same drag and stability as their solid counterparts. The decelerator exhibits excellent stability in the supersonic wake region. The drag reaches a maximum and has little change with increases in tow-cable length when the decelerator reaches the supersonic wake region. (AUTHOR)

3,370

McSurely, A. 1952 GOOD SEATING ENGINEERING SAVES LIVES
Aviation Week, 24 Nov. 1952.

ABSTRACT: The importance of seat design and construction is exemplified by the analysis of an airplane crash involving a Convair 240 (in Flushing Bay near La Guardia Airport, New York, on January 14, 1952). The plane ditched in 15 ft. of water at a speed of about 135 mph., and a normal rate of descent of about 500 ft per minute. Peak decelerations in the range of 10 to 15 g were absorbed by hull and wings. Failure of some seat anchorages indicated that standard load specifications of 6 g forward, 6.6 g downward, and 1.5 g sideways were exceeded. Still, no major injuries were incurred by the passengers due to the resilient structure of seat backs and the firm anchorage of the seats. The following improvements are recommended: (1) seats which will stand 15 g loads; (2) seat backs of ductile metal that will cushion body or head shock; (3) firm anchoring of passengers to their seats with snugly tightened 3000-lb. load seat belts.

ACCELERATION

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3,371

Maaske, C. A. 1943 REPORTS OF THE COMMITTEE ON AVIATION MEDICINE, NATIONAL RESEARCH COUNCIL, ON RADIAL ACCELERATION AND ITS EFFECT ON THE HUMAN AND ANIMAL ORGANISM. (Wright Field) Memo Rept. ENG-M-49-696-36; 8 Apr. 1943

ABSTRACT: Report and summary of the third meeting of the subcommittee on acceleration, CAM-NRC, Washington, D. C., 29 March 1943.

3,372

Maaske, C.A. 1943 CONFERENCE ON ACCELERATION AT THE MONTREAL NEUROLOGICAL INSTITUTE. (USAAF, AMC, Aero Med. Lab., Wright Field, Ohio) ENG-49-696-4B, 14 June 1943.

ABSTRACT: Animal results obtained to date were reviewed by means of conferences, written reports, graphs and other illustrations; the most pertinent of which are summarized below.

a. The normal cardiac response during radial acceleration is a tachycardia superseded by a bradycardia on removal of the "g", provided no anti-"g" protection is employed. Failure to obtain a tachycardia indicates poor or depressed cardiac reflexes and as such is a grave sign. However, a bradycardia is often but not invariably seen during exposure to "g" with protection. The situation is altered here in the sense that the form of the electrocardiogram is the best index of the subject's cardiac condition. It was suggested that the Wright Field group continue electrocardiographic studies and employ a leg reference electrode in addition to the chest lead now used. This lead can be used successfully only on those subjects who can attain a satisfactory degree of muscular relaxation while exposed to "g".

b. The results of animal experimentation indicate that physiological events immediately following "g" exposure are as significant as results obtained during radial acceleration. Furthermore, these events vary with the duration of the "g" exposure. The important indices include changes in blood pressure, in electrocardiogram, in electroencephalogram, and in respiration. Therefore, it appears necessary to make all centrifuge studies conform in time relationship to flight maneuvers. Wright Field centrifuge studies are so designed.

3,373

Maaske, C. A., G. A. Hallenbeck, & E. E. Martin 1944 EVALUATION OF ANTI-"G" SUITS. (Wright Field) Rept. No. 4; Eng-49-696-51D; CAM No. 348; 10 June 1944

ABSTRACT: The efficacy of a single pressure pneumatic suit (G-2) was compared with that of a gradient pressure suit (g-1) with a view to lightening and simplifying anti-"g" protection. The G-1 suit plus oil filter and valve weighs 15.5 lbs the G-2 assembly weighs 8.5 lbs.

In the G-2 the oil filter has been removed and the abdominal bladder simplified. It is pressurized at 1 psi/"g" for values of "g" over 2. There are one abdominal, 2 calf, and 2 thigh bladders. Air is metered to the suit by a 2 unit single pressure "g" activated valve. Pressure source is the positive pressure side of the B-12 vacuum instrument pump rotating at 3,000 rpm and working on -5 inches Hg intake.

Twenty experienced subjects who tested the G-2 by 10 second exposures on the centrifuge obtained an average protection of 1.2 "g" against visual dimming and peripheral light loss and of 1.9 "g" against blackout. This compares favorably with the performance of the G-1 suit.

3,374

Maaske, C. A., A. L. Roach, E. E. Martin & G. L. Maison 1944 EVALUATION OF ANTI-G SUITS.
(USAAF, AMC, Wright Field, Ohio) TSEAL-3-696-51-F; Rept. No. 6; 16 Nov. 1944.

ABSTRACT: (a) Tests have been made on the Wright Field centrifuge of efficacy of the G-3 (cutaway) and G-4 (coverall) anti-"g" suits. Eleven subjects tested the G-3, 10 subjects the G-4. Protection was determined relaxed with maximum "g" lasting 10 seconds.

(b) Protection offered was as follows:

Graying	1.0 "g"	1.0 "g"
Peripheral light loss	1.05"g"	1.14"g"
Blackout	1.26 "g"	0.9 "g"

(c) The G-3 is pressurized at 0.86 psi per "g" in maneuvers exceeding 2 "g". The G-4 is pressurized at 0.88 psi/"g". The slightly greater protection against blackout offered by the G-3 is though to be due to the better fit obtained with adjustable lacings, which are not incorporated in the G-4.

(d) The G-3 has been reported to offer 2 "g" protection in planes, quite adequate for the aircraft now being flown.

3,375

Maaske, C. A., G. L. Maison, & G. A. Hallenbeck 1945 PATTERN OF HUMAN CARDIAC RESPONSE TO CENTRIFUGAL FORCE. Abstract: Federation Proceedings 4(1):48, March 1945

ABSTRACT: Man is admirably adapted for life on a planet where the normal force of gravity is as it is on earth. If he is seated, his circulatory system is

adequate in most cases to maintain his sensorium alert at three times normal gravity. The primary mechanism by which this is accomplished seems to be increased cardiac rate.

Centrifugal force has been used to simulate multiplication of normal gravity. At the highest force level which over a ten second exposure did not produce visual changes the average increase in cardiac rate in 47 subjects was 27.42 per minute with a range from 13 to 47. At force levels which abolished peripheral vision heart rate rose (average) 31.65 per minute (range 3 to 53) in 47 subjects. When force was adequate to abolish central vision cardiac rate rose 34.11 per minute average (range 14 to 66) in 44 subjects. When the force is rapidly withdrawn at the end of the 10 seconds a bradycardia is the rule with strong "vagal" beats. On the other hand continuance of these force levels beyond 10 seconds permits recovery of symptoms without accompanying further rise of cardiac rate.

3,376

Maaske, C. A. 1945 THE HOURLY VARIATION OF HUMAN "G" TOLERANCE AND THE EFFECT OF BENZEDRINE MEDICATION.
(USAAF Air Tech. Serv. Com., Aero Med. Lab., Wright Field, Ohio) Memo Rept. TSEAL 3-696-4F, 18 Sept. 1945.

ABSTRACT: Determination that repeated exposures of (10 seconds duration each) to radial acceleration throughout the course of eight hours has no appriciable effect on the subjects's 'g' tolerance, and that a single oral dose of 10 mgm. benzedrine sulfate did not cause a significant change in "g" tolerance of any subjects studies.

3,377

Maaske, C. A. 1946 HUMAN TOLERANCE TO CENTRIFUGAL FORCE REPEATED HOURLY THROUGHOUT THE DAY
Federation Proceedings 5:68.

ABSTRACT: Following repeated exposures to high radial accelerations, either in a human testing centrifuge or in aircraft, some personnel may complain of varying degrees of fatigue (subjective). To determine whether such repeated physiologic stresses had any effect upon the individuals G-tolerance per se; 6 young men, who had a known G-tolerance history of many months, were given complete G-tolerance assays at intervals of 45 minutes to an hour throughout the normal working day on the Air Technical Service Command human testing centrifuge. This series of assays also served as a control in a benzedrine medication study.

The standard AAF technique was used to determine the highest acceleration tolerated with retention of clear vision in a ten second interval. Likewise the lowest accelerations which produced dimming, narrowing and complete loss of vision (blackout), and in some cases loss of consciousness were determined in ten second exposures.

Complete abolition of vision was lost at 4.8 Grams with a range from 3.6 to 7.2. There was no significant difference in any of the values for the various symptom levels either individually or collectively throughout the series of repeated hourly exposures for an entire day.

3,378

Mackie, R. R., L. Morehouse, & D. A. Clegg 1956 MEASUREMENT OF FORCES AFFECTING HUMAN BODIES IN AIRCRAFT ACCIDENTS. (Human Factors Research, Inc., Los Angeles, Calif.) Contract Nonr-152700, Rept. No. TR-2, Feb. 1956. ASTIA AD 93 351

ABSTRACT: A study has been conducted to develop a method for recording deceleration forces in airplane crashes. To do this, accelerometers were placed in drone aircraft used by the Navy for missile evaluation. The accelerometers, which are self-actuating, were mounted in the seats of drone aircraft immediately prior to take-off. The accelerometer design is such that upon being stimulated with a force of 8 g or more, the accelerometer starts, and continued recording the pattern of forces for a period of 8 seconds. In this manner it was possible to obtain a record of both the magnitude and the pattern of g forces with respect to time, for the duration of the crash.
This report presents the findings of two airplane crashes which were similar in nature. Both airplanes crashed during landing striking the runway nose down, at approximately the same angle. The severity of the two crashes differed somewhat, but in the main, they were the same kind of crash. This report contains the results of the crashes, the summary of accelerometers records and recommendations for future research. (CARI)

3,379

Maciolek, J. A. 1955 CIRCULATORY REFLEX ACTIVITY AS A G-PROTECTIVE DEVICE. (Aero Medical Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio) Report No. WCRD-55-1. Jan. 1955. ASTIA AD 75 056.

ABSTRACT: The response on the human centrifuge of 7 seated subjects to positive accelerations of normal rapid onset (1 g/sec) was compared with their tolerance in runs having 0.07 to 0.1 g/sec rate of onset. The

approximate blackout threshold of the group was 3.7 g for the standard runs. The runs of slow onset attained 6.2 g before equivalent symptoms occurred. The 2.5 g difference in symptom level is a measure of the response of the various hemostatic mechanisms tending to sustain blood pressure in man exposed to a gravitational stress which is acting from head to foot. The technique seems to be a simple and practical method of evaluating the activity of the protective reflexes in different persons and in the same person under varying conditions.

3,380

Mackie, R.R., L. Morehouse, D.A. Clegg 1956 A STUDY OF THE CRASHES DURING LANDING OF TWO INSTRUMENTED F6F DRONE AIRCRAFT (Human Factors Research, Incorporated Los Angeles, California) February 1956, ASTIA AD-93352

ABSTRACT: A study has been conducted to develop a method for recording deceleration forces in airplane crashes. To do this, accelerometers were placed in drone aircraft used by the Navy for missile evaluation. The accelerometers, which are self actuating, were mounted in the seats of drone aircraft immediately prior to take-off. The accelerometer design is such that upon being stimulated with a force of 8 g or more, the accelerometer starts, and continues recording the pattern of forces for a period of 8 seconds. In this manner it was possible to obtain a record of both the magnitude and the pattern of g forces with respect to time, for the duration of the crash.
This report presents the findings of two airplane crashes which were similar in nature. Both airplanes crashed during landing, striking the runway nose down, at approximately the same angle. The severity of the two crashes differed somewhat, but in the main, they were the same kind of crash. The principal findings and summary of accelerometer records are presented in this report.

3,381

Mackworth, N.H. 1950 RESEARCHES ON THE MEASUREMENT OF HUMAN PERFORMANCE. (His Majesty's Stationery Office, London) Med. Res. Council, Special Rep. Ser. No. 268.

3,382

Macrae, D. 1960 THE NEUROLOGIC ASPECTS OF VERTIGO: ANALYSIS OF 400 CASES. Calif Med. 92:255-9, April 1960

3,383

Madson, R. A. 1957 HIGH ALTITUDE BALLOON DUMMY DROPS. PART I. THE UNSTABILIZED DUMMY DROPS.
(Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 57-477. ASTIA AD 130 965

ABSTRACT: The characteristics of instrumented dummies carried aloft to predetermined altitudes were studied during the free fall in unstabilized situations. These dummies were observed to assume an attitude permitting spins about a transverse axis, and the angular velocities recorded on accelerometers exceeded rates compatible with human tolerance. This study justifies further tests to develop a method of stabilizing a man descending from high altitudes.

3,384

Madson, R.A. 1961 HIGH ALTITUDE BALLOON DUMMY DROPS. II. THE STABILIZED DUMMY DROPS. (Aerospace Medical Lab., Wright-Patterson AFB, Ohio) WADC TR 57-477, Aug. 1961. ASTIA AD 270 880.

ABSTRACT: A study was conducted to develop a means of eliminating body tumbling, spinning, and rotation which are inherent in a long free-fall from extremely high altitude. Dummy men, wearing seat-style instrument kits and stabilization parachute assemblies, were carried to altitudes between 30,000 and 98,000 feet. They were released from the balloons by radio-command, and the instrument kits recorded effectiveness of the parachutes and movements of the dummies. The tests proved that an effective means of stability could be provided and that live jumps could be made safely from high altitude with the parachute developed during this program. (Author)

3,385

Maekawa, M. et al. EXPERIMENTAL STUDY ON AVIATION MEDICINE. II. ACCELERATION. Kokuigaku, 2:149, 1944.

ABSTRACT: Electrocardiogram for fur seal during receiving positive 6 G for 10 to 30 seconds. Pulse rate increasing, augmentation of P wave and depressed ST segment was observed. The compression of abdomen by appropriate band diminished the findings.

3,386

Maher, P. J., Jr. 1948 HUMAN TOLERANCE TO NEGATIVE G IN AIRCRAFT. (Air Materiel Command, Wright-Patterson AFB, Ohio) MCREXD 695-69B, 19 April 1948. ASTIA AD 126 361; ASTIA ATI 26 477.

ABSTRACT: Subjective sensations in humans resulting from exposures to negative accelerations up to 3.6 g of 7 sec duration in A-24 aircraft are described. A 45 degree to 50 degree dive was started from 11,000 ft. and sustained until a speed of from 360 to 380 mph was reached (6000 - 7000 ft); the aircraft was then leveled out, inverted, and abrupt forward pressure applied to the stick, causing the aircraft to climb vertically, Each subject was exposed to at least 5 negative runs and as high as 17 runs. The discomfort experienced in the aircraft was similar to or less than experienced on the centrifuge. The phenomenon known as "red-out" was not observed. It was demonstrated that a human subject may safely tolerate 3.6 negative g for 7 sec. (ASTIA)

3,387

Maier, E. 1943 LATERAL STRESSES ON AIRCRAFT UNDERCARRIAGES. (Lilienthal Gesellschaft, Rept. No. 169, 1943, pp. 19-27) RAE Translation No. 277.

3,388

Main, R. J. 1937 ALTERATIONS OF ALVEOLAR CO_2 IN MAN ACCOMPANYING POSTURAL CHANGE. Amer. J. Physiol. 118:435-440

3,389

Mains, R.M. 1961 STRUCTURAL RESPONSE TO DYNAMIC LOAD. In: Shock, Vibration and Associated Environment Bulletin No. 30 (Office of the Secretary of Defense, Washington, D.C., January 1962) pp. 66-84, ASTIA AD 273 514

ABSTRACT: This paper represents an attempt to generalize the problem of calculating responses to random vibration and shock into a set of simple principles, which are sufficient to produce numerical solutions to practical problems.

Within the limitations of superposition and linearity, there are no restrictions on the recipes given so that the methods are general. The use of a digital computer with narrow frequency or time intervals leads to solutions as precise as desired, yet the numerical summations can be done by slide rule or hand computer and still give acceptable results. The related subjects of load definition and damage evaluation are discussed so that the prediction of structural response is placed in a proper frame of reference.

3,390

Maison, G. L. 1943 CONFERENCES AND TESTS AT THE CENTRIFUGE OF THE MAYO AERO MEDICAL UNIT.
(USAAF, AMC, Wright Field, Ohio) ENG-49-660-11y, 24 April 1943.

ABSTRACT: Report of conference held by Army representatives, Mayo Clinic group, and suit manufacturers. The difference between types of acceleration encountered in centrifuges and planes is explained.

3,391

Maison, G. L., C. A. Maaske, & E. E. Martin 1943 DESCRIPTION OF THE MATERIEL COMMAND HUMAN CENTRIFUGE, TECHNIQUES EMPLOYED THEREWITH AND RESULTS OF STUDIES OF NORMAL G-TOLERANCE OF HUMAN SUBJECTS. (Wright Field, Dayton, Ohio) Rept. No. ENG-49-696-4D, 11 Oct. 1943

ABSTRACT: (a) The Wright Field centrifuge, which was placed in operation 15 March 1943, is driven by a 180 HP motor driven in turn by a 250 HP AC-DC motor generator set. Automatic control is provided by a photoelectric scanning device. The safety factor is 3, and failure of any part of the driving mechanism or opening of the doors to the centrifuge room automatically stops the centrifuge. The system of signal lights and the recording mechanism are described.
(b) Standard operating procedure is given. For 10 second exposures the following average thresholds have been determined in 772 centrifuge runs on 35 normal male subjects:

Clear vision	4.0 "g"
PLL	4.5 "g"
Blackout	5.0 "g"

3,392

Maison, G. L. & E. E. Martin 1943 HUMAN PICK-UP.
(USAF, AMC, Wright Field, Ohio) ENG-49-696-53, 8 October 1943.

3,393

Maison, G. L., C. A. Maaske, G. A. Hallenbeck & E. E. Martin 1943 THE EFFECT OF TAPING THE BODY ON "G" TOLERANCE IN MAN. (National Research Council, Committee on Aviation Medicine, Washington, D. C.) CAM Rept. No. 204; 29 Sept. 1943.

ABSTRACT: It has been reported that Japanese pilots sometimes tape their bodies to increase their "g" tolerance. In 416 10-second centrifuge trials on 18 subjects, taping the body with 2 and 4 inch Ace bandage from the ankles to the xiphoid process and from the axillae to the wrists gave the following protection:

Clear vision	0.8 "g"
Grayout	0.5 "g"
Peripheral light loss	1.2 "g"
Blackout	1.1 "g"

Unavoidable variations in tightness of bandages produce very variable results. The process is exceedingly uncomfortable and time consuming and is not considered practical.

3,394

Maison, G.L. 1944 EVALUATION OF ANTI-G SUITS. (USAF, AMC, Wright Field, Ohio) Rept. No. 3, ENG-49-696-51C, CAM No. 309, 18 April 1944.

ABSTRACT: A total of 22 Berger Bros pneumatic gradient pressure suits and 22 hydraulic Franks flying suits were flight tested by 26 pilots of the 9th Air Force in P-47 and P-51 aircraft, Complete visual protection was obtained with both suits.

Eighty per cent of the pilots thought anti-"g" protection desirable in P-51 aircraft but only about 40 per cent thought it necessary in P-47's, probably because the latter planes are less maneuverable. Protection was especially desired for combat flying.

Of the 17 pilots who tested both types of suit, 11 preferred the GPS, one the FFS, and 5 had no preference. The GPS was preferred because it is lighter, less cumbersome, can be worn over ordinary clothing, fitting is less critical, and it does not need to be serviced with water prior to take off.

3,395

Maison, G. L. 1944 REPORT TO THE AIR SURGEON ON STATUS OF ANTI-G DEVICES AS OF 25 March 1944. (Wright Field, Ohio)

ABSTRACT: Simplification of the three pressure GPS suit (G-1) into the one pressure (G-2) suit is reported. Service tests in the ETO have been performed and are reported.

3,396

Maison, G. L., & C. A. Maaske 1944 EVALUATION OF ANTI-G SUITS. REPORT NO. 5 (TO REPORT THE STATUS OF ANTI-"G" DEVICES FOR FIGHTER PLANES IN THE VARIOUS THEATERS). (Wright Field) Eng-49-696-51E-1; 11 Aug. 1944

ABSTRACT: Two models of the anti-"g" suit have been shown to be necessary, a cut-out suit (G-3) consisting only of the cloth covered bladders to be worn with regular officer's clothing in cold climates, and the G-4, a very light weight coverall for wear in tropical localities where a minimum of clothing is desirable. G-suits are now optional in the 9th Air Force for P-47's and P-51's; they are mandatory in the 8th AAF for P-51's.

The G-3 is a cut-out G-2 (single pressure) suit. Comparative weights:

G-2 suit.....6 lbs.
G-2 plane installation .....4 lbs.
G-3 suit.....2½ lbs.
(Plane installation interchangeable with G-2).

The G-4 coverall is made of rayon marquisette; probably is too porous to protect against sunburn. (NB this has been replaced by solid weave nylon at a later date) Total number of "g" suits delivered to date is 3500. 6600 are on order.

Photographs of G-1, G-2, and G-4 suits are included.

3,397

Maison, G.L., C.A. Maaske, G.A. Hellenbeck & E.E. Martin 1945 ACCELERATION AND G SUIT. Air Surgeon's Bull. 1:3-7, Jan. 1945.

3,398

Maison, G. L., C. A. Maaske, & E. E. Martin 1945 SENSORY EFFECTS OF CENTRIFUGAL FORCE ON MAN WHEN SEATED. Fed. Proc. 4(1):48, March 1945.

ABSTRACT: As of 1 January, 1945, 276 persons have been exposed to centrifugal force on the AAF human centrifuge during its 19 months in operation. The character of the exposures involves a rigid pattern in which the centrifugal force is brought as rapidly as possible to the peak force desired, maintained at that level for 10 seconds, and withdrawn as rapidly as possible. The actural rate of rise of force is between 2 and 3 gravitational units per second.

The outstanding sensory effects of centrifugal force on man are visual. Subthreshold levels averaged 3.4 gravitational units with a range from 2.6 "g" to 4.9 "g". Peripheral vision dimmed on the average at 3.9 "g" with a range from 2.8 to 5.2. Peripheral vision was lost at 4.5 "g" (average), range 3.1 to 6.6. Central vision was lost at 5.0 "g" range 3.2 to 7.0. Complete abolition of sight and hearing occurred at 5.6 "g", range 4.0 to 7.0. Prolongation of a given force level beyond 10 seconds if it does not cause unconsciousness usually results in a recovery of the sensorium to a greater or lesser degree.

3,399

Maison, G. L. & K. E. Penrod 1945 COMPARISON OF SHOCK FORCES AT OPENING OF SILK AND NYLON PARACHUTES AT VARIOUS ALTITUDES.
(USAF, Wright Field, Ohio) TSEAL-3-696-661, 20 July 1945.

3,400

Maison, G. L., K. E. Penrod & Hall 1945 DESCENT TIMES OF 200-POUND DUMMIES WITH 28-FOOT SILK, 28-FOOT NYLON AND 24-FOOT NYLON PARACHUTE.
(USAF, Wright Field, Ohio) TSELA-3-696-66H, 30 May 1945.

3,401

Maison, L. PARACHUTE SHOCK FORCES.
Air Surg. Bulletin, 2:350

3,402

Maitland, T.G. 1931 GENERAL OBSERVATIONS ON SEA-SICKNESS AND THE LABYRINTHINE THEORY. Brit. med. J., 1:171-176

3,403

Majer, E. H. 1961 UBER DIE DREHNACHEMPFINDUNGSDAUER (Concerning the Duration of the Postrotatory Sensation)
(Trans. of Arch. f. Ohren.-Nasen.-Kehlkopfheilk. 149:210-218, 1941.)
(SLA Translations Center, Chicago, Ill.) 61-14306.

3,404

Makarchenko, A. 1962 BIOLOGICAL PROBLEMS IN ASTRONAUTICS
(In: "Medical and Biological Aspects of USSR Space Flights", Joint Publications Research Service Translation No. 16,277. ASTIA AD 400 411
Original Source: Russian newspaper, Meditsinskiy rabotnik, 17 August 1962, P. 3

ABSTRACT: The flight of a man into outer space, beyond the ordinary atmospheric shell of the earth, can be effected only by using a space rocket. In this connection much still remains to be done, not only by engineers, astraonomers, designers and astrophysicists but also biologists, physiologists and medical personnel. It is necessary to perfect a whole system of medical and biological measures to assure safety on such long flights. The most serious medicobiological problems are those of acceleration, weightlessness, the effect of cosmic, ultraviolet and x-rays, variation in heat exchange, vibration, etc.

3,405

Makarov, A. 1961 [GREEN LIGHT FOR SPACE FLIGHTS]
Tekhnika molodezhi 1961(9):20-23

ABSTRACT: The article contains data on developments in the conquest of space. Yuriy Gagarin is mentioned and some well-known details of German Titov's flight, his behavior and physical reactions during flight and his landing by parachute are given. Titov's working efficiency during flight was excellent and while sleeping his pulse rate was 58 strokes per minute. In the section "Space Calls", the author mentions some serious injuries which may befall the human body in space vehicles due to its increase in weight during acceleration and deceleration of the space vessel. The blood may accumulate in the legs or in the head, the heart may become bloodless, and the vessels may burst. The most comfortable position for the astronaut during flight has already been established in ground laboratories. Practice has proved that the organism is able to endure the acceleration force created by a 20 million h.p. engine and the change from acceleration to the state of weightlessness without any harmful effects. Within a 25-hour flight Titov covered a distance of 700,000 km which is equivalent to a two-way flight between the earth and the moon. The author is convinced that in the near future space vessels will land on the moon and flights to Venus and Mars will become reality.

3,406

Makino, R.C. 1956 AN APPROXIMATION METHOD IN BLAST CALCULATIONS (Ballistic Research Labs., Aberdeen Proving Ground, Md.) proj. no. TB2-0001; BRL Memo. rept. no. 1034; Feb 1956, ASTIA AD-114 875

ABSTRACT: A heuristic study is made of reducing the system of partial differential equations describing blast waves to a system of ordinary differential equations by

the imposition of approximating constraints on the flow. The procedure is illustrated for plane, cylindrical, and spherical blast waves only. Boundary and initial conditions are satisfied up to the order of approximation. The analysis includes equations of motion, constraints and shock-front conditions. The shock-line is calculated, and from it, the remainder of the flow field is determined. The analysis assumes continuity in the flow field through n+1 derivatives, when n is the differential order of the constraint function. Several applications are made to illustrate the approximation method. No analysis is made of errors introduced by the constraint, and the sufficiency conditions on the constraint are not examined.

3,407

Makuuchi, S and K. Iwabuchi 1944 A FEW EXPERIMENTS ON CENTRIFUGAL TOLERANCE. Kokuigaku, 2(1,2):163. Aug. 1944.

ABSTRACT: Tolerance of positive and negative G stress (83 to 85G) and changes of body weight between the malnutritious young mice and control group.

3,408

Malcik, Vladimir 1957 LETADLOVA NEMOC. (Air Sickness)
Vojenske zdravotnicke listy 26 (10):459-467, Oct. 1947. In Czech.

3,409

Malcik, Vladimir, 1958 ILUSE ZA LETU (Illusions While Flying)
Vojenske zdravotnicke listy 27, Suppl. 3:19-26, 1958.

3,410

Malkin, V. B. 1957 ISUCHENIE SERDECHNOI DEIATEL 'NOSTI PRI DEISTVII RADIAL' NYKH USKORENII (Studies on Cardiac Function in Radial Acceleration.)
Voen. med zh. (Moskva) (9):57-61, Sept. 1957.
Translation, (Joint Publications Research Service, Washington, D. C.)
JPRS L-1724-D.

3,411

Malkin, V. 1958 PHYSIOLOGICAL INVESTIGATIONS IN THE UPPER ATMOSPHERE.
Meditsinsky Rabotnik (Medical Worker) September 5, 1958

ABSTRACT: The creative genius of Soviet scientists is continuously advancing and opening up new vistas. Recently, the latest achievement broadcast throughout the world was the launching of a single-stage, 1,690 kilogram geophysical rocket by Soviet scientists. The rocket carried a hermetically-sealed cabin containing two experimental dogs, "Belyanka" and 'Pestraja,". During take-off, when the animals inside the rocket were subjected to back to chest acceleration, an increase in pulse frequency was noted in all animals. During the period of weightlessness, the pulse frequency decreased, and increased again after the parachutes opened up and animals were subjected to deceleration. No substantial change was noted in the behavior of experimental animals under conditions of weightlessness. Examination of moving picture films revealed a sharp rise of the head during weightlessness. This apparently was due to the fact that the tonus of extensors of the neck and back ceased to be in conformity with the force of gravity. During the first few minutes of weightlessness, the blood pressure, pulse frequency, and respiration in the dogs remained high and became normal only after a lapse of 4-6 minutes. The Soviet researchers came to the conclusion that the G-forces create the most adverse effect on the organism during deceleration of the detachable part of the rocket. (CARI)

3,412

Malkin, V. 1958 MEDICO-BIOLOGICAL INVESTIGATIONS ON ROCKETS.
Sovet. Aviat. (USSR) Sept. 9, 1958
(Air Technical Intelligence Ctr., Wright-Patterson AFB, Ohio). Rept. No. ATIC-IR-1613-58

ABSTRACT: This paper discusses the flights of dogs in non-hermetic chambers up to altitudes of 110 km, and in hermetically sealed cabins to an altitude of 212 km.

3,413

Malkin, V.B. 1959 PROBLEMS OF BIOLOGY IN COSMIC FLIGHT (TSIOLKOVSKII'S CONCEPTS HAVE BEEN TRANSFORMED INTO REALITY).
Trans. of Priroda (USSR) 48(10):35-44, 1959
(SLA Translations Center, Chicago, Ill.) 60-11516.
See also (Joint Publications Research Service, Washington, D.C.) JPRS 2531.

3,414

Malkin, V. 1959 A SIGNIFICANT STAGE IN THE EXPLORATION OF OUTER SPACE
Sovetskaya Aviatsiya (Moscow) 259(3429):4- , Nov. 3, 1959

ABSTRACT: This article states that the next step in space exploration will consist of attempts to probe the space around the sun. Layka, the experimental dog aboard the ship, was subjected to the simultaneous action of acceleration, vibration, and noise during the take-off. The animal was situated in the cabin in such a way that acceleration acted from chest to back. Although the dog was pressed against the floor of the cabin during the entire period of acceleration, it did not show any noticeable effects. The pulse frequency increased immediately after take-off, possibly due to the effects of intense noise and vibration. The frequency of the pulse beats subsequently decreased; the electrocardiogram showed that the heart activity remained normal despite acceleration. (CARI)

3,415

Malcik, V. 1961 OTAZKY KOSMICKEHO LEKARSTVI (Problems of Space Medicine)
Tvorba (Prague) 26(17):387-388, 27 April 1961, (in Czech.).
See Also; U. S. Joint Publ. Research Service, Washington, D. C.,
Trans. no. 4717 (1842-S), 22 June 1961.
Also (Office of Technical Services, Washington, D.C.) 62-19362.

ABSTRACT: Some of the physiological problems of space flight are reviewed. Vibrations of high amplitude cause general fatigue, create disturbances of the autonomic nervous system, vision, and hearing. To raise tolerance to acceleration, the space ship may be equipped with an anti-g capsule which rotates, keeping the astronaut transverse to the direction of acceleration. Weightlessness does not interfere with vital functions, e.g., respiration, heart rate, blood pressure, but it has a disturbing effect on coordination of movements and orientation in space. A different composition of the cabin atmosphere from that of earth is considered; it may consist of 60% oxygen, 20% helium, and 20% nitrogen. The high oxygen content will permit reduction of cabin pressure, and together with helium, avert some of the consequences of explosive decompression. Other problems result from the effects of accumulation of carbon dioxide, radiation, isolation, and disturbance of the diurnal rhythm. Sanitation problems to be solved include hygiene of skin and clothing, elimination, and disposal of wastes.

3,416

Mallan, Lloyd 1955 MEN, ROCKETS AND SPACE RATS
(New York: Julian Messner, 1955)

ABSTRACT: The accomplishments in rocket technology, which made possible the

announcement of a planned earth satellite, are brought together in terms of the men who are pioneering in the design and testing of rocket ships and are risking their lives as the guinea pigs of space medicine to determine the effects of space flight upon human beings.

3,417

Mallan, L. 1956 SECRETS OF SPACE FLIGHT
(Greenwich, Conn.: Fawcett Publications, Inc., 1956). (Fawcett Book No. 298)

ABSTRACT: A photographic account is presented of rocketry and space flight. Subjects covered include studies in space medicine; escape capsules and rocket sleds; development of the space suit; launch into the stratosphere; training of space pilots, and research rocket takeoff.

3,418

Malassez, J. 1930 DE LA PERCEPTION DES ACCELERATIONS ANGULAIRES DANS LE MAINTIEN DE L'EQUILIBRE ET D'UNE FORME PARTICULIERE DE VERTIGE DE POTATION (The Perception of Angular Acceleration in the Maintenance of Equilibrium and a Particular Form of Vertigo of Rotation)
Bulletin de la Société philomathique de Paris (Paris) 19: 37-55

3,419

Malmgren, B. & T. Holme 1961 CONSTRUCTION OF A HORIZONTAL-ROTOR CENTRIFUGE. (Karolinska Inst., Stockholm, Sweden)
Contract DA 91-591-EUC-1619, November 1961. ASTIA Doc. No. AD-270 204L.

ABSTRACT: The basic ideas which had only been tested on a small aluminium model were used as the basis for the construction of the big apparatus shown in the attached drawings. A number of difficult mechanical problems were analysed and solutions were adopted which would permit occasional runs at 25.000 g. For normal operations it was decided that 20.00 g would probably be sufficient, considering the rapid acceleration and short travelling distance of the particles. The principle of the apparatus are summarized.

3,420

Maloney, J.A., & F.G. Richardson 1961 TESTS OF A LIFE SUPPORT SYSTEM UNDER SIMULATED OPERATING CONDITIONS. In 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D.C. (Mt. Prospect, Ill.: Institute of Environmental Sciences) Pp. 379-394

ABSTRACT: As an initial step in man's exploration of space the McDonnell Aircraft Corporation under the sponsorship of NASA has developed a "space capsule" complete with all necessary controlling systems for orbital flights about the Earth. This project, known as Project Mercury, is to place a man in orbit approximately 100 miles above the earth and return him safely. Time required for one orbital revolution will be approximately 90 minutes and the first orbital flight will consist of three orbits making a total flight time of four and one half hours. A primary requirement for a successful orbiting mission is the satisfactory operation of a Life Support System. In addition to the basic requirement to sustain the Astronaut in this flight, there will be periods of "on-the-pad" time prior to launching and "in the ocean" time after re-entry during which the system must provide for the Astronaut's safety and comfort. The satisfactory operation of the life support system of spacecraft must be assured before man can safely venture beyond his normal environment. Complete system operation under conditions as nearly like those expected to be encountered is one means of evaluating design adequacy. A program for evaluating and demonstrating operation of the Environmental Control System of the Capsule Mercury was conducted in McDonnell's Systems Laboratory.

The system test installation, instrumentation, methods of simulating essential capsule environments, test procedures, safety precautions, and medical monitoring instrumentation and methods are described. The basic program for system demonstration is outlined and a brief evaluation of the test installation is presented. (Author)

3,421

Mammen, R. E., G. T. Critz, D. W. Dery, F. M. Highly, & E. Hendler 1963 EFFECTS OF SEQUENTIAL EXPOSURE TO ACCELERATION AND SPACE CAPSULE ATMOSPHERIC CONDITIONS (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, April 28 - May 2, 1963)

ABSTRACT: A study was conducted to determine the physiological suitability of a proposed space capsule atmosphere. Six subjects were each exposed to typical launch and re-entry acceleration profiles. Between exposures to acceleration, each subject spent 14 days at a simulated altitude of 27,000 feet breathing 100 per cent oxygen. Frequent determinations were made before, during and after the 14-day confinement period to assess the physiological status of the subjects. Blood and urine constituents, including arterial gas tensions, pulmonary, and cardiac activity were closely monitored. Performance was measured at regular intervals using a specially designed task. The results of these measurements are presented and discussed. (Aerospace Med. 34(3):260, Mar. 1963)

3,422

Managan, Richard F., James W. Brinkley, George Lokatos & Robert N. Headley
1960 HUMAN FACTOR RESPONSES DURING GROUND IMPACT
Paper: 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960

ABSTRACT. This research effort was undertaken to establish human factor and design parameters of restraint systems and impact attenuators for future manned space flight. The Inclined Test Facility at the Wright Air Development Center is presently being used to simulate vertical impact conditions as experienced in the soft landing of aerospace vehicles. (Soft landing velocities do not exceed 45 ft./sec.) The facility has a capability for simulating soft landings utilizing vehicles weighing up to 30,000 pounds at velocities up to 45 ft./sec. vertical and 60 ft./sec. horizontal velocities. Data gathering techniques have consisted of: oscillograph recordings from accelerometers mounted within the vehicle and on the subject, high speed motion picture coverage, electrocardiogram prior to, during and immediately following impact, a complete physical examination preceding and following each experiment, and accessory laboratory analysis. Vertical accelerations up to 38 G's at the rate of onset of 12,000 G/sec. and duration of .003 sec. have been recorded from accelerometers mounted on the human subjects. To date, a total of thirty-six experiments have been conducted with human subjects. These experiments have been supplemented by a series of twenty-eight control tests utilizing fully articulated anthropomorphic dummies. Information gained from this research effort will be applied to all future restraint and impact attenuator requirements for manned aerospace vehicles.

3,423

Mandel, M.J. 1962 EFFECT OF SINUSOIDAL VERTICAL VIBRATION ON THE URINARY SEDIMENT IN MAN. (6570th Aerospace Medical Research Lab., Aerospace Medical Division, AFSC, Wright-Patterson AFB, Ohio)
Report No. MRL-TDR-62-63, June 1962. ASTIA AD 283 844.

ABSTRACT: Experiments were conducted to determine whether sinusoidal, low frequency vertical vibration for 1 minute at subjective tolerance levels could produce renal damage. Two groups of vibrated sitting subjects (frequency, 4 to 9 cps) were compared to a control group which had never been exposed to vibration experiments. One group had long experience, varying from 6 months to 2 years, with experimental sinusoidal vibration at subjective tolerance levels. The other group was experiencing its first shake at high levels (near subjective tolerance). No difference could be detected in the urinary sediment between the two experimental groups or between the vibrated groups and the control subjects. Although the data does not indicate renal damage, it might have occurred if the vibrations had been continued for a longer time period.

3,424

Mandel, M. J., & R. D. Lowry 1962 ONE-MINUTE TOLERANCE IN MAN TO VERTICAL SINUSOIDAL VIBRATION IN THE SITTING POSITION. (6570th Aeromedical Research Labs., Wright-Patterson AFB, Ohio) AMRL-TDR-62-121

ABSTRACT: One-minute subjective tolerance in man to sinusoidal vertical vibration was determined in the sitting position. In comparing the data to previously published information, we noted that, although the new levels were higher, the contour of the curve remained unchanged. The reasons for this difference, as well as specific subjective complaints leading to tolerance, are presented and discussed. (AUTHOR)

3,425

Mandel, M.J., F.R. Robinson, and E.A. Luce 1962 SGOT LEVELS IN MAN AND THE MONKEY FOLLOWING PHYSICAL AND EMOTIONAL EXERTION. Aerospace Med. 33(10):1216-1223, Oct. 1962.

ABSTRACT: Ten students and four instructors observed the nature and duration of their after-sensations following the cessation of a 45° banked turn at 90 knots in a Chipmunk Aircraft.

Observations were made under three conditions: (a) eyes closed, (b) eyes open u under an instrument hood, and (c) eyes open with attention directed towards the horizon.

The after-sensations always included a component described as rotation in the opposite direction to the stimulus turn.

Some observers reported a component of descent and described their after-sensations as a slipping turn or spiral dive.

The after-sensations gradually decreased in intensity and the end points were difficult to detect.

The durations of the after-sensations experienced with closed eyes were in general accord with the published psycho-physical data.

The durations of the after-sensations diminished as the amount of visual information about the true state increased.

The more experienced pilots reported after-sensations of shorter duration.

3,426

Mangelsdorf, J.E. 1959 LOGISTIC SUPPORT TO MAN'S ECOLOGY IN SPACE Mechanical Engineering 81:79, July 1959

ABSTRACT: This paper discusses the ecological elements with which the system must provide the satellite crew. Provision for potable water and nutriment

and means of ingestion; gases for breathing; disposal of body wastes; protection from thermal, noise, radiation, psychological and G-stresses are treated in some detail. It is shown that the solution of the problem of man's ecology in space requires talent from a number of technical areas. The author briefly examines the Lockheed ecological model, first as a means of illustrating man's metabolic exchange, and second, as a tool for solving some of the problems of designing for long-endurance, manned satellites.

3,427

Mann, C.W., N.H. Berry, and H.J. Dauterive 1949 THE PERCEPTION OF THE VERTICAL: I. VISUAL AND NON-LABYRINTHINE CUES J. Exp. Psychol 39:538-547

3,428

Mann, C. W. & N. H. Berry 1949 THE PERCEPTION OF THE POSTURAL VERTICAL. II. VISUAL FACTORS. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 110 500.5, 23 June 1949. ASTIA ATI 80 464.

SUMMARY: Under the conditions of this experiment there was no significant difference in the precision of the individual's judgment of the visual vertical and visual horizontal.

As in a previous investigation, the mean errors and variability of judgment are significantly increased when a soft padded seat is substituted for a hard seat.

The mean error and variability of the judgments of the visual horizontal are significantly greater when the individual is in a position of tilt than when he makes the judgment from a vertical position

3,429

Mann, C. W., & G. E. Passey 1949 THE PERCEPTION OF THE VERTICAL. V. ADAPTATION EFFECTS. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 110 500.9., 17 Nov. 1949

ABSTRACT: Ten subjects placed in positions of lateral tilt were required to return themselves to the postural vertical after a delay of 60 sec. in the position of tilt and with no delay in the tilt position. Each was given 10 trails in random order at 10°, 45°, and 90° of tilt in both right and left quandrants. The positions were presented for immediate and delayed adjustment and under modified and nonmodified somesthetic conditions. The index of postural adjustment used was the constant error. Adaptation, as measured by a shift of constant error toward the direction of initial inclination and by an increase in the number of errors in the direction of inclination, was present under conditions of delay for both modified and nonmodified somesthetic conditions.

3,430

Mann, C. W., & H. J. Dauterive 1949 THE PERCEPTION OF THE POSTURAL VERTICAL. I. THE MODIFICATION OF NON-LABYRINTHINE CUES. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 110 500.4., 3 June 1949

3,431

Mann, C. W., G. E. Passey, & R. K. Ambler 1950 THE PERCEPTION OF THE VERTICAL. VII. EFFECT OF VARYING INTERVALS OF DELAY IN A TILTED POSITION UPON THE PERCEPTION OF THE POSTURAL VERTICAL. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 110 500.12., 25 Jan. 1950

ABSTRACT: The effects of varying durations of exposure upon adjustment to the gravitational vertical were investigated. Passey and Guedry have shown that when adjustments to the vertical were made following a 60-sec. exposure to tilt there was a statistically significant increase in the average error of adjustment to the gravitational vertical. Following 60-sec. exposure they also noted a greater number of errors in the direction of initial tilt. Artifacts of their appartus made it impossible to use the index of constant error. In this study 12 subjects (Ss) were subjected to a tilt of 45° in either quadrant in the lateral plane using the Tulane lateral tilt chair. They were exposed to tilt for periods of 0, 15, 30, and 45 sec. following which they readjusted to the gravitational vertical in the absence of a visual frame of reference. Each S made 24 adjustments for each duration of exposure to tilt, 12 determinations from each upper lateral quadrant. Data for the determinations in each quadrant were subjected to statistical analyses separately since it was demonstrated that adjustments differed with respect to the quadrant from which they were made for the delayed readjustment trials. With increasing time of exposure to tilt there was an increase in the constant error in the direction of initial tilt. With increasing time of exposure there was also an increasing average error and an increasing number of errors made in the direction of initial tilt. With increasing time of exposure there was no increase in the variability of the data for average, constant, or number of errors in the direction of initial tilt.

3,432

Mann, C. W. & G. E. Passey 1950 THE PERCEPTION OF THE VERTICAL. VIII. ADJUSTMENT TO THE VERTICAL AS A FUNCTION OF THE MAGNITUDE OF TILT EXPOSURE. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 110 500.14., 23 Feb. 1950.

ABSTRACT: The object of the present experiment was to determine the effect of varying amounts of initial tilt and various times of exposure in position of initial tilt upon the adjustments made to the postural vertical in the absence of a visual frame of reference. Three subjects (Ss) were subjected to tilts 5°, 15°, 25°, 45°, and 55° in the lateral plane, and were maintained in these

positions of lateral tilt for periods of 0, 5, 15, 25, 35, 45, 55 and 65 sec. prior to being allowed to return themselves to the gravitational vertical. Each S was given 10 adjustments from each position of tilt and time of exposure making 480 adjustments for each S. Half of the adjustments of S were made from the left upper lateral quadrant and half from the right upper lateral quadrant. The adjustments were made during 20 experimental sessions for each S. With increasing duration of exposure to tilt there is an increasing average error of adjustment and a shift of constant error of adjustment in the direction of initial tilt. Increasing the amount of initial tilt is accompanied by an increasing average error of adjustment and a shift of constant error ir the direction of initial tilt. An increase in the duration of exposure to tilt and an increase in amounts of initial tilt produces no significant change in variability of either average or constant error. The results are related to previous work in this area and curves are fitted to the empirical data. These curves are proposed as theoretical functions.

3,433

Mann, C. W. 1950 STUDIES IN SPACE PERCEPTION. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 110 500. 18., 31 Oct. 1950 ASTIA ATI 198 564

ABSTRACT: The evidence presented supports the hypothesis that space orientation is a complex function involving, in the intact organism, all sense modalities that, under the circumstances, are appropriate. Moreover, it involves not only the receptor but the motor aspects of perception. The total effect of body tilting under static conditions or under the influence of centrifugal force is that the organism not only received the impulses but reacts to them. With a tilted visual field there is a tendency towards postural compensation by appropriate motor responses. The perceptions involved in space orientation, both visual and postural, are motor as well as receptive.

3,434

Mann, C. W. 1951 THE EFFECTS OF AUDITORY-VESTIBULAR NERVE PATHOLOGY ON SPACE PERCEPTION. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 110 500.22., 15 Aug. 1951

3,435

Mann, C. W., F. E. Guedry & J. T. Ray 1951 POST-ROTATIONAL PERCEPTION OF APPARENT BODILY ROTATION.
J. exper. Psychol. 41:114-120. ASTIA ATI 122 199.
Also see: Naval School of Aviation Medicine, Pensacola, Fla. Research Rept. NM001 11050013, Feb. 3, 1950.

ABSTRACT: This investigation was designed to determine the relative contributions of the visual and postural factors to the post-rotational effects of the oculogyral phenomenon. Comparisons were made of the post-rotational effects produced under conditions of (a) no visual stimulus, (b) continuous visual stimulus, and (c) flickering visual stimulus. Three sophisticated Ss were used in the investigation. The equipment consisted of a Link Trainer modified to rotate at 20 rpm. Reports by the Ss of the cessation of post-rotational apparent movement under all conditions yielded subjective measures of the duration of the first effect of the oculogyral phenomenon. The duration of the first effect under conditions A, no visual stimulus, and B, continuous visual stimulus, were of the same order. A Phi phenomenon was experienced by observers at the commencement of the first effect. It was of variable duration for each observer, but in each case was of lesser duration than the total visual first effect. It is concluded that the perceptual nature of the first effect of the oculogyral illusion is a result of two components: (a) a visual component which produces the rapid Phi phenomenon, probably a corollary of nystagmic eye movements, and (b) a postural component which contributes the smooth unidirectional apparent motion characteristic of the first effect. It is proposed to designate the postural component the "postural negative aftereffect."

3,436

Mann, C. W. and G. E. Passey 1951 THE PERCEPTION OF THE VERTICAL: V. ADJUSTMENT TO THE POSTURAL VERTICAL AS A FUNCTION OF THE MAGNITUDE OF POSTURAL TILT AND DURATION OF EXPOSURE.
J. Exp. Psychology 41:108-13, Feb. 1951

3,437

Mann, C. W. 1952 AN ANALYSIS OF THE OCULOGYRAL EFFECT
J. of Aviation Medicine 23(3):246-253, June 1952

ABSTRACT: In a recent series of articles, Mayne has suggested that, within the limits of the linearity of the vestibular system, the duration of the subjective effects arising from the stimulation of the semicircular canals is proportional to the angular velocity. He arrives at a formula for the duration of the first effect of the form $Y = ae^{bx}$. The application of this formula to the data of nystagmus in pigeons by Mowrer and the audiogyral effect obtained by Clark and Graybiel gives a good fit to the exponential curve.

In this study an attempt was made to apply Mayne's formula to the first effects during and after rotation in the oculogyral illusion. The curve of the data derived from the total first effects appeared sigmoidal, but a good fit to Mayne's exponential curve was obtained at velocities up to 20 r.p.m. when the formula was applied to the gross visual effects--described in this article as the "picket fence" phase of the first effect.

Analysis of the results indicates that the total first effect of the oculogyral illusion is made up of two components. One of these is produced by the rapid oscillations of the cupula due to its inertia during and following rotation, and the other by the finer movements of the cupula induced by the inertia of the endolymph of the semi-circular canals.

3,438

Mann, C. W. 1952 VISUAL FACTORS IN THE PERCEPTION OF VERTICALITY. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 110 500. 29., 19 Aug. 1952. ASTIA ATI 188193

ABSTRACT: This experiment investigates Gibson's hypothesis that errors in the perception of verticality will be less under consistent visual-proprioceptive stimulation than under discrepant conditions. The present results considered in relation to a previous experiment by Boring indicate that only where the subject can identify himself with the visual framework will there be a difference in responses to "consistent" and discrepant" conditions.

3,439

Mann, C. W. 1952 VISUAL FACTORS IN THE PERCEPTION OF VERTICALITY J. exp. Psychol. 44:460-464

3,440

Mann, C. W. 1952 SUBJECTIVE EFFECTS OF DIFFERENT ROTATIONAL VELOCITIES. (USN School of Aviation Medicine, Pensacola, Fla.) Proj. No. NM 001 063.01.24, March 30, 1952. ASTIA ATI 159 446.

ABSTRACT: Mayne's formulation for the duration of the first subjective effect following stimulation of the semicircular canals is of the form $\& = ae^{bx}$. An

attempt was made to apply Mayne's formula to the first effects of the oculogyral illusion during and after rotation. A good fit was obtained to Mayne's exponential curve up to velocities of 20 r.p.m. for the gross visual effects. The analysis indicated that the total first effect of the oculogyral illusion is made up of two components rapid oscillations of the cupula, and finer movements of the cupula induced by the inertia of the endoylmph of the semicircular canals. (Naval School Aviation Medicine abstract)

3,441

Mann, C. W., & R. O. Boring 1952 THE ROLE OF INSTRUCTION IN EXPERIMENTAL SPACE PERCEPTION. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 110 500.30., 1 Sept. 1952. ASTIA ATI 188194

ABSTRACT: Two groups of four subjects were required to set a luminescent rod to a "vertical" during exposure to visual frameworks which were sometimes tilted and sometimes upright. One group was given careful instructions as to what was meant by "vertical." The other group was simply instructed to set the luminescent rod to vertical. The constant and average errors made by the naive group were consistently larger than those made by the sophisticated group. It is inferred that a number of criteria of verticality are possible in the relatively simple experimental situation employed and that different criteria may be selected by different subjects.

3,442

Mann, Cecil W. 1955 CATALOG OF TRANSLATED MATERIAL IN SPACE PERCEPTION (The Tulane University of Louisiana & U.S. Naval School of Aviation Medicine, Pensacola, Fla.) Joint Project Report No. 37, May 15, 1955. ASTIA AD 760 64

ABSTRACT: This report is a catalog of bibliographic materials in the area of proprioceptive, vestibular function and vision which have been translated from foreign languages. The catalog lists 427 items. The catalog is arranged in the author-alphabetical format adopted by the American Psychological Association.

3,443

Mann, C. W. 1956 FINAL TECHNICAL REPORT. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 110 500. 43., 30 June 1956. ASTIA AD 119 601.

3,444

Mann, C. W. & J. T. Ray 1956 THE PERCEPTION OF THE VERTICAL. III. AN INVESTIGATION OF QUADRANT DIFFERENCES.
(The Tulane Univ., New Orleans, Louisiana & U. S. Naval School of Aviation Medicine, Pensacola, Fla.) Joint Project Rept. No. 39, May 18, 1956. ASTIA AD 107 736.

ABSTRACT: An experiment was designed to investigate the possibility of right and left quadrant differences in the judgment of the postural vertical. Under the conditions of this experiment, no quadrant differences of statistical significance were found. The prediction that differences would be found between subjects tested, and under the interacting conditions producing adaptation was justified.

3,445

Mann, C. W., & C. J. Canella 1956 AN EXAMINATION OF THE TECHNIQUE OF CUPULOMETRY. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 110 500.42., 30 May 1956

3,446

Mann, C. W. & J. Ray 1956 ABSOLUTE THRESHOLDS OF PERCEPTION OF DIRECTION OF ANGULAR ACCELERATION.
(Tulane Univ., New Orleans, Louisiana and U. S. Naval School of Aviation Medicine, Pensacola, Fla.) Joint Project NM 001 110 500, Rept. No. 41, May 25, 1956. ASTIA AD 119 602.

ABSTRACT: The threshold of perception of angular acceleration was defined in this experiment in terms of a component of angular acceleration applied for a given time of exposure and judged correctly as to direction at a 75 per cent level of confidence. The results indicate that the curve of best fit describes a hyperbolic relationship between acceleration and exposure time. The maximum time of exposure of 30 seconds was determined by previous experiments on adaptation, and at this maximum the defined angular threshold acceleration was of the order of $0.035^{\circ}/sec^{2}$.

3,447

Mann, C. W., & J. T. Ray 1956 THE PERCEPTION OF THE VERTICAL. XIII. AN INVESTIGATION OF QUADRANT DIFFERENCES. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 110 500.39., 18 May 1956. ASTIA AD 107 736.

SUMMARY: An experiment was designed to investigate the possibility of right and left quadrant differences in the judgment of the postural vertical.

Under the conditions of this experiment, no quadrant differences of statistical significance were found. The prediction that differences would be found between subjects tested, and under the interacting conditions producing adaptation was justified.

3,448

Mann, C. W. & J. T. Ray 1956 THE PERCEPTION OF THE VERTICAL. XIV. THE EFFECT OF RATE OF MOVEMENT ON THE JUDGMENT OF THE VERTICAL.
(The Tulane Univ., New Orleans, Louisiana and U. S. Naval School of Aviation Medicine, Pensacola, Fla.) Joint Project Rept. No. 40, May 22, 1956. ASTIA AD 105 716.

ABSTRACT: An experiment was designed to test the effect of different rates of tilting movement upon the judgment of the postural vertical in the absence of visual cues. Subjects were tilted at combinations of speeds, delay at the tilted position, and in right and left quadrants. Analysis of variance of the constant errors indicates that the errors of judgment are significantly greater when the subjects are returned to the vertical at slower rates of movement. It is suggested that the problem of differential adaptation to inclination as an influence upon vertical judgment should be examined in the airplane under conditions of relatively rapid and relatively slow return from a bank to a straight and level attitude.

3,449

Manning, G. W. & W. G. Stewart 1942 THE EFFECT OF POSITION ON THE INCIDENCE OF SWING SICKNESS.
(National Research Council, Canada) Rept. No. C-2426, Dec. 1942.

ABSTRACT: Experiments on 825 men used in a total of 1005 swing experiments showed: (1) the incidence of swing sickness varies with different body positions; (2) the maximal susceptibility to swing sickness occurred in the sitting position when the subject was completely enclosed in a cabin-like arrangement; (3) Minimal susceptibility to swing sickness was found when the subject was swung in the supine position with the eyes open; (4) Seasonal variation in susceptibility may be an important factor and is certainly worthy of further consideration; (5) When swung on different occasions individuals vary in their swing susceptibility; (6) The group incidence of swing sickness (Type 2 and 3) does not change when the same subjects are reswung at an interval of 7 days or longer; (7) The time of day, meals and room temperature (range limited to 68 to 80 degrees Fahrenheit) do not apparently affect group susceptibility to swing sickness; (8) Apprehension does not appear to be a factor in group susceptibility to swing sickness; (9) These studies support the thesis that motion sickness is primarily a labyrinthine disturbance. This effect on the labyrinth can be modified considerably by visual orientation. The subsequent train of events characterized by nausea, vomiting, pallor, sweating, weakness and dizziness are the result of this stimulation.

3,450

Manning, G. W. 1943 ACCLIMATIZATION TO SWING SICKNESS (National Research Council, Canada) Rept. No. C2623, October 1943.

ABSTRACT: One hundred and two unselected Initial Training School aircrew were divided into groups. Fifty-one of these men swung themselves 15 minutes daily for 10 consecutive days, remaining 51 men selected at random from the total of 102 men acted as controls and were not swung until the 11th day. On the 11th day the 102 men were swung on 10-foot, 2-pole swings and the incidence of sickness in each group determined. The experiments were done in 2 groups, of 51 men each, over a period of approximately 4 weeks. The incidence of swing sickness was significantly lower (18%) in the group of men swung daily for 15 minutes than in the group of normals (42%) who had experienced no swinging prior to the assessment swing.

3,451

Manning, G.W. 1943 CHOLINE ESTERASE ACTIVITY IN RELATION TO AIRSICKNESS. (National Research Council, Canada) Report #C2513, May 21, 1943

ABSTRACT: Choline esterase determinations were carried out before and after swinging or after the development of nausea and vomiting in 14 cases of persistent airsickness and 31 Initial Training School trainees. In 8 of those men blood enzymes activities were determined before, during and after swinging or the occurrence of airsickness on the swing.

3,452

Manning, G.W. 1943 FAILURE OF A VERTICAL ACCELERATOR TO PRODUCE MOTION SICKNESS. (National Research Council, Canada) Report #C-2649, 10 December 1943

ABSTRACT: In order to ascertain the effect of vertical forces on the incidence of motion sickness, a simple vertical spring accelerator was devised which reproduced only the vertical radial forces (same magnitude and frequency), of a 10-foot 2-pole swing.

Forty unselected men were subjected to a simple vertical G change of 0.6 G to 1.4 G 33 times per minute on the spring accelerator and 40 others to the same frequency and quantity of vertical G change on the swing. No sickness occurred in the group exposed to simple vertical motion as compared to a 50% incidence of motion sickness in the group who were swung. Either vertical forces are not responsible for the occurences of swing sickness or some additional stimulus, which occurs on the swing, is also necessary. Further investigation with the vertical accelerator is necessary to ascertain the effects of visual orientation, direction of vertical force in respect to the labyrinth, and of combining other accelerative forces.

3,453

Manning, G.W. 1944 FAILURE OF A VERTICAL ACCELERATOR TO PRODUCE MOTION SICKNESS. Proc. Assoc. Comm. Aviation Med. Research, Appendix H. 25 February 1944

3,454

Manning, G. W. & G. W. Stewart 1949 EFFECT OF BODY POSITION ON INCIDENCE OF MOTION SICKNESS.
J. Appl. Physiol. 1(9):619-628.

3,455

Manning, L.A. 1960 IONIC VELOCITY SENSOR FEASIBILITY STUDY (Varian Associates, Palo Alto, Calif.) Engineering rept. no. 207-6Q, Contract AF 33(616)5200), ASTIA AD-242 611

ABSTRACT: Three essentially different schemes are considered for measurement of the air speed of a vehicle traveling in the atmosphere at altitudes above 100 kilometers. Use of the dielectric displacement of a neutral gas stream in an electric field gradient is shown to produce too small a deflection for use in a practical device. On the other hand, a rotating-disc type mechanical velocity sorter, using both ionized and unionized particles, is shown to have altitude limitations and to require large mathematical data reductions. A third system utilizing a pair of rotating pressure-sensitive microphones appears to hold great promise owing to its simplicity. The development of sufficiently low noise resistant microphones would permit this device to be used at greater altitudes and at lower velocities. (Author)

3,456

Manzurov, A. R. 1956 RENTGENOLOGICHESKIYE ISSLEDOVANIYA PRI DEYSTVIL NA ORGANISM CHELOVEKA RADIAL'NYKH USKORENIY. (X-RAY EXAMINATIONS OF THE HUMAN ORGANISM SUBJECTED TO RADIAL ACCELERATION). Voyenno-meditsinskiy Zhurnal (Military Medical Journal). 10:59-64, 1956. (Translation in USAF Air Intelligence Information Report "Two Problems in Acccleration: Cumulative Effect and X-Ray Examinations". IR-1600-57, 23 July 1957)

3,457

Marbarger, J. 1942 PROPOSED EQUIPMENT FOR THE SELECTION OF PERSONNEL WITH RESPECT TO THE PROBLEM OF MOTION SICKNESS (School of Aviation Medicine, USAF Randolph AFB, Texas) Rept. No. 84-1, September 1942

3,458

Marbarger, J. P., ed. 1951 SPACE MEDICINE, THE HUMAN FACTOR IN FLIGHTS BEYOND THE EARTH.
(Urbana, Ill.: University of Illinois Press, 1951)

CONTENTS:
Armstrong, H. G., Space Medicine in the United States Air Force;
von Braun, W., Multi-Stage Rockets and Artificial Satellites;
Strughold, H., Physiological Considerations on the Possibility of Life Under Extraterrestrial Conditions,
Haber, H., Astronomy and Space Medicine;
Campbell, P. A., Orientation in Space;
Buettner, K., Bioclimatology of Manned Rocket Flight

3,459

Marchesseau and Fabre 1961 ROLE AND IMPORTANCE OF THE FLIGHT SURGEON IN FRANCE WITH REGARD TO AIR SAFETY. (Rôle et importance du médecin de l'air en France dans la securité aérienne) Revue internationale des services de santé des armées de terre, de mer, et de l'air (Paris) 34(1-2):21-24 Jan. - Feb. 1961. (In French, with English summary, [p. 21].

3,460

Marcus, Hn. J. E. Walsh, L. P. Clark et al 1948 SHOCK AND VIBRATION BULLETIN NO. 7.
(Office of Naval Research, Washington, D. C.) NRL REpt. No. S-3229.
ASTIA ATI 75 153.

ABSTRACT: The eight symposium on shock and vibration was held at Naval Research Laboratory. Papers presented were concerned with the effect of shock and vibration on structures, vibration porblems of aircraft, theoretical and experimental research on flutter in aircraft, photoviscous flow channel, static stress in aircraft structures, the measurement of mechanical transients following landing impact of a model airplane, ejection of pilots from aircraft, and the measurement of forces acting on the pilot during crash landing.

3,461

Margaria, R. 1940 ACCELERATION AND THE PILOT.
Aircraft Engr. 12:165.

3,462

Margaria, R. 1950 ALCUNI IMPORTANTI DE URGENTI PROBLEMI DI MEDICINA AERONAUTICA (Important and Urgent Problems of Aeronautic Medicine)
Minerva Medica. (Torino), 41:229-232, July 28, 1950.

3,463

Margaria, R. 1953 ON THE FUNCTIONS OF CEREBROSPINAL FLUID.
Exp. Med. Surg. 11:297-301.

ABSTRACT: 1. The functions of crebrospinal fluid, commonly given as (a) fluid buffering, (b) being a reservoir of fluid, and (c) being a nutrient medium for the brain, are discussed.

2. The essential function of the cerebrospinal fluid, in which the brain is suspended, is to reduce the effective mass of the brain to 1/26 of the mass of the organ as measured in air.

3. This mechanism reduces the effective weight of the brain ot the equivalent of about 50 g., a weight which is tolerated by the delicate nervous and vascular structures of the base of the brain.

4. Forces acting on the brain as a consequence of acceleration (linear, angular or centripetal) are reduced proportionately; this is the reason why the brain is one of the last structures to be damaged in spite of its praticularly delicate and fragile texture. Only accelerations of a very high order of magnitude, over 100 times the acceleration of gravity, are liable to damage the brain tissue structures.

5. A disadvantage of the fluid is that, like all liquids, it is incompressible and therefore cannot act as a pressure-volume buffer such as is required to prevent damage to the brain in some emergency cases, for instance when a body makes an "air tight" entry into the cranium.

This explains the explosive character of certain lesions of the head caused by gunshot.

3,464

Margaria, R. 1953 LA CONDIZIONE DI SUBGRAVITA E LA SOTTRAZIONI DALL'EFFETTO DELLE ACCELERAZIONI (The Condition of Subgravity and the Elimination of the Effects of Accelerations)
Rivista di Medicina Aeronautica (Rome) 16(4): 469-474; Oct.-Dec. 1953.

3,465

Margaria, R. 1956 EFFECT OF ACCELERATIONS ON CEREBELLAR POTENTIALS IN BIRDS AND ITS RELATION TO THE SENSE OF DIRECTION.
(USAF Office of Scientific Research) AFOSR TN 57-519, June 1, 1956.
ASTIA AD 136 601.

ABSTRACT: Rotatory and post-rotatory cerebellar responses of homing and domestic pigeons and of migratory and sedentary doves have been studied by means of an orientable centrifuge, the speed and position in the space of which could be changed at will. These results are discussed taking in account the Ising theory about the detection of the vertical component of Coriolis acceleration as a base for direction sense in animals.

Further work has been performed later and the following results have been obtained: (1) In order to make sure that muscular potentials did not play a role in the recorded responses to acceleration, the pigeon has been deeply curarized during centrifugation and recording from the cerebellum. (2) In order to investigate the reports about the loss of orientation of homing pigeons when hit by radar beams, rotatory and post-rotatory responses have been recorded immediately after subjecting the animals to up to 2 min. of radar waves. The effect of radar might be reduced to disruption of the equilibrium sense and other injuries due to increase of temperature in the head: it is well known in fact that local rise of temperature succeeds in exciting the labyrinth.

3,466

Margaria, R. 1957 PROLONGED AFTER-EFFECT OF CENTRIPETAL AND TANGENTIAL ACCELERATIONS ON CEREBELLAR POTENTIALS. Final Report 1 June 1956 - 30 Sept. 1957. (Laboratorio di Fisiologia dell'Universita di Milano, Italy)
Rept. No. AFOSR TR-58-37; Contract AF 61(514)968; ASTIA AD-152 246.

Abstract: The rotatary and post-rotatory responses of domestic and nonmigratory species were compared with the responses of homing pigeons and migratory birds. Results indicated that the cerebellar cortex of birds if highly sensitive to rotatory acceleration. A response was obtained at a value as low as 0.01 to 0.02 g. The stimulation of the cerebellar neurons resulted from changes of the sensory inflow coming from the laby-rinth. Bilateral labyrinthectomy completely abolished the cerebellar response. A highly typical, spindle-like afterdischarge was found only in homing pigeons and migratory birds. (ASTIA)

3,467

Margaria, R. 1957 LE FORZE DI ACCELERAZIONE E LA CONDIZIONE DI SUBGRAVITA IN VOLO. (ACCELERATION FORCES AND THE SUBGRAVITY STATE DURING FLIGHT) Riv. Med. Aeronaut. (Rome) 20:(2):175-186

3,468

Margaria, R. and T. Gualtierotti 1957 AVOIDANCE OF ACCELERATION FORCES IN THE ANIMAL BY IMMERSION IN WATER.
(Paper, 1957 Meeting of Aero Medical Association, Denver, Colo., May 6-8)

ABSTRACT: A body immersed in a liquid of the same density is not subjected to acceleration forces. The specific weight of the single components of the animal body is not the same; therefore, the consequences of the immersion in a liquid of the same density of the animal as a whole, when subjected to acceleration forces, ought to be limited to the differences of density of the single organs. This is expected to be a minor effect. Fishes subjected to centrifugation at 1500 G for up to ten minutes survived over twenty-four hours having only the otolithic system destroyed. Frogs, centrifuged when immersed in water, survived when exposed to several hundred G for some minutes. Mice contained in a missile in free fall for nine minutes and decelerated to stop in 1 cm. were killed instantly, but they survived a number of successive such falls when immersed in water. (J. Aviation Med. 28(2):210, April 1957)

3,469

Margaria, R. 1958 WIDE RANGE INVESTIGATIONS OF ACCELERATIONS IN MAN AND ANIMALS: FOURTH ANNUAL LOUIS H. BAUER LECTURE.
Riv. med. aeronaut. 21:655-690
See also J. Aviation Med. 29(12):855-871, Dec. 1958.
See also (Milan University, Italy) AFOSR TN-58-516, ASTIA AD 158 327

ABSTRACT: This article discusses many aspects of the problem of accelerative forces on man and animals. The viewpoint presented is that much more information can be gathered with less troublesome experimental situations that the gravity-free or free-fall situation. Several examples of simpler data-gathering circumstances are included. Discussion also considers protection from acceleration forces, disadvantages of a gravity-free condition, sensitivity of the labyrinth to gravitation, and effects of gravitation upon various animals. The author includes several experiments conducted under non-free-fall conditions, especially underwater studies.

3,470

Margaria, R. 1958 WIDE RANGE INVESTIGATIONS OF ACCELERATION IN MAN AND ANIMALS: FOURTH ANNUAL LOUIS H. BAUER LECTURE (Milan University, Italy) AFOSR TN 58-516; ASTIA AD-158 327
See also J. Avia. Med. 29(12):855-871, Dec. 1958
See also Rivista di Medicina Aeronautica 21:655-690, 1958

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SECOND ABSTRACT: On the basis of elementary laws of physics, describing the behavior of bodies floating in a fluid and subjected to acceleration, consideration has been given to possible protection against acceleration forces. Immersion of mammals (mice) in water increases the resistance to acceleration more than ten fold. Impacts of more than 1000 G have been sustained by such animals as opposed to 100 G when not immersed. Animals without air cavities in the body, such as fish or mammalian foetuses, can support higher acceleration forces. The threshold of physiological stimulation of the otolithic apparatus in all directions has been determined in man floating in water. Lack of impulses from this apparatus is possible of no serious consequences on the functionality of the brain. The threshold for gravity stimulation of the labyrinth in mammals as from the induced changes of the electrical activity of the floculo-nodular lobe of cerebellum is of the order of 0.01 to 0.005 G. The loss of orientation, as an effect of radar on homing pigeons, is considered as a possible temperature effect.
Migratory animals respond to acceleration stimulus with peculiar spindlelike bursts of cerebellar action potentials lasting some time after removal of the stimulus. This peculiarity is in accord with the hypothesis that migration in animals is possibly supported by a higher sensitivity to geodetic forces. The possible geodetic forces that may induce migration are considered, particularly the accessory Coriolis acceleration; they are of the order of magnitude of 1 x 10-6G, which is much lower than the threshold to stimulation as found experimentally on the same animals. The physiological basis to account for animal migration is still lacking. (CARI)

3,471

Margaria, R. 1958 WIDE RANGE INVESTIGATIONS OF ACCELERATION IN MAN AND ANIMALS. THE FOURTH ANNUAL LOUIS H. BAUER LECTURE
J. of Aviation Medicine 29(12):855-871, December 1958

SUMMARY: On the basis of elementary laws of physics, describing the behavior of bodies floating in a fluid and subjected to acceleration, consideration

has been given to possible protection against acceleration forces. Immersion of mammals (mice) in water increases the resistance to acceleration more than ten fold. Impacts of more than 1000 G have been sustained by such animals as opposed to 100 G when not immersed. Animals without air cavities in the body, such as fish or mammalian foetuses, can support higher acceleration forces.

The threshold of physiological stimulation of the otolithic apparatus in all directions has been determined in man floating in water. Lack of impulses from this apparatus is possibly of no serious consequences on the functionality of the brain. The threshold for gravity stimulation of the labyrinth in mammals as from the induced changes of the electrical activity of the floculo-nodular lobe of cerebellum is of the order of 0.01 to 0.005 G. The loss of orientation, as an effect of radar on homing pigeons, is considered as a possible temperature effect.

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3,472

Margaria, R., T. Gualtierotti, & D. Spinelli 1958 PROTECTION AGAINST ACCELERATION FORCES IN ANIMALS BY IMMERSION IN WATER. (Proceedings of the XXVIII Congress of the Aeromedical Association, Denver, Colorado). See also J. Aviation Med. 29(6):433-437.

ABSTRACT: Experimentally an animal immersed in water can stand acceleration forces more than ten times greater than in air, the probability of survival being very high even at 1,000 G. A limit to the resistance to acceleration forces is given by parts of the body having a specific weight different from that of the rest of the body, particularly the lungs for their air content, and the otoliths. Rat foetuses, having no air in their lungs, can survive impacts corresponding to accelerations higher than 10,000 G when the mother is floating in water. (CARI).

3,473

Margaria, R. 1959 SPATIAL FLIGHT PHYSIOLOGY.
Scientia Medica Italica 7(4):605-637

ABSTRACT: A discussion of the requirements of the first inhabitants of satellites and the first interplanetary travellers. The greatest functional stress will not fall on the circulatory or respiratory apparatus, but on the central nervous system, particularly on the cerebral cortex. It is therefore especially to this organ that the attention of physiologists should be directed when selecting the first men to be sent into space and when training the candidates for this extraordinary enterprise.

3,474

Margaria, R. & T. Gualtierotti 1960 BODY SUSCEPTIBILITY TO HIGH ACCELERATIONS AND TO ZERO GRAVITY CONDITION. (Paper, Intern. Council. Aero. Sci., 2nd Intern. Congress, Sept. 12-16, 1960, Zurich)

ABSTRACT: Experiments were conducted on pigeons, birds and frogs in order to investigate possible effects of satellite flight on humans. This report gives the results of those experiments and observations.

3,475

Margaria, Rodolfo 1960 SPINAL REFLEXES IN MAN AND ANIMAL DURING REST AND AFTER STRESS. RHYTHM OF DISCHARGE OF SINGLE MOTONEURON IN MAN. ROTATORY RESPONSES AND INJURIES OF THE VESTIBULOCEREBELLAR SYSTEM. REMOTE STIMULATION OF THE MOTOR CORTEX IN THE CAT. (Milan University, Italy) Contract AF 61 (052)23; AFOSR-605; ASTIA AD-259 051

ABSTRACT: Oligo- and multisynaptic reflexes in the sciatic-gastrocnemius territory have been studies in man during rest and after exhaustive physical exercise. During exhaustive physical exercise the only significant change consisted in a decrease of the spinal reflex time. The effect of curarelike substances on the same parameters as above has been also investigated in man. Changes in the reflex responses and in the excitability of nerve fibers have been found. The rhythm of discharge of the single motoneuron in man has been studied by recording the action potentials of the single muscle fiber in ten muscular groups from head to leg muscles. The rate of firing of the neuromuscular units has been found to be constant except at the very beginning of a voluntary contraction. The responses of single units of the flocculo-modular lobe to rotatory accelerations has been studied and differential discharges have been found. (AUTHOR)

3,476

Margaria, R. 1960 SPINAL REFLEX RESPONSES DURING STRESS AND FATIGUE (Milan U. Italy) Contract AF 61(052)-23; Project 9777(805); AFOSR, DLS.

ABSTRACT: This is a consolidation of two previous contracts held by Margaria in which several spinal reflex responses have been used to measure fatigue and stressful states. Studies will be made of the effects of hypoglycemia, hypoxia, sleeplessness, and drugs upon the monosynaptic reflex patterns in persons. Cats and possibly monkeys will be subjected to brain damage and the effects on these reflex patterns determined. The possibility of a vestibular cerebellar mechanism underlying direction sense in birds will be investigated by measuring cerebellar discharges in homing pigeons after rotation. These monosynaptic reflex studies may lead to the development of methods for measuring fatigue or stress.

3,477

Marko, A.R. 1961 MULTI-CHANNEL PERSONNEL TELEMETRY SYSTEM USING PULSE POSITION MODULATION.
(Paper, 1961 Meeting of Aerospace Medical Association, Chicago, April 24-27)

ABSTRACT: Personnel telemetry systems are used to obtain physiological information for instance heart rate, respiration, etc., from a human subject without using trailing wires. Most important requirements on such a system are minimum encumbrance, accuracy under different environments, low power drain, small size and weight. Pulse position modulation has several advantages for this type of application. The ratio between effective signal radiated and average power drain is much higher for other modulation systems. Necessary circuitary in the transmitting heart rate, respiration rate and body temperature. Operating time on one small battery is approximately 50 hours, transmitting range 60 feet. A simple cathode ray scope display system is described as well as a system for permanent recording. (Aerospace Med. 32(3):240, March 1961)

3,478

Marko, A. R. 1961 MULTI-CHANNEL PERSONAL TELEMETRY SYSTEM USING PULSE POSITION MODULATION
Aerospace Medicine 32(11):1019-1022, Nov. 1961.

ABSTRACT: A feasibility study was undertaken of a pulse position modulation, personal telemetry system. A three-channel laboratory model was assembled capable of transmitting heart rate, respiration rate, and body temperature at ranges up to approximately 100 ft. The characteristics of the system were given along with block diagrams for the recording and display units. (Tufts)

3,479

Marko, A.R., M. A.McLennan & E. C. Correll 1961 A MULTI-CHANNEL PERSONAL TELEMETRY SYSTEM USING PULSE POSITIONS MODULATION (USAF Biomedical Lab., Wright-Patterson AFB, Ohio) Proj. 7222, Task 71751, ASD TR 61 290, July 1961.

ABSTRACT: A personal telemetry system using the pulse position modulation technique is described. The laboratory model transmits heart rate, respiration rate, and body temperature within a range of 100 ft. Compared with FM-FM Systems this system has the advantage of very low power consumption (20 milliwatts), light weight (six ounces with batteries for 30 hours continuous operation), small sizes (4 3/4 by 3 1/2 by 1 inches), and sufficient accuracy and stability for physiological measurements. The recording and display systems are also described. Certain limitations of the system are pointed out. (Tufts)

3,480

Marko, A.R., M.A. McLennan, E.C. Correll 1962 A SOLID STATE MEASURING DEVICE FOR GALVANIC SKIN RESPONSE. (6570th Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio) TDR No. AMRL-TDR-62-117. ASTIA AD 292 690

ABSTRACT: The problem of monitoring galvanic skin resistance, especially when used in combination with electrocardiographic or electroencephalographic recordings is discussed. A new approach is outlined that eliminates interference from other measurements. A small, lightweight laboratory model has been built that has low power consumption and is insensitive to vibration and acceleration forces. The performance, stability, and accuracy of the model is equivalent to larger, more conventional instruments used for the same purpose.

3,481

Marrow, D.J. 1949 ANALYSIS OF INJURIES OF 1942 PERSONS IN 1422 LIGHT PLANE ACCIDENTS. (CAA Med. Serv. Records, Wash., D.C., Unpub. data, 1949)

3,482

Marsh, C.L. & R.C. Moore 1957 DECELERATION TRAUMA. Am. J. Surg. Series 2, 93(4):623-631, Apr. 1957.

3,483

Marshall, G. S. 1933 THE PHYSIOLOGICAL LIMITATIONS OF FLYING.
Flight 25:99-100
See also J. Royal Aero. Soc. 37:389-410

3,484

Marshall, G.S. 1939 INVESTIGATION OF EFFECTS OF ACCELERATION ON HUMANS. (RAF, Institute of Aviation Medicine, Farnborough)
FPRC 76, Dec. 1939.

3,485

Marshall, G.S. 1940 PHYSIOLOGICAL PROBLEMS OF HUMAN FLIGHT.
Lancet, 1:270-271. See also Brit. Med. J. 1:226-227.

ABSTRACT: The physiological problems of flight are divided into those of position and those of movement. "Blacking out" is the most common symptom of excessive acceleration. The effect can be alleviated by bending the body forward and tightening the muscles. The pilot faints when the pressure is continued for a long time. The movement of the body fluids into the splanchnic area cause the symptoms. Temporary blindness is probably caused by a failure in the arterial pressure in the neighborhood of the eye to a point at which the blood can no longer overcome the intra-ocular pressure of from 20 to 25 mm.

3,486

Marshall, G. S. 1940 PHYSIOLOGICAL PROBLEMS OF HUMAN FLIGHT.
(Lecture, [illegible] Society of London, Jan 29, 1940)

ABSTRACT: A lecture. Describes oxygen problems briefly. Discusses problems of acceleration and centrifugal force, especially those encountered in dive-bombing. Estimates 3-6 G tolerance for the average pilot, 7-8 G for highly experienced men. Suggests posture and muscle-tensing as means of increasing tolerance. (Lancet 1(238):270-271, Feb. 1940)

3,487

Marshall, G. S. 1940 PHYSIOLOGICAL PROBLEMS OF HUMAN FLIGHT. (Lecture, Medial Society of London, Jan. 29, 1940)

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3,488

Marshall, H. W., E. F. Lindberg, & W. F. Sutterer 1961 CARDIAC OUTPUT, CIRCULATORY PRESSURES AND ARTERIAL OXYGEN SATURATION DURING FORWARD ACCELERATION.

ABSTRACT: Six men were exposed to varying periods of forward (transverse) acceleration of up to 10 mins' duration on a centrifuge at plateau levels of 2, 3½, and 5 g while supported in the supine position, with hips and knees flexed at right angles, by a nylon net stretched tightly over a contoured metal frame. The back was elevated 12 degrees in the direction of acceleration. Cardiac output (dye method) right atrial and aortic pressures, respirations, E. C. G., ear opacity, ear opacity pulse and arterial oxygen saturations were recorded in the control situation (1 g) and during exposure to acceleration. During forward acceleration of up to 5 g, cardiac output showed either no systematic change or a slight increase; right atrial pressure increased from 8 (1 g average) to 22 mm. Hg at onset of 5 g; intraesophageal pressure measured in 3 subjects increased similarly; and mean aortic pressure averaged 31% above control values. Arterial oxygen saturation below 85% encountered in some subjects during exposure to 5 g, but prevented by breathing 99.6% oxygen, suggests a change in ventilation perfusion relationships in the lung during forward acceleration. (Federation Proc. 20(1): 131, Mar. 1961)

3,489

Martin-Baker Aircraft Co. THE MARTIN- BAKER AUTOMATIC EJECTOR SEAT-MARK 3 (Martin-Baker Aircraft Co., Ltd., England). ASTIA ATI 88684

ABSTRACT: The design of the Martin-Baker automatic ejector seat is described which enables pilots and aircrew personnel to escape from high-speed aircraft at all altitudes. It is effective at any speed and under any G accelerations that may occur whatever the altitude of the aircraft. By the simple movement of a hand lever, the airman has his parachute available for normal rip-cord operation either without ejection with the seat or at any time after ejection has taken place. The seat is ejected from the aircraft by means of a cartridge operated gun and slides during ejection on four rollers in a guide rail. The ejection gun is fired by the withdrawal of a flexible screen, which covers and protects the occupant's face against the effects of the air stream. On ejection, the seat leaves the aircraft at 60 fps.

3,490

Martin Co., Denver, Colo. 1961 MTSS. GENERAL HUMAN FACTORS CONSIDERATIONS. VOLUME III.
(Aeronautical Systems Division, Wright-Patterson AFB, Ohio) ASD-CR-61-14, ASD-TR-61-211, July 1961. ASTIA AD 273 005L

ABSTRACT: Contents include material in the following subjects:
Acceleration
Weightlessness
Artificial Gravity
Labyrinthine Sensitivity in Space Flight
Vibration
Summary of Vibration Test Results
Summary of Literature Surveyed

3,491

Martin, F.D. & J.T. Howe 1960 AN ANALYSIS OF THE IMPACT MOTION OF AN INFLATED SPHERE LANDING VEHICLE.
(National Aeronautics and Space Administration, Washington, D.C.)
NASA TN D-314, 1960.

3,492

Martin, E.D. 1961 A DESIGN STUDY OF THE INFLATED SPHERE LANDING VEHICLE, INCLUDING THE LANDING PERFORMANCE AND THE EFFECTS OF DEVIATIONS FROM DESIGN CONDITIONS. (National Aeronautics and Space Administration, Washington, D.C.)
NASA TN D-692, April 1961.

ABSTRACT: The impact motion of the inflated sphere landing vehicle with a payload centrally supported from the spherical skin by numerous cords has been determined on the assumption of uniform isentropic gas compression during impact. The landing capabilities are determined for a system containing suspension cords of constant cross section. The effects of deviation in impact velocity and initial gas temperature from the design conditions are studied. (Author)

3,493

Martin, E.D. 1961 SKIN STRESSES IN AN INFLATED SPHERE DURING IMPACT.
(National Aeronautics and Space Administration) NASA TN D-1070, Aug. 1961. ASTIA AD 260 764.

ABSTRACT: An analysis is made of the stresses in the skin of an inflated non-stretchable sphere during normal, nonrotating impact with a hard flat surface,

as assuming infinite modulus of elasticity in the skin and infinite propagation speed of stress waves. The analysis is further applied to the study of the inflated sphere landing vehicle containing a payload suspended at the center. Curves are presented showing the stress distributions during impact for cases corresponding to those calculated in previous reports in which the impact motion and payload landing performance capabilities of the landing vehicle have been studied.

3,494

Martin, E.E., J.P. Henry, J.L. Gamble & R.S. Shaw 1948 EVALUATION OF THE ANTI-G SUIT. (USAF Air Material Command, Wright-Patterson AFB, Ohio) MCREXD-689-2C, Report No. 8. 24 July 1948.

ABSTRACT: Three subjects were each exposed to one or more series of runs on the human centrifuge. Each series consisted of direct arterial pressure measurements at 1 g, 2.5 g, 3.5 g, and 5 g without and with each of the anti-g suits. This report presents direct radial artery pressure results obtained while comparing three anti-G suits on the human centrifuge. The G-5 suit proved to be more efficient than the G-4A which gives more than twice the protection afforded by the G-3A suit. The added protection given by the three suits when using the M-1 maneuver is as follows: ½ g for the G-3A, 2.3 g for the G-4A and 0.1 g for the G-5. This protection is over and above the normal 2 g protection obtained while performing the M-1 maneuver alone. The direct arterial pressure method for evaluating G-suit protection can be used to confirm the results obtained by the visual method of G-suit evaluation. Experiments should be conducted to measure cerebral perfusion pressure head and blood flow rates during positive acceleleration to determine how they vary in proportion to cerebral arterial pressure.

3,495

Martin, E.E. & J.P. Henry 1950 THE SUPINE POSITION AS A MEANS OF INCREASING TOLERANCE TO ACCELERATION. (Air Materiel Command, Engineering Div., Wright-Patterson AFB, Ohio) AF Report No. 6025. Aug. 1950. ASTIA ATI 89 949

ABSTRACT:A new supine hammock seat is described as a method for enhancing tolerance to positive acceleration. The protection afforded by the seat used in a fixed position is compared with the conventional upright seated posture. Protection afforded in the supine seat while wearing a modified anti-G suit compressing the legs alone, exceeds that presently found when using an anti-G suit in the upright seated posture by approximately 1 g.

3,496

Martin, E. E. & J. P. Henry 1951 THE EFFECTS OF TIME AND TEMPERATURE UPON TOLERANCE TO POSITIVE ACCELERATION. Tech. Data Digest 16(6):19-23, June 1951
See also J. Avia. Med. 22:382-390

ABSTRACT: Eleven subjects have been repeatedly exposed to 2-minute runs on the human centrifuge in the upright seated posture at a room temperature of 24 degrees C (72 degrees F). Peripheral lights were lost and central vision dim. A sustained compensatory vasopressor effect reduces the duration of the visual symptoms to 6% of the long runs; during the remaining 94% of the run vision was clear. In further tests with 7 subjects in a temperature-controlled cockpit tolerance to long-term acceleration when sweating (skin temperature 37 degrees C) was only 0.5 g less than when shivering (25 degrees C). Even when the subject is in a state of heat vasodilation the normal cardiovascular system can still compensate for the stress of accelerations of 3.5 to 4.0 g lasting for 2 minutes. (DACO)

3,497

Martin, E. E., & J. P. Henry 1951 THE EFFECTS OF TIME AND TEMPERATURE UPON TOLERANCE TO POSITIVE ACCELERATION. J. Avia. Med. 22:382-390
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3,498

Martin, F. 1930 AIRSICKNESS AND SEASICKNESS.
Proc. Roy. Soc. Med. 24:635

3,499

Martin, J. 1949 REPORT ON RESEARCH AND DEVELOPMENT CARRIED OUT BY MARTIN-BAKER AIRCRAFT CO. LTD. IN CONNECTION WITH EJECTION SEATS FOR HIGH SPEED AIRCRAFT.
(Martin-Baker Aircraft Co., England) June 1949. ASTIA ATI 89 438

ABSTRACT: A description is given of British research and development carried out in connection with ejection seats and the escape of personnel from high-speed

aircraft. The early history of the ejection seat project is presented as well as information on work done on the Defiant and Meteor III fighters, and the 16 and 65 ft test rigs. The design and construction of the test installation for the Meteor III fighter and the design, development and construction of the Mark I seat and the fully automatic seat is discussed. Consideration is given to the work conducted for the U. S. Navy and the development of the 110 ft test righ and the 50 ft training rig for the RAF. A schedule of dummy and live ejections from the Meteor III is included. Photographs and drawings illustrate some of the equipment and graphs show acceleration data.

3,500

Martin, J. 1955 EJECTION FROM HIGH SPEED AIRCRAFT.
(Martin Baker Aircraft, Ltd., Denham, Uxbridge, Middlesex)
See also J. Royal Aero. Soc. 60(550):659-668, 1956.

ABSTRACT: Early studies to determine physiological acceleration limits on a ground ejection rig and to test operational designs of the Martin-Baker aircraft ejection seat in flight are described. The chief design features of the seat, including an automatic ejection device, main time release, ejection gun, leg restraining device, and duplex drogue system are described, and the peculiar conditions and methods of ejection at high altitude, high speed, and low altitude are discussed.

3,501

Martin, J. 1956 EJECTION FROM HIGH SPEED AIRCRAFT.
J. Royal Aero. Soc. 60(550):659-668, Oct. 1956.

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3,502

Marks, A. 1960 [CAN MAN STAND IT?]
Horyzonty Techniki 1960(2):51-57

ABSTRACT: The author describes the much-discussed hazards of space travel and particularly the presumed effects of space travel on certain body functions, such as breathing. He also deals with the problem of feeding, the effects of acceleration and heat on humans traveling in space ships, with the psychological aspects of cosmic flights, with the dangers from meteors and cosmic radiation and with the survival on the Moon, Mars or Venus. The author points out that the severe tests undergone by the dog "Layka" during its 8 days in space show that man will also be able to exist in space provided the journey does not last too long and that all the scientific measures have been taken for his survival. Since several endurance tests have already been undergone successfully, there is no doubt that a short journey, such as the one to the Moon, taking 8 days there and back, would present no insurmountable difficulties. Each member of the space ship crew should be assured about 1.25 kg of oxygen per 24 hours. Research has also shown that each member of the crew would require about 1 kg of food in concentrated form and 2 kg of water per 24 hours. The pressure in the space ship should be decreased to 2/3 or even 1/2 atm. A table showing the highest and lowest temperatures which can be obtained inside the space ship, depending whether the black or silver-painted side of the ship is turned towards the Sun, is included in the article. In the opinion of the author the crew of a space ship should consist of 1) mechanical-chemical-electronic engineer (as pilot mechanic); 2) astronomer-mathematician (as navigator) and a doctor-biologist. In case of a flight to the Moon a geologist-geodetic-geophysicist should also be included. The age of the crew should be between 30 and 40. (CARI)

3,503

Marks, A. 1961 [ROCKETS AS MEDIUM OF AIR PASSENGER TRANSPORTATION.]
Skrzydlata Polska 1961(37):9

ABSTRACT: This article deals with the problem of utilization of rockets and rocket planes as a means of mass transportation. It seems almost certain that with progress in rocket engineering they will become even safer means of passenger transportation than modern conventional aircraft. An automatic control of the spaceship's navigational system would be the decisive safety factor for travel at high speeds, especially, at the rocket landing stage. On the other hand, it is highly improbable that rockets can entirely supercede conventional aircraft as the sole means of transportation. (CARI)

3,504

Marukhanian E. V. 1960 ELECTROCARDIOGRAPHIC OBSERVATIONS DURING A PROLONGED EXPOSURE TO ACCELERATION.
In Pat. Fiziol. Eksp. Ter. 4:72-73, Nov. - Dec. 1960 (Russian).

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Marukhanian, E. V. 1961 IZMENENIIA V ELEKTROKARDIOGRAMME I NARUSHENIE SOSTOIANIIA TSENTRAL'NOI NERVNOI SISTEMY POD VLIIANIEM USKORENIIA (ELECTRO-CARDIOGRAPHIC CHANGES AND CENTRAL NERVOUS SYSTEM DISTURBANCES PRODUCED BY ACCELERATION) Fiziologicheskii zhurnal SSSR (Moskva) 47(7) 843-851, July 1961 English Translation: Sechenov Physiol. J. USSR (New York: Pergamon Press, 1962) 47(7):921-931, Jan. 1962

ABSTRACT: Various electrocardiographic changes indicative of moderate deflection of the electrical axis of the heart to the right and of the primary effect of acceleration on the right heart were seen when subjects were exposed to the action of centrifugal forces in the head-to-foot direction. When there was profound functional disturbance of the central nervous system, the subjects' ECGs exhibited moderate displacement of the ST interval from the isoelectric line and reduction in the size of the T wave or a negative T wave. The most pronounced displacement of the ST interval and most pronounced change in the T wave were 10-20 sec. before the manifestations of disturbed cerebral circulation. Slight displacement of the ST interval and slight change in the T wave in subjects undergoing acceleration gave warning of the possible development of profound functional disturbances of the CNS on further increase or prolongation of the acceleration. Weakened cardiac activity as a result of primary changes in the cardiac muscle produced by hemodynamic disturbances was apparently the cause of the functional disturbance in the CNS in many cases. (AUTHOR'S CONCLUSIONS)

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Marukhanian, E. V. 1962 ELECTROCARDIOGRAPHIC CHANGES UNDER THE INFLUENCE OF TRANSVERSE ACCELERATION.
In Fiziol. Zh. SSSR Sechenov. 48:700-705, June 1962 (Russian)

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Marukhanian, E. V., P. K. Isakov et al 1962 ELECTROPHYSIOLOGICAL RESEARCH ON THE ACTIVITY OF CUTANEOUS AND MOTOR ANALYSERS DURING ACCELERATION Zh Vyssh Nerv Deiat Pavlov 12:1021-1028, Nov.-Dec. 1962 (Russian)

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Mases, P., R. Falet & C. Jacquemin 1959 MODIFICATIONS RESPIRATOIRES ET CIRCULATOIRES ENGENDREES PAR CERTAINES POSITIONS DE TRAVAIL DU PERSONNEL NAVIGANT AU COURS DU VOL (Respiratory and Circulatory Changes Caused by Certain Work Positions of Flying Personnel in Flight)
Medecine Aeronautique (Paris) 14(1): 1-3.

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Mason, J. K. 1958 PATHOLOGICAL FINDINGS FOLLOWING UNSUCCESSFUL EJECTION FROM HIGH SPEED AIRCRAFT.
J. Forensic Med., (Johannesburg, S. Africa), 5(4):173-184, Oct.-Dec. 1958.

ABSTRACT: Operational and performance features of the standard British ejection seat are outlined. Post-mortem examinations of victims of unsuccessful escapes during flight are analyzed. The findings suggest human or instrumental failure in the preparatory stage or during actual ejection. Potential pathologic findings are correlated with various ejection stages. Illustrations are included showing how the post-mortem examination may disclose the circumstances surrounding the unsuccessful escape. On the basis of the degree of pulmonary fat embolism and of local reaction to injury, general observations are made with regard to timing of injuries. The role of post-mortem examinations in preventive medicine is stressed with particular regard to the common causes of death encountered in unsuccessful ejections.
(J. Aviation Med. 30(5):378, May 1959)

3,510

Massachussetts Institute of Technology 1946 IMPACT INVESTIGATION ON TEXTILE MATERIALS. (Textile Division, Massachusetts Institute of Technology) 30 June, 1946. ASTIA ATI 87219.

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Massard, J.M. 1956 THE EFFECT OF UNDERWATER EXPLOSIONS ON SHIP AND SUB-MARINE HULLS.
(Illinois U. Engineering Experiment Station Urbana) Contract NObs-62250; Continuation of Contract NObs-55889; Dec. 1956; ASTIA AD 128 073.

ABSTRACT: The basic objectives of this investigation, both analytical and experimental, were to develop scaling parameters and numerical procedures for predicting the strength of submarine structures under explosive loadings, to investigate the feasibility of reproducing the action of full-size submarines by means of scale models (by determining the least possible scale factors at which reproducibility of structural action can be assured) to develop means for analyzing the dynamic response of stiffened cylindrical shells to blast pressures produced by underwater explosions with particular attention to numerical or approximate methods and with the objectives in mind of determining a correlation between the results of analysis and such test results as have been obtained or which are likely to be developed in the future, and to determine the patterns of force on various types of structures at various aspects due to the underwater detonation of explosives. (Author)

3,512

Masters, P.G., W. Lehman, P.W. Wood & D.M. Bland 1960 INTEGRATED FLIGHT CAPSULE IMPACT AND FLOTATION BAG INFLATION SYSTEM.
(Chance Vought Aircraft, Dallas, Texas) Naval Weapons Contract Noas 59-6150-c, Interim Report No. AER-EOR-12836, 1 March 1960.

ABSTRACT: This report describes the studies made and system selected for inflation of the impact bags and flotation bags used on the integrated flight capsule. The use of a hot gas generator inflation system was considered early in the study. However, contact with Vendors indicated that the hot gas generator system hardware is feasible, but bag materials are not available which will withstand the generated gas temperature. Three different types of cold gas inflation systems were investigated. The single air bottle, single pressure regulator system requires extremely large lines to achieve desired results. A system using a single air bottle with a pressure regulator at each bag allows use of smaller lines but the required inflation time of 3 seconds is not feasible using the proposed 900 cu. in. air bottle. Both of these systems can be designed; however, calculations are presented only to the point that the assumptions made for system design are insufficient to meet established criteria. The system recommended for this application is individual air bottles with no pressure regulators. The most apparent advantage of this system is insurance against loss of the entire recovery system in the event of failure of one bag.

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Maswell, S.S. 1923 LABYRINTH AND EQUILIBRIUM (New York and London, Lippincott, 1923)

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Matsuo, T. 1960 EXPERIMENTAL ELECTRONIC EQUIPMENT FOR MEDICAL TELEMETRY
(Trans. of Mitsubishi Electric and Mfg. Co. (Japan) Material TM-51001, 20 Nov. 1959)
(Office of Technical Services, Washington, D.C.) 61-11123

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Mathews, C.W. 1960 REVIEW OF THE OPERATIONAL PLANS FOR MERCURY ORBITAL MISSION. (Paper, 28th Annual Meeting of the Inst. Aero. Sci., New York, N.Y., 25 Jan. 1960)

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Mathewson, J.H., & D.M Severy 1953 RAPID DECELERATION TESTS OF CHEST LEVEL SAFETY BELT. (ITTE-UCLA, LosAngeles, Calif.) Rept. No. 27 Reprint, Bulletin No. 73 - Highway research Board, Washington, D.C.

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Mathewson, J.H., and D.M. Severy 1954 AUTOMOTIVE IMPACT RESEARCH National Safety Council, Transactions 28:93-101

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Mathewson, J. H., et al. 1960 AUTOMOBILE SIDE-IMPACT COLLISIONS. J. of the Society of Automotive Engineers SP 174

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Mathewson, J. H., et al. 1960 HEAD-ON COLLISIONS, SERIES III (Society Automotive Engineers National West Coast Meeting, San Francisco, Calif., 16-19 Aug. 1960)

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Matlock, H., E.A. Ripperger, J.W. Turnbow, & J.N. Thompson 1957 HIGH VELOCITY IMPACT CUSHIONING, PART I. DROP-TEST FACILITIES AND INSTRUMENTATION. (Structural Mechanics Research Lab., University of Texas, Austin, Texas) Aug. 1957. ASTIA AD 220 737

ABSTRACT: Three drop-test installations were developed for research on impact cushioning. These range from a small indoor facility, 28 feet high, to 275-foot tower which provides for both vertical and inclined guided drops of masses weighing up to 5000 pounds. Instrumentation measures time, force, and displacement during impact for determining energy-absorbing properties of materials and systems. (Author)

3,521

Matlock, H., & J.N. Thompson 1957 HIGH-VELOCITY IMPACT CUSHIONING, PART III. PRELIMINARY TEST ON A NONPRESSURIZED AIR BAG. (Structural Mechanics Research Lab., Texas University, Austin, Texas) Contract No. DA 19-129-qm-817, 15 Oct. 1957. ASTIA AD 220 822

3,522

Matlock, H., E.A. Ripperger, et al. 1957 HIGH-VELOCITY IMPACT CUSHIONING, PART II, ENERGY-ABSORBING MATERIALS AND SYSTEMS. (Structural Mechanics Research Lab., Texas University, Austin, Texas) Contract No. DA 19-129 qm-817, 26 Aug. 1957. ASTIA AD 220 738

ABSTRACT: The cost of air drop can be substantially reduced to the proper combination of aerial retarder and ground cushioning, which depends upon the relative cost of the retarder and cushioning. Laboratory studies of the impact energy absorption of various materials and systems including paper honeycomb foamed plastics, and metal cylinders indicate that minimum cost is achieved with smaller parachutes than those currently in use.

3,523

Matranga, G. J. 1961 ANALYSIS OF X-15 LANDING APPROACH AND FLARE CHARACTERISTICS DETERMINED FROM THE FIRST 30 FLIGHTS (National Aeronautics and Space Administration, Washington, D. C.) NASA TN D-1057; July 1961

SUMMARY: The approach and flare maneuvers for the first 30 flights of the X-15 airplane and the various control problems encountered are discussed. The results afford a relatively good cross section of landing conditions that might be experienced with future glide vehicles having low lift-drag ratios.
Flight-derived drag data show that preflight predictions based on wind-tunnel tests were, in general, somewhat higher than the values measured in flight. Depending on configuration, the peak lift-drag ratios from flight varied from 3.5 to 4.5 as compared with a predicted range of from 3.0 to 4.2.
By employing overhead, spiral-type patterns beginning at altitudes as high as 40,000 feet, the pilots were consistently able to touch down within about ±1,000 feet of a designated point.
A typical flare was initiated at a "comfortable" altitude of about 800 feet and an indicated airspeed of approximately 300 knots, which allowed a margin of excess speed. The flap and gear were extended when the flare was essentially completed, and an average touchdown was accomplished at a speed of about 185 knots indicated airspeed, an angle of attack of about 7 degrees, and a rate of descent of about 4 feet per second.
In general, the approach and landing characteristics were predicted with good accuracy in extensive preflight simulations. F-104 airplanes which simulated the X-15 landing characteristics were particularly valuable for pilot training. (AUTHOR)

3,524

Matthes, M. 1940 UNTERSUCHUNGEN UBER DAS VERHALTEN EINIGER KREISLAUFGROSSEN BEI HOHEN BESCHLEUNIGUNGEN IM FLUGVERSUCH UND UBER DEN EINFLUSS VON CO_2 - ZUSATZ ZUR ATEMLUFT AUF DIE BESCHLEUNIGUNGSERTRAGLICHKEIT (Behavior of Blood Pressure and Pulse During Extreme Acceleration in Flying Experiments and Effect of Addition of Carbon Dioxide to Air on Acceleration Tolerance)
Luftfahrtmedizin 4:123-137
See also ASTIA ATI 71 122

ABSTRACT: Additional CO_2 increases the resistance to acceleration. While a field of 4-6g applied centrifugally in the direction head-foot is the average that can be tolerated; additional CO_2 allows it to be increased by 0.5-1.2g which enables it to be endured longer. The experiments were carried out on a mechanical trainer and in aircraft in dives or spirals. The estimations were made by blood pressure measurements and subjective accounts. No reason could be found why some of the experimental subjects had clonic cramps in the front muscles of the neck and upper arm.

3,525

Matthews, B.H.C. PHYSIOLOGICAL EFFECTS OF HIGH ALTITUDE. (Flying Personnel Research Committee, Gt. Britain) FPRC 3, ASTIA ATI 208 744

ABSTRACT: In reviewing the physiological effects of high altitude, the author discusses lowered barometric pressure and lowered oxygen tension. Also included in this report is a summary of present knowledge of physiological effects of high acceleration. In connection with this subject, the author discusses the possible methods of reducing effects of high g and the investigation and measurement of g effects.

3,526

Matthews, B.H.C. 1943 HUMAN LIMITS IN FLIGHT.
Proceedings of the Royal Institution of Great Britain 32(3):558-569, 1943.
See also Nature 153(3893):698-702, 1944.
See also Annual Report of the Smithsonian Institution, 1944, pp. 273-284.

ABSTRACT: The two greatest stresses which an aircraft puts upon a pilot are (1) those due to acceleration or rapid change of motion and (2) those due to high altitude flying.

Posture and seating can do much to relieve the effect of centrifugal force upon the body. A crouched position with legs raised lessens distance the heart must raise the blood to the head, and also less blood goes to the feet. In a prone position where head and heart are nearly the same height, the body can withstand a force of 10 g. However, this posture is fatiguing and inconvenient.

Breathing air the human safety limit is 16,000 feet, 40,000 feet with oxygen.

3,527

Matthews, B.H.C. 1944 HUMAN LIMITS IN FLIGHT.
Nature, (London), 153:698-702

ABSTRACT: Stresses of flying are enumerated and means of minimizing their effect on the pilot are described.

Posture and seating minimize the effects of centrifugal force. If the pilot is in a crouching position with legs raised the effect is lessened. In the prone position, since heart and head are at the same height, a man can withstand a centrifugal force of 10 g. This position is convenient and fatiguing. The effect of position on tolerance of acceleration is shown graphically. Tolerance is greatest in supine position with the feet extended in the direction of flight.

3,528

Matthews, R.H.C. 1945 HUMAN LIMITS IN FLIGHT
(Smithsonian Institute, Washington, D.C.) Publication 3785

ABSTRACT: A modern aircraft will climb in a few minutes to heights at which the air is so thin that will no longer support life. It can turn and maneuver so fast that pilot may easily be rendered unconscious from the mechanical forces which it imposes on his body, and in an aircraft which is moving rapidly in three planes of space the pilot can be subjected to stresses beyond the limits which the human body can stand. Besides the stresses from wind pressure, cold, vibration, and noise, the pilots body must also be protected from other less obvious stresses. The two greatest stresses which an aircraft puts upon the pilot and those reviewed in this publication are those stresses due to acceleration and those due to high flying in the rarefied air of the upper atmosphere.

3,529

Matthews, B. H. C. 1953 ADAPTATION TO CENTRIFUGAL ACCELERATION.
(Physiological Laboratory, University of Cambridge)

ABSTRACT: The well-known effects of centrifugal acceleration on man and large animals spring from the disturbance of the circulation resulting from the hydrostatic pressure gradients set up. In addition, the hindrance to muscular movement in man is subjectively striking.

In small animals, however, it is to be anticipated that the short hydrostatic columns will not lead to great circulatory disturbance. The effective increase of weight of body and limbs, however, remains.

3,530

Rats have been reared under continual centrifugal acceleration giving a total of three times that of gravity. They thrive under these conditions and are able to perform normal locomotion; a functional derangement of the whole mechanism of antigravity tonus appears to take place to enable them to do so.

The rats remain of below control weight and have lived for over a year and a half under these conditions. A few have been decerebrated and show striking extensor tonus. They also show some abnormal types of movement when placed under normal conditions.
Growth in an environment where the normal ratio of mass to weight is altered by a factor of three shows that functional adaptation can occur within the nervous system to meet these conditions; this adaptation is achieved without great macroscopic distortion, but some microscopic changes seen are thought to relate to the changed environment. (J. of Physiology 122:31P, July 24-25, 1953)

3,531

Matthews, B. H. C. 1953 ADAPTATION TO CENTRIFUGAL ACCELERATION
Jour. Physiol., London, 122 (3):31P

Abstract: The well-known effects of centrifugal acceleration on man and large animals spring from the disturbance of the circulation resulting from the hydrostatic pressure gradients set up. In addition, the hindrance to muscular movement in man is subjectively striking. In small animals, however, it is to be anticipated that the short hydrostatic columns will not lead to great circulatory disturbance. The effective increase of weight of body and limbs, however, remains. Rats have been reared under continual certrifugal acceleration giving a total of three times that of gravity. They thrive under these conditions and are able to perform normal locomotion; a functional derangement of the whole mechanism of antigravity tonus appears to take place to enable them to do so. The rats remain at below control weight and have lived for over a year and a half under these conditions. A few have been decerebrated and show striking extensor tonus. They also show some abnormal types of movement when placed under normal conditions. Growth in an environment where the normal ratio of mass to weight is altered by a factor of three shows that functional adaptation can occur within the nervous system to meet these conditions, this adptation is achieved without great macroscopic distortion, but some microscopic changes seen are thought to relate to the changed environment.

3,532

Matthews, B. H. C. 1956 SOME FREE FALL EXPERIMENTS.
(Paper, 20th International Physiological Congress, 20 July-4 Aug. 1956)
In Proceedings of the Twentieth International Physiological Congress, (Brussels, 1956).

3,533

Matthews, B. H. C. 1956 TENDON REFLEXES IN FREE FALL.
(Paper, Meeting of the Physiological Society, University Laboratory of Physiology, Oxford. 2 June 1956.)

ABSTRACT: Free fall leads to vigorous reflex responses in animals. Some of these have been analysed by cinema records (McDondld, 1955). Conditions approaching those of free fall are met with by man for short periods in some aircraft manoeuvres and in parachute drop with delayed opening, but little exact analysis of reflex responses is possible under such conditions.

A drop platform has been constructed for human subjects giving up to 500 msec of free fall with facilities for automatic test and recording of tendon reflexes during fall. The muscle action potential in response to a tap on the tendo Achillis at various times after the start of free fall is greatly altered. In unhabituated subjects tested the reflex is absent after 140 msec free fall; in some subjects it disappears earlier than this. This does not appear to be due to any change in the state of stretch of the muscle concerned, but to change in excitability of the reflex, produced centrally. This could occur either via alpha or gamma neurones; present evidence does not make it possible to decide which.

This suppression of the tendon jerk appears to be a necessary precursor for a safe landing to allow the muscles to extend during a suddenly applied stretch.
(J. of Physiology 133:31P. 1956)

3,534

Matthews, B., & T.C.D. Whiteside 1960 TENDON REFLEXES IN FREE FALL
Proc. Roy. Soc. B. 153(951):195-204

ABSTRACT: A falling chair has been used to study the neurological state of human subjects who are suddenly dropped. The sudden transition from 1 to 0 g produces changes in shape of all soft tissues, and elongation of the trunk. Complex voluntary activity becomes impossible immediately after the start of falling, coarse voluntary control is retained. The ankle jerk is temporarily suppressed and analysis suggests this is due to changes of shape of the muscle consequent on weightlessness. The experiments here are concerned with reactions of human subjects to the abrupt change from 1 to 0 g when a subject is suddenly allowed to fall. Much work has already been done in aircraft and rockets to investigate the effects of weightlessness on human beings and animals but under these conditions the onset of 0 g usually occurs slowly.

3,535

Matthews, B.H.C. c.1962 [EFFECTS OF PROLONGED ACCELERATORY STRESS ON RATS] and [EFFECTS ON MAN OF ABRUPT TRANSITION FROM 1 TO 0 G.] Unpublished.

ABSTRACT: Since Matthews is interested primarily in problems of applied physiology especially pertinent to certain requirements of military importance, it might appear desirable for him to publish more often. He has maintained a colony of rats under an acceleratory stress of 3 g for several years. The only published account of this work is an abstract published in 1953. The experiment is still under way and we may look forward to a comprehensive paper on the problem within the next few months. The animals have adapted very well indeed to their new environment. It is considered worth while at this time to paraphrase the earlier abstract (Proceedings of the Physiological Society, 24-25 July, 1953) in this report.

Mathews is also studying righting reflexes in man subjected to free fall. A falling chair has been used to study the neurological state of human subjects who are suddenly dropped. The sudden transition from 1 to 0 g produces changes in shape of all soft tissues, and elongation of the trunk. Complex voluntary activity becomes impossible immediately after the start of falling; coarse voluntary control is retained. The ankle jerk is temporarily suppressed, and analysis suggests this is due to changes of shape of the muscle consequent to weightlessness. The experiments here are concerned with reactions of human subjects to the abrupt change from 1 to 0 g when a subject is suddenly allowed to fall. Much work has already been done in aircraft and rockets to investigate the effects of weightlessness on human beings and animals, but under these conditions the onset of 0 g usually occurs slowly.

3,536

Maurer, Martin 1961 A STUDY OF COMPENSATION METHODS FOR INERTIAL ACCELEROMETERS. (Kearfott Div., General Precision, Inc., Little Falls, N.J.); ASTIA AD 274 158.

ABSTRACT: The characteristics and limitations of the force-mass, spring-restrained, the force-balance inverted pendulum, and the torque-balance gyroscopic accelerometers are investigated. Various static and dynamic errors of each type of accelerometer are mathematically analyzed and examined from the viewpoint of applying electronic compensation to reduce these errors. Results show the difficulty of singling out a particular error for electronic compensation. The advantages of improving an accelerometer's dynamic performance are minimized by the fact that the included errors were negligible when considered from the viewpoint of the navigational system. Results of the accelerometer's static errors are included. (Author)

3,537

Maurizi, M. & F. Dittrich 1962 ON SOME NYSTAGMOGRAPHIC RESULTS OBTAINED WITH SUPRALIMINAL ACCELERATIONS AND DECELERATIONS OF MARKED INTENSITY AND SHORT DURATION.
Valsalva 38:281-287, Dec. 1962 (It)

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Maxwell, S. S., V. L. Burke, & C. Reston 1922 THE EFFECT OF REPEATED ROTATION ON THE DURATION OF AFTER-NYSTAGMUS IN THE RABBIT. Amer. J. Physiol. 58:432-438.

3,539

Maycock, R. & G.M. Morant 1951 TRIALS OF DRAMAMINE AS A PREVENTATIVE FOR AIRSICKNESS. (RAF Institute of Aviation Medicine, Farnborough) FPRC Memo 20, Feb. 1951. ASTIA AD 110 142

ABSTRACT: The trials relate to a total of 118 paratroops made up by six sub-groups. Each of these formed a party of passengers in a towed glider. Half an hour before each flight the men were given either a tablet of dramamine, or a similar tablet used as a placebo or nothing, and the three sets were approximately equal in size. For all the flights taken together there was little distinction between the three series of men as far as previous flying experience and previous motion sickness are concerned. The incidence of sickness (nausea, dizziness or vomiting) during the flights was least for the men given dramamine (17 per cent) and greater with marked statistical significance for the men given the placebo (55 per cent), or nothing (46 per cent). The series are not clearly distinguished from one another on account of side effects during flight, or the conditions of the men shortly after landing.

3,540

Mayerson, H. S., & L. A. Toth 1939 THE INFLUENCE OF POSTURE ON SKIN AND SUBCUTANEOUS TEMPERATURES. Amer. J. Physiol. 125:474-480

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Mayerson, H. S., H. M. Sweeney, & L. A. Toth 1939 THE INFLUENCE OF POSTURE ON CIRCULATION TIME. Amer. J. Physiol. 125:481-485

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Mayerson, H. S., & G. E. Burch 1940 RELATIONSHIPS OF TISSUE (SUBCUTANEOUS AND INTRAMUSCULAR) AND VENOUS PRESSURES TO SYNCOPE INDUCED IN MAN BY GRAVITY. Amer. J. Physiol. 128:258-269

3,543

Mayerson, H. S. 1942 THE INFLUENCE OF POSTURE ON BLOOD FLOW IN THE DOG. Amer. J. Physiol. 136:381-385

3,544

Mayerson, H.S. 1944 A CARDIOVASCULAR "BLACKOUT" TEST. J. Aviation Med. 15:304-315.

ABSTRACT: This report deals with a procedure designed to improve the tilting test for use in determining the physiologic aptitude for flying. A modified Martin bicycle ergometer was used.

Of the 50 subjects tested, 23 made good responses, 17 fainted and 10 made poor responses. Of the 10 who fainted transient blurring of vision was noted in 2.

Gross inspection of the available material leaves no doubt but that the subjective and objective syncopal manifestations in the post-exercise period are the result of the lowering of the systolic pressure to a level which is no longer adequate to provide for the proper blood flow to the eyes and brain.

Because of the suggested correlation between susceptibility to fainting and ease of "blacking out" when pulling out of a dive, the test described is proposed as a particularly suitable method of selecting pilots for combat flying.

3,545

Maynard, A. de L., E.A. Naclerio, and J.W.V. Cordice 1955 TRAUMATIC INJURY TO LUNG. Amer. J. Surg. 90:458-468.

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Mayne, R. 1950 THE DYNAMIC CHARACTERISTICS OF THE SEMI-CIRCULAR CANALS. J. Comp. Physiol. Psychol. 43:309-319

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Mayne, R. 1951 THE AUDIOGYRAL ILLUSION AND THE MECHANISM OF SPATIAL REPRESENTATION.
Goodyear Aircraft Corp. Bull , GER-2863, 1-15, Akron, Ohio.

3,548

Mayo, A. M. 1951 BASIC ENVIRONMENTAL PROBLEMS RELATING TO MAN IN THE "AEROPAUSE" AS SEEN BY AN AERONAUTICAL ENGINEER. (Douglas Aircraft Co., Inc., El Segundo, Calif.) ASTIA AD-87 435; 6 Nov. 1951

ABSTRACT: While many new factors and principles must be considered in design for flight in the AEROPAUSE, emphasis on the cardinal principles of working toward the optimum pilot-airplane combination, will probably pay the greatest total dividend in operational efficiency. This principle can best be approached by making use of the best available aeromedical and engineering data, in order to arrive at workable compromises in each. Some of the new problems will radically affect some of the equipment associated with the airplane.

New problems include those of fit and arrangement of the aircraft cabin, time-distance factor, temperature of the aircraft, pressure environment in the cabin, acceleration, noise and vibration and the escape problem.

3,549

Mayo, A.M. 1952 BASIC ENVIRONMENTAL PROBLEMS RELATING MAN AND THE AEROPAUSE AS VISUALIZED BY THE AERONAUTICAL ENGINEER
In: White, C.S. & O.O. Benson, Jr., eds., Physics and Medicine of the Upper Atmosphere, A Study of the Aeropause (Albuquerque, New Mexico: University of New Mexico Press, 1952) Pp. 6-22

ABSTRACT: Flight in the aeropause will impose great physiological and psychological demands on pilot and crew. The rapid advances in aircraft construction call for a corresponding step-up in education and training. The human factor should, on the other hand, be considered in the design of equipment and instrumentation. The latter should be reduced to the absolute eseentials. Further clarification of the visual effects of reduced light dispersion is required. The reduction of the time-distance factor in high-speed flight will put more reliance on automatic control mechanisms, confining the human element to slow-rate monitoring operations. Temperature regulation systems will have to be adapted to the increasing speeds (a chart indicating various cooling systems practicable at the various speed ranges is presented). Problems concerning pressurization, physiological effects of acceleration, of noise, and vibration are discussed. Brief sections are dedicated to radiation and meteor hazards. General principles of escape mechanisms are analyzed. In conclusion it is recognized that a compromising formula is to be worked out to balance all factors involved and keep the resulting costs at a minimum.

3,550

Mayo, A. M. 1956 ENVIRONMENTAL CONSIDERATIONS OF SPACE TRAVEL FROM THE ENGINEERING VIEWPOINT.
Interav'a 11(6):435-438.

ABSTRACT: The basic medical, physical and engineering data for manned flight in free space, while still inadequate, are rapidly being assembled. Progress

to date has been made possible by the combined effort of people in practically every branch of science. As the day of manned space flight is more closely approached, a drastic increase in the amount of effort will be needed to answer the increasingly detailed questions incident to actual design fabrications and operation of the manned space craft.

3,551

Mayo, A.M. 1956 ENVIRONMENTAL CONSIDERATIONS OF SPACE TRAVEL FROM THE ENGINEERING VIEWPOINT.
J. Aviation Med. 27(4):379-389.

ABSTRACT: The basic medical, physical and engineering data for manned flight in free space, while still inadequate, are rapidly being assembled. Progress to date has been made possible by the combined effort of workers in almost every branch of science. As the day of manned space flight is more closely approached, a drastic increase in the amount of effort will be needed to answer the increasingly detailed questions incident to actual design fabrications and operation of the manned space craft.

3,552

Mayo, A.M. 1957 SOME SURVIVAL ASPECTS OF SPACE TRAVEL
Journal of Aviation Medicine 28(5): 498-503

ABSTRACT: In a space craft as in aircraft the over-all objectives must command first attention. Survival problems resulting from space environment will be so severe however, that a larger percentage of total space craft design time is likely to be spent in their solution than in airborne craft. The design of crew compartments will be dictated by the requirements of human operators not significantly different in basic physical and mental capabilities from those of the pilots of present aircaaft. Automatic controls will be needed as greatly for actuation of safety equipment and environmental control of the crew quarters as in control of the craft and its propulsion and power systems. A major problem will be that of suitably linking the human operator to his "automatic" systems. Hermetically sealed crew quarters to provide a livable earth environment in space will be a prime survival requirement. The reconversion of liquid and food waste products to useful nutrients that are psychologically satisfactory might be approached by the use of secondary living organisms in the same manner as in nature. Temperature control will undoubtedly require specialized attention. The possibly dangerous stresses to be encountered during space flight include weightlessness and acceleration. The problems of surviving the effects of a wide variety of solar and cosmic radiation are other dangers Careful consideration must be given to a proper balance of the fundamental moral, morale and economic factors to provide escape equipment justifiably on the basis of the total purpose of the craft involved.

3,553

Mayo, A.M. 1962 REVIEW OF NASA IMPACT WORK AND PLANS
In Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication #977, Pp. 5-16

ABSTRACT: To meet its statutory responsibilities, the National Aeronautics and Space Administration's interest in human impact acceleration must include: (1) A search for knowledge from and in support of space exploration. (2) Research and development to answer specific problems related to manned space flight. (3) The stimulation of industrial and military application of information available from past research.

The NASA is now sponsoring research and is prepared to sponsor or conduct additional research and development which can result in improvements to manned space flight. The need for limited research efforts on human tolerance to impact along axes other than horizontal and vertical is presently identified.

It is considered particularly important that the people involved in acceleration research work be continually alert to identify possible efforts which can result in large versus marginal gains.

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Mayou, D. 1942 VISUAL PROBLEMS IN CONNECTION WITH AIRSICKNESS (RAF, Institute of Aviation Medicine, Farnborough) FPRC Reporr no. 464; May 1942, ASTIA ATI-206 853

ABSTRACT: Investigations on visual tests were conducted using 201 people divided into three groups. From the results of the tests, the following conclusions were reached: visual acuity does not decrease as a result of swinging or gliding tests; adduction power tends to decrease after swinging and gliding, but not to a degree that would affect the efficiency of personnel; and depth perception remains stable after swinging and gliding, and there is no deterioration after nausea or vomiting, but there is an interesting feature arising which indicates that esopheria becomes converted into relative exophoria. The results of the Bishop Harman Diaphragm test are of little importance, as readings considered to be defective must be greater than 5. The average increase in error for all groups fell wit in these limits. It may be concluded that there is no deterioration in night visual capacity after swinging or gliding. Nausea or vomiting has no adverse effect.

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Mayskii, I. 1961 KOSMOS I BIOLOGIYA (Space and Biology)
(Trans. of Meditsinskii Rabotnik (USSR) 24(30)(1986):3, 1961)
(Office of Technical Services, Washington, D.C.) 61-27228

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Mazelsky, B. 1950 CHARTS OF AIRPLANE ACCELERATION RATIO FOR GUSTS OF ARBITRARY SHAPE.
(National Advisory Committee for Aeronautics, Washington, D.C.)
Technical Note 2036, Feb. 1950. ASTIA ATI 68 639.

SUMMARY: The equation of vertical motion for an airplane flying in gusty air is simplified in order that its solution is a function of only two parameters, namely, the mass parameter of the airplane and the shape of the gust the airplane is penetrating. The solutions of the quation are presented in the form of charts that can be used for estimating rapidly and easily the acceleration ratios encountered by airplanes with different mass parameters penetrating a sharp-edge gust, a gust of arbitrary shape, or a triangular gust. (Author)

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Mazer, M. 1945 THE G SUIT IN COMBAT.
Air Surg. Bull., 2:236-238

ABSTRACT: Presents data on the occurence of grayout and blackout and the highest G force ever experienced as recorded by the Kollsman accelerometer in 35 pilots who wore the G suits on all missions. Ten of the pilots had had grayout but not blackout. Of these, 9 had been exposed to 5 G or more. Of the 4 who had blacked out, 3 had been exposed to 6 G or more. Of the 21 who had never grayed out, 17 had experienced 5 G or more and 14, 6 G or more. Of the 31 who had never blacked out, 20 had experienced a force of 6 G or more. Six pilots had experienced 7 to 7.9 G and 5.8 to 9 G without blacking out.

It is concluded that the G suit is an important factor in increasing the combat efficiency of the P-51 pilot-aircraft combination.

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Mazza, G. 1963 NEW ACQUISITIONS ON VESTIBULAR PHYSIOLOGY AND PHYSIOPATHOLOGY DURING SPACE FLIGHT.
Riv. Med. Aero. 26:99-136, Jan.-Mar. 1963 (Italy)

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Mazza, V. 1947 PNEUMATIC CATAPULTS FOR SIMULATED SEAT EJECTION TESTS.
(Engineering Division, Air Materiel Command) Sept. 1947.
ASTIA ATI 49510

ABSTRACT: Preliminary tests were conducted of two types of pneumatic catapults which were developed for use on the ejection seat test tower to

determine the most tolerable acceleration-time diagrams on human subjects. In one catapult type, acceleration is controlled by metering compressed air through a series of orifices in the cylinder which are uncovered successively by movement of the piston. The other pneumatic catapult is accelerated by air metered by a mechanically actuated air valve which is positioned through a cam arrangement by the upward displacement of the ejection seat. The two methods were shown to be feasible, with the former method recommended for work with human subjects from the standpoint of safety and simplicity.

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Mazza, V., R.W. Briggs, C.E. Caroll, & R.V. Wheeler 1950 HIGH ALTITUDE BAILOUTS. (USAF, AMC, Wright-Patterson AFB, Ohio) Memo Rept. No. MCREXD-695-66M.

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Mazza, V. 1951 HIGH ALTITUDE BAILOUTS. J. Aviation Med. 22(5):403-407, Oct. 1951.

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Mazzei, J.H. 1961 A COMPARISON STUDY. CONFINED VS UNCONFINED TEST DATA. A CHECK STUDY. INSTRUMENTATION RESPONSE AT HIGH FREQUENCIES. (Feltman Research Labs., Picatinny Arsenal, Dover, N.J.) Technical rept. no. FRL-TR-45, ASTIA AD-263 564L, September 1961

ABSTRACT: Confined and unconfined dynamic drop tests were conducted on like specimens of cushioning material of known density, size, and under comparable environmental conditions. The data collected from these tests were employed to plot, on the same graph, a static load-vs-peak acceleration curve, one for confined and one for unconfined data. A comparison of these curves shows conclusively that there is considerable difference in the dynamic behavior of the cushion in the confined, or as-packaged, condition. Beyond the optimum loading range, the peak accelerations transmitted by the unconfined cushion, continue to rise sharply, while peak accelerations for the confined cushion show a secondary decrease beyond the optimum loading range, the peak accelerations transmitted by the unconfined cushion, continue to rise sharply while peak accelerations for the confined cushion show a secondary decrease beyond the optimum loading range, before starting a secondary increase beyond bottoming-out. (Author)

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Meda, E. July-Sept. 1951 [VALUES OF THRESHOLD OF ANGULAR VELOCITY FOR PHENOMENON OF CORIOLIS AND OF PURKINJE IN MAN.] Riv. Med. Aeronaut. 14:453-456

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Meda, E., tr. E.R. Hope 1952 A RESEARCH ON THF THRESHOLD FOR THE CORIOLIS AND PURKINJE PHENOMENA OF EXCITATION OF THE SEMICIRCULAR CANALS. Arch. di Fisiol. 52:116-134. (Defence Scientific Information Service, DRB, Canada) Translation T 17 I, 15 Sept. 1954. ASTIA AD 50 280.

ABSTRACT: "The uniform angular velocity, proportional to the threshold acceleration for the development of the Coriolis and Purkinje vertigos, has been determined in six normal subjects. The angular velocities found were 14.7°/sec ± 1.39° for the Purkinje phenomenon, when the forward bending of the head took place in about 1/5 of a second. In the text of the paper we have discussed the application of the Coriolis theorem, and have demonstrated that all the ampullary receptors participate in the Coriolis and Purkinje phenomena. A mathematical foundation is laid for determining the threshold acceleration."

3,565

Meehan, J.P. 1959 RENAL PLASMA FLOW UNDER POSITIVE ACCELERATION (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: Exposure to positive acceleration elicits a pressor response that may reasonable produce a change in the over-all vascular resistance of the kidney. A study of PAH and creatinine clearances has been undertaken in an effort to determine the extent to which the renal circulation is involved in this pressor response. Subjects were exposed to an acceleration of 3 G for 10 minutes on the human centrifuge. By means of a constant infusion technique, PAH and creatinine clearances were determined for a 20 minute period that included the 10 minute G exposure. Automatic blood sampling permitted proper timing for the blood samples. Renal plasma flow during acceleration is below resting control values. Because of changes in renal arterial and venous pressures under positive accelerations, renal vasoconstriction is indicated.

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Meehan, J. P., & E. Jacobs 1959 PHYSIOLOGIC PRODUCTION OF CATECHOL AMINES IN RESPONSE TO SEVERAL PHYSICAL STRESSES. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 59-534; Sept. 1959

ABSTRACT: Measurements of tne physiologic production of adrenaline and noradrenaline in response to four standardized physical stresses were undertaken on young

adult male subjects. Plasma levels of noradrenaline were found to increase significantly in exercise and the increase appears to bear a positive relationship to the physiologic severity of the exercise. Plasma levels of noradrenaline did not change as the result of the cold pressor test or as the result of exposure to positive accelerations of 3 g for 5 minutes. Renal plasma flow was not altered as the result of similar exposure to acceleration lasting for 10 minutes.

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Meehan, J.P. & H.I. Jacobs 1959 RELATION OF SEVERAL PHYSIOLOGICAL PARAMETERS TO POSITIVE G TOLERANCE.
(Wright Air Development Division, Wright-Patterson AFB, Ohio)
WADC-TR-58-665, Jan. 1959. ASTIA AD 209 387.

ABSTRACT: A series of experiments was undertaken in an attempt to relate several physiologic parameters to positive g tolerance. Blood pressure, blood volume, and physical condition as measured by both the Harvard Step Test and a modified physical fitness test were the parameters studied. Subjects were studied at the end of one month of enforced rest and again at the end of one month of supervised physical training. It can be concluded that considerable change in the physical condition of an individual does not affect his tolerance to positive acceleration. (Author)

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Meehan, J. P. and Edith Jacobs 1960 VENOUS PLASMA LEVELS OF CATECHOL AMINES IN SEVERAL PHYSICAL STRESSES
Aerospace Medicine 31(9):733-738 September 1960

ABSTRACT: The venous plasma levels of adrenaline and noradrenaline have been studied in relation to the physiologic responses seen in several physical stresses. The stresses studied were the Harvard Step Test, a treadmill exercise, the Cold Pressor Test, and positive acceleration. Exercise consistently produced elevations of plasma noradrenaline concentrations. The Cold Pressor Test yielded negative results, while the acceleration studies showed markedly variable responses. The data indicate that anticipation of the experiment may significantly raise control or resting plasma levels of noradrenaline. Plasma levels of adrenaline did not show consistent variations in these experiments.

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Meehan, J.P. & W. Brandt 1960 PARA-AMINO HIPPURATE AND ENDOGENOUS CREATININE CLEARANCES IN POSITIVE ACCELERATION.
Aerospace Med. 31(3):220-223, March 1960.

ABSTRACT: In eight experiments conducted on three subjects, exposure to a positive acceleration of 3G for ten minutes did not demonstrate any consistent changes in PAH clearances or creatinine clearances from control values.

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Meehan, J. P. 1960 RENAL RESPONSES TO POSITIVE ACCELERATION. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 60-637; ASTIA AD-247 461

ABSTRACT: The para-amino hippurate (PAH) clearances, creatinine clearances and urine flows of young male subjects exposed to positive acceleration have been studied. Exposures at 3 g for 10 min produced no consistent changes in the above parameters from control values. Longer exposures at 3 g produced a reduction of the para-amino hippurate (PAH) clearance in some subjects, no consistent changes in creatinine clearances, and significant reductions in urine flow following centrifugation. It is concluded that positive acceleration as used in the present experiments affects the kidney primarily through mechanisms involving a reduction of the thoracic blood volume. (AUTHOR)

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Meehan, J. P., & T. J. McNey 1961 THE ELECTROENCEPHALOGRAM DURING POSITIVE ACCELERATION. (Paper, 32nd Annual Meeting, Aerospace Medical Assoc., 24-27 Apr. 1961, Chicago, Ill.)

ABSTRACT: Studies were made of the electroencephalogram as a physiologic indicator of blackout and early unconsciousness in man induced by positive acceleration. Fifteen-second exposures at constant acceleration and exposure to gradual onset acceleration of 1.5 g/min. were programmed. Needle electrodes were used. A simple adjustable helmet provided good mechanical support. Results indicated that no alterations in the electroencephalogram occurred during blackout. The ones occurring with loss or recovery of consciousness might have been significant if like changes had not sometimes been noted without such clinical events present. Conscious muscular effort frequently produced motor activity in the electroencephalogram similar to that observed during unconsciousness. The conclusion seems to be, therefore, that the electroencephalogram has doubtful reliability as a sole measure of consciousness in subjects exposed to positive acceleration. (Aerospace Medicine 32(3):240, Mar. 1961)

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Meek, J.C., A. Graybiel, et al. 1961 OBSERVATIONS OF CANAL SICKNESS AND ADAPTATION IN CHIMPANZEES AND SQUIRREL MONKEYS IN A SLOW ROTATION ROOM. Proj. MR005.13-6001; May 1961. ASTIA AD 261 695.
See also Aerospace Med. 33:571-578, May 1962.

ABSTRACT: Chimpanzees and squirrel monkeys, with both normal and disturbed vestibular function, were subjected to varying degrees of rotation in the Pensacola Slow Rotation Room. The normal animals showed a form of canal sick-

ness similar to that observed in normal humans, and adaptation could be observed after exposure of the animals to subcritical stimulation for several days. The manifestations of canal sickness were correlated with labyrinthine function. It was found that canal sickness failed to develop in those animals which exhibited no nystagmus in bilateral caloric tests. These experiments point to the conclusion that in these animals as in man, the canal sickness experienced in a slow rotation room depends upon normal vestibular function. Thus the chimpanzee and the squirrel monkey may contribute considerably to the clarification of the etiology and final control of canal sickness. (Author)

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Meek, J.C., A. Graybiel, D.E. Beischer and A.J. Riopelle 1961 OBSERVATIONS OF CANAL SICKNESS AND ADAPTATION IN CHIMPANZEE AND SQUIRREL MONKEYS IN A "SLOW ROTATING ROOM."
(Paper, 32nd Annual Meeting, Aerospace Medical Association, 24-27 April 1961, Chicago, Ill.)

ABSTRACT: Chimpanzees and squirrel monkeys, with both normal and disturbed vestibular function, were subjected to varying degrees of rotation in the Pensacola Slow Rotation Room. The normal animals showed a form of "canal sickness" similar to that observed in normal humans, and adaptation could be observed after exposure of the animals to subcritical stimulation for several days. The manifestations of canal sickness were correlated with labyrinthine function. It was found that canal sickness failed to develop in those animals which exhibited no nystagmus in bi-lateral caloric tests. These experiments point to the conclusion that in these animals as in man, the canal sickness experienced in a slow rotation room depends upon normal vestibular function. Thus the chimpanzee and the squirrel monkey may contribute considerably to the clarification of the etiology and final control of canal sickness. (Aerospace Med. 32(3):341, Mar. 1961)

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Meek, J.C., A. Graybiel, D.E. Beischer and A.J. Riopelle 1961 OBSERVATIONS OF CANAL SICKNESS AND ADAPTATION IN CHIMPANZEES AND SQUIRREL MONKEYS IN A "SLOW ROTATION ROOM."
Aerospace Med. 33(5):571-578, May 1962.

ABSTRACT: Chimpanzees and squirrel monkeys. with both normal and disturbed vestibular function, were subjected to varying degrees of rotation in the Pensacola Slow Rotation Room. The normal animals showed a form of "canal sickness" similar to that observed in normal humans, and adaptation could be observed after exposure of the animals to subcritical stimulation for several days. The manifestations of canal sickness were correlated with labyrinthine function. It was found that canal sickness failed to develop in those animals which exhibited no nystagmus in bilateral caloric tests. These experiments point to the conclusion that in these animals as in man, the canal sickness experienced in a slow rotation room depends upon normal vestibular function. Thus the chimpanzee and the squirrel monkey may contribute considerably to the clarification of the etiology and final control of canal sickness.

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Meeks, R. B., Jr., & E. R. Wells, Jr. 1961 FEASIBILITY OF USING A TERNARY MODE FOR PULSE TORQUING A PENDULOUS ACCELEROMETER. (Master's Thesis: Massachusetts Institute of Technology, 1961) (U. S. Naval Postgraduate School, Monterey, California) Rept. No. M426

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Meineri, G. 1955 EFFETTI FISIOPATOLOGICI E SPORAVIVENAZ DEL RATTO DOPO ACCELERAZIONI SECONDO L'ASSE CORPOREO LONGITUDINALE (Physiopathologic Effects and Survival of Rat Following Acceleration According to Longitudinal Body Axis; Description of Lesion)
Rivista di Medicina Aeronautica (Rome) 18: 322-337.

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Meller, C. L. 1951 MOTION SICKNESS.
J. A. M. A., 145: 1109

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Melville-Jones, G. 1955 THE LOSS OF AIRCRAFT CONTROL DURING A SINGLE RAPID ROLLING MANOEUVRE. (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. 933, Oct. 1955.

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Melville-Jones, G. 1957 A STUDY OF CURRENT PROBLEMS ASSOCIATED WITH DISORIENTATION IN MAN-CONTROLLED FLIGHT. (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. No. 1021., Oct. 1957.

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Melville, Jones, G. 1958 DISORIENTATION IN FLIGHT. (RAF, Instit. of Aviation Med., Farnborough) FPRC Memo. 96 Sept 1958.

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Melville-Jones, G. 1959 SOME ASPECTS OF LABYRINTHINE INFLUENCE UPON EYE MOVEMENT DURING RAPID ROTATIONAL MANOEUVRES. (RAF, Institute of Aviation Medicine, Farnborough) FPRC Memo 110 Dec. 1959.

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Melville-Jones, G. 1959 DISORIENTATION DUE TO RAPID ROTATION IN FLIGHT. (1st European Congress of Aviation Medicine). In Medical Aspects of Flight Safety (London: Pergamon Press, 1959)

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Melville-Jones, G. 1959 DISORIENTATION IN FLIGHT (1st Internat. Cong. of Aeronautical Sci.) Advances in Aeronautical Science. (London: Pergamon Press, 1959).
See also FPRC Memo 96, Sept. 1958.

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Melville-Jones, G. 1959 VESTIBULAR INTERFERENCE WITH VISION IN FLIGHT. Proc. of the Roy. Soc. of Med. 52:185.

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Melville-Jones, G. and W. Free 1960 A METHOD FOR SIMULTANEOUS MEASUREMENTS OF EYE MOVEMENTS ABOUT THREE ORTHOCONAL AXES. (RAF Institute of Aviation Medicine, Farnborough) FPRC Rept. 1156, Nov.1960.

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Melville-Jones, G. 1960 A NOTE ON SOME HUMAN FACTORS IN HELICOPTER FLYING (RAF, Institute of Aviation Medicine, Farnborough) FPRC Memo No. 142, July 1960.

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Melville-Jones, G. & D. Drazin 1961 OSCILLATORY MOTION IN FLIGHT (RAF Institute of Aviation Medicine, Farnborough) FPRC Rept. 1168, July 1961.

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Mendes, M.F. 1952 FATORES QUE AFETAM AOS AVIADORES, DURANTE, O DESEMPHENHO DE SEUS DEVERES (Factors Which Affect Aviators During the Performance of Their Duties)
Revista Medica da aeronautica (Rio de Janeiro) 4(3): 5-18, DSG(WL RE609, v. 4)

ABSTRACT: The last decade witnessed the expansion of the literature of aviation medicine. The majority of pertinent studies centered around three physical phenomena: the density of air, the ambient temperature, and acceleration. The factors most likely to affect the pilot during flight, such as altitude, temperature, noise, light, position of the body in flight, diet, and fatigue are analyzed in some detail.

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Mentzer, W.R. 1963 ANALYSIS OF THE DYNAMIC TESTS OF THE STRETCH YO-YO DE-SPIN SYSTEM. (National Aeronautics and Space Administration, Washington, D.C.) NASA TN D-1902. Sept. 1963.

ABSTRACT: Results of the stretch yo-yo feasibility and flight qualification tests are presented. These tests were conducted to prove the concept that the stretch yo-yo is a more accurate de-spin device than the rigid yo-yo, and to verify the analytical development of the stretch yo-yo properties. Variations in the design parameters and their effects on the final spin rate of the payload are noted in the analysis of the test results. The variables include initial spin rate, moment of inertia, and spring properties. A computer solution of the test payload equations of motion is included for comparison with the experimental results to confirm the mathematical analysis of the stretch yo-yo system. As a result of the successful flight qualification tests a stretch yo-yo was flown on Ariel I (1962 ο 1) in April 1962.

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Menzio, P. 1951 RICERCHE'NELL UOMO SULLA SOGLIA DI FENOMENI VESTIBOLARI DA ACCELERAZIONE ANGOLARE NEGATIVA (Research In Man On The Vestibular Phenomena Threshold Of Negative Angular Acceleration)
Rivista di Medicina Aeronautica, (Rome) 14:457-463, July-Sept. 1951.

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Mercier, A., G. Perdriel, and P. Ganas 1959 LA VISION DANS LE VOL A BASSE ALTITUDE ET A GRANDE VITESSE. (Vision in low altitude and high speed flying) Medecine Aeronautique (Paris), 14: 15-24

ABSTRACT: From the 271 answers to a questionnaire sent to test, fighter, and reconnaissance pilots and to all-weather fighter navigators, the authors

conclude that low-altitude, high speed flying does not precipitate a noticeable visual fatigue, but generates a nervous tension which, added to the effects of turbulence could impair the visual function. Vision is impaired by the increasing speed of scanning while sensory perception remains relatively slow. Reading the instrument panel or the map is almost impossible and the fatigue of accomodation is manifested, especially among radar navigators. Low-level obstacle jumping (impossible in jets) has no influence on vision. Detection and identification of an aircraft from a distance of 4.5 km is often difficult. Goggles are easily fogged because of the elevated cabin temperature, and especially if the oxygen mask is improperly adjusted. Vibrations, although usually rare, affect vision and often cause flyers to return to higher altitudes During night flying, watching the instruments impairs retinal adaptation and increases visual fatigue.

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Mercier, A, ed. 1962 VISUAL PROBLEMS IN AVIATION MEDICINE (Papers, Aero Space Medical Panel, Advisory Group for Aeronautical Research and Development, Paris, France) (Oxford, N.Y.: Pergamon Press, 1962) AGARDograph-61; NASA N62 17142.

ABSTRACT:
Mercier, A. La Vision Dans L'Aviation D'Aujourd Hui (Vision in Aviation Today NASA N62-17143
Beckman, E.L., T.D. Duane, & K.R. Coburn Limitation Of Ocular Motility and Pupillary Dilation In Humans During Positive Acceleration NASA N62-17144
McCulloch, C. The Acceptance of Contact Lenses in Military Personnel NASA N62-17145
Culver, J.F. & A.V. Adler Protective Glasses Against Atomic Flash NASA N62-17146
Curtis, J.L Visual Problems of High Altitude Flight NASA N62-17147
Evard, E. Le Clignement Des Yeux, Cause Possible D'Accident Aerien (Blinking of Eyes, Possible Cause of Airplane Accidents NASA N62-17148
Grether, W.F. Instrument Dials, Instrument Arrangement And Cockpit Design NASA N62-17149
Howard, P. The Origin of Black-out NASA N62-17150
Mercier, A. & G.Perdriel Les Problemes Visuels Dans Le Vol A Basse Altitude (Visual Problems in Flight at Low Altitude) NASA N62-17151
Mercier, A. & G. Perdriel L'Entrainement De La Vision Nocturne (Training for Night Vision) NASA N6217152
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Price, T.J.G. Visual Standards In The Selection Of Flying Personnel NASA N62 17154
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Merz, M. 1962 WPLYW WARUNKOW WSPOLCZESNEGO LOTU NA NARZED WZROKU (EFFECT OF FLIGHT IN MODERN AIRCRAFT ON THE VISUAL APPARATUS) Lekarz wojskowy (Warszawa) 38(4):311-317.

ABSTRACT: High-altitude, high speed flight affects the visual apparatus, nervous system, and circulatory system. Special consideration is given to the eye as affected by supersonic speeds, accelerations, high altitudes, hypoxia, and sensory disorders.

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Messer, J.V., I. S. Levin & J. Pines 1962 THE EFFECTS OF ACCELERATION UPON CENTRAL CARDIOVASCULAR DYNAMICS
(Paper, NATO-AGARD Meeting, Paris, France, 1962)

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Moiitskii, L.V. & I.I. Kas'yan 1962 BIOCHEMICAL ASPECTS OF THE RADIATION METHOD OF PRESERVING FOOD PRODUCTS (AND) SOME HUMAN PHYSIOLOGICAL REACTIONS UNDER CONDITIONS OF ALTERNATING OVERLOADS AND WEIGHTLESSNESS
(Joint Publications Research Service, San Francisco, Calif.) JPRS 17591 12 Feb. 1963
Trans. of Akademiya Nauk SSSR. Izvestiya (Seriya Biologicheskaya), 27(6): 869-884 and 876-908, 1962.

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Meves, Ernst UNTERSUCHUNG VON MOEGLICHKEITEN DES NOTAUSSTIEGS DER FLUGZEUGINSASSEN BEIM ABSTURZ, INSBESONDERE BEI HOHER GESCHWINDIGKEIT (Investigations on Emergency Escape from Diving Aircraft, particularly at high speeds), ASTIA ATI 74752.

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ABSTRACT: During 1954, three phases of windblast tests were conducted on the MB-2 semi-rigid helmet. The first two series of tests were made in conjunction with the B-47 downward ejection program sponsored by the Aircraft Laboratory. The first phase was carried on at Wright-Patterson Air Force Base by using an anthropomorphic dummy ejected downward from the observer's position. The second phase, using live subjects, was made at Eglin Air Force Base, Florida. The third test was carried out at the windblast facility of the Marquardt Aircraft Company, Van Nuys, California, using an anthropomorphic dummy seated in an ejection seat installed in front of a blast nozzle. Results of the tests have proved the MB-2 semi-rigid helmet has windblast retention capabilities and might possibly be a satisfactory replacement for the standard P-3 helmet. (C.M.L.)

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ABSTRACT: Analysis of the mechanics of the escape trajectories for low-acceleration propulsion. The method used involves inversion of the formulation of the problem, i.e., a trial-and-error procedure is used to choose a probable trajectory, which is then used to compute the corresponding thrust components; if these components are economically justified in terms of fuel consumption, the trajectory is deemed feasible.

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Mikhaylovskiy, G. P. 1963 CERTAIN RESULTS OF THE DEVELOPMENT OF SPACE BIOLOGY (Foreign Technology Division, Wright-Patterson AFB, Ohio) FTD-TT-63-358 Vestnik Akademiy nauk SSSR, Dekabr' 1962 pp. 105-108. ASTIA AD 408 420.

ABSTRACT: Some results of the Vostok 3 and Vostok 4 flights were discussed at the session of the Section of Biological Sciences of the Academy of Sciences of the USSR on 1 and 2 October 1962. This article reports the papers presented at this second session on the problems of space biology. V. I. Yazdovskiy and O. G. Gazenko reported results of biological experiments carried out in Satelloids and of studies made during the Vostok flights. These studies suggest that the flights gave rise to no pathological reactions. V. V. Antipov et al and A. V. Lebedinskiy et al discussed the problems of radiation. I. T. Akulinichev et al reported information collection by biological telemetry. Four groups presented papers on the effects of positive and angular acceleration and weightlessness on the vestibular apparatus and on the possibility of vestibular adaptation. Three groups discussed closed ecological systems. A. I. Oparin presented a paper on the possibility of extraterrestrial organisms.

(CARI)

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Milch, L. J., H. D. Frankl, & A. A. Renzi 1958 THE EFFECTIVENESS OF DRUGS AGAINST MOTION SICKNESS - PERPHENAZINE AND SYSTRAL. (School of Aviation Medicine, Randolph AFB, Texas) Rept. 59 20, Dec. 1958; ASTIA AD 207 232.

ABSTRACT: To test the effectiveness of the drugs perphenazine and systral against motion sickness, groups of unselected basic airmen were tested aboard a multi-engine aircraft. The subjects were equally divided into drug and placebo groups. The four-hour flight involved simulated turbulence. The end point was vomiting. Subsequent to the flight all subjects completed a questionnaire on side effects. Data from 223 subjects were analyzed for differences between drugs and placebo. Also, dogs were swing-tested after the administration of chlorpromazine and perphenazine to test the reliability of extending results of apomorphine inhibition to the relationship of the chemoreceptive zone to motion sickness.

SECOND ABSTRACT: The observation that a drug will inhibit apomorphine-induced emesis in dogs frequently leads to the suggestion that such a compound may be useful in the prophylaxis of motion sickness. Accordingly, trilafon^{R} (perphenazine), a drug with high activity against apomorphine-induced vomiting in dogs, and systral^{R}, an antiemetic analog of benadryl^{R} with little or no activity against apomorphine-induced vomiting in dogs, were tested for anti-motion-sickness activity in humans aboard aircraft. Neither furnished any protection. Further, dogs were swing-tested after the administration of chlorpromazine and perphenazine. In spite of the significant difference in protection against apomorphine-induced vomiting afforded by the two drugs (perphenazine much greater than chlorpromazine), perphenazine failed to protect against swing-induced vomiting and chlorpromazine furnished only 25 percent protection. These data emphasize the unreliability of extending the results of apomorphine inhibition to the relationship of the chemoceptive trigger zone to motion sickness. (Author)

3,607

Miller, C.O., & J.A. Barton 1957 ANALYSIS OF EJECTIONS FROM JET FIGHTER AIRCRAFT. (Chance Vought Aircraft, Inc., Dallas, Texas) Rept. No. 11184 7 Oct. 1957.

3,608

Miller, C.O. 1957 EVALUATION OF TRANSVERSE ACCELERATION(REAR TO FRONT) UTILIZING CONVENTIONAL AND SPECIAL RESTRAINT GEAR. (Chance Vought Aircraft, Inc., Dallas, Tex.) Rept. no. 10816, Feb. 1957

3,609

Miller, C. O. and J. D. Horgan 1958 STRESSES AFFECTING THE PILOT DURING POST-STALL MANEUVERS OF HIGH PERFORMANCE AIRCRAFT
J. of Aviation Medicine 29(3):180-186, March 1958

ABSTRACT: The advent of high performance aircraft has resulted in post-stall flight characteristics which can surpass the pilot's ability to perceive, judge, and act correctly to alleviate the situation. The various stresses are discussed and recommendations made for comprehensive research to provide the necessary design parameters for safe flight.

3,610

Miller, C. O. 1960 THE OMNI-SONIC FLIGHT CAPSULE--A PRACTICAL REALITY
Society of Experimental Test Pilots Quarterly Rev. 5(2):22-38, Winter 1960

ABSTRACT: This article reports on the work done at Vought Aircraft on the design, development, and testing of the Omni-Sonic Flight Capsules; it also argues for a more optimized recovery system through a flight rather than escape capsule approach. Highlights of the system discussed include: boost rocket installations, capsule-parent vehicle system integration, seat and restraint system design, automatic escape system design, and capsule-fuselage separation methods. (Tufts)

3,611

Miller, C.O. 1963 SYNTHESIS OF IMPACT ACCELERATION TECHNOLOGY FOR AVIATION CRASH INJURY PREVENTION. (PROJECT SIAT)
(U.S. Army Transportation Research Command, Fort Eustis, Va.)
TRECOM TR 63-31A. June 1963.
See Cambeis, L., 1963. TRECOM TR 63-31B

ABSTRACT: This report was prepared by Flight Safety Foundation, Inc., New York, New York. It describes a project to search for and collate information on the topics of (1)Hazard Exposure to Impact Acceleration (2) Crash Loads (3) Design for Impact Acceleration (4) Test and Analysis Methodology and (5) Human Tolerance to Impact Acceleration. An information retrieval system utilizing IBM cards is detailed and code indexes provided. (CARI)

3,612

Miller, D.R. 1942 LYNN RIVER WORKS SHOCK STAND. ACCELERATION MEASUREMENTS ON U.S NAVY LIGHTWEIGHT HIGH IMPACT SHOCK STAND (General Electric Co., Schenectady, N.Y.) Data Folder no. 72316; 20 May 1942; ASTIA AD-146 132

ABSTRACT: This data folder records measurements of maximum accelerations on the U.S. Navy light-weight high impact shock stand in the Laboratory of the General Electric Company, Lynn River Works. Measurements were made on the main plate at the eight holes used for supporting apparatus mountings and also on various mountings. The holes in the main plate and sketches of two of the mountings are shown on an enclosed drawing. Other points of measurement are described in Table I. Results showed that the maximum accelerations fall in the same range as those previously reported for tests on similar shock stands at Schenectady, Philadelphia, and Pittsburg. This comparison applies to measurements at the four mounting holes nearest the center of the thin plate, these having been chosen as most significant in the report referred to. A range of 3200 to 5940 g maximum acceleration on the main plate at all eight mounting holes was recorded for back blows of 2000 ft-lb impact energy. A range of 1080 to 1370 g maximum acceleration was recorded on the various mountings for back blows of

3,613

Miller, E. F., II 1961 COUNTERROLLING OF THE HUMAN EYES PRODUCED BY HEAD TILT WITH RESPECT TO GRAVITY.
Acta Oto-laryngol 54(6):479-501.

ABSTRACT: A photographic method of measuring torsional eye movements (counter-rolling) yielded, on the average, a precision of ±5.3 minutes of arc. Using this method, torsional eye movements compensatory to head (body) tilt were found in all planes tested except the sagittal. In the two intermediate (±45°) planes the overall counterrolling response was quite similar and somewhat less than that found in the case of lateral tilt. Counterrolling always occurred opposite to the lateral component of head tilt and increased fairly rapidly up to a maximum at a head inclination of between 60° and 90°. From this point on counterrolling decreased, but at a lesser rate than it increased, reaching about zero when the head was positioned vertically downward. A difference in absolute amount of torsion of the right eye found between tilting the head (body) leftward and rightward could not be established. However, no difference in counterrolling could be attributed to the order (clockwise or counterclockwise) in which the measurements were made. Variability in counterrolling response was found to be considerable at every position of tilt. A theory attempting to explain the mechanism of otolith organ stimulation is presented.

3,614

Miller, E.F. II. 1962 COUNTERROLLING OF THE HUMAN EYES PRODUCED BY HEAD TILT WITH RESPECT TO GRAVITY. (Naval School of Aviation Medicine, Pensacola, Fla.) Research Report No. 75, Sept. 1962. ASTIA AD 294 479

ABSTRACT: The photographic method of measuring counter-rolling yielded, on the average, a precision of ± 5.3 minutes of arc. Compensatory torsional eye

movements were found in all planes tested except the sagittal. In the two intermediate (± 45 degrees) planes the overall counterrolling response was quite similar but somewhat less than that found in the case of lateral tilt. Counter rolling always occurred opposite to the lateral component of head tilt and increased fairly rapidly up to a maximum at a head inclination of between 60 and 90 degrees. From this point on counterrolling decreased, but at a lesser rate than it increased, reaching about zero when the head was positioned vertically downward. A difference in absolute amount of torsion of the right eye found between tilting the head (body) leftward and rightward could not be established. However, no difference in counterrolling could be attributed to the order (clockwise or counter-clockwise) in which the measurements were made. Variability in counterrolling response was found to be considerable at every position of tilt. A theory attempting to explain the mechanism of otolith organ stimulation is presented. (Author)

3,615

Miller, E. F. 1959 EFFECT OF EXPOSURE TIME UPON THE ABILITY TO PERCEIVE A MOVING TARGET. (Naval School of Aviation Medicine, Pensacola, Fla.) MR005.13-6001.2.2., 1/6/59

3,616

Miller, E. F. 1962 COUNTERROLLING OF THE HUMAN EYES PRODUCED BY HEAD TILT WITH RESPECT TO GRAVITY. Acta Oto-Laryngologica (Stockholm) 54:479-501
NOTE: Reel 7, Flash 7, Item 17

ABSTRACT: A photographic method of measuring torsional eye movements (counterrolling) yielded, on the average, a precision of ± 5.3 minutes of arc. Using this method, torsional eye movements compensatory to head (body) tilt were found in all planes tested except the sagittal. In the two intermediate (± 45 degree) planes the overall counterrolling response was quite similar and somewhat less than that found in the case of lateral tilt. Counterrolling always occurred opposite to the lateral component of head tilt and increased fairly rapidly up to a maximum at a head inclination of between 60 degrees and 90 degrees. From this point on counterrolling decreased, but at a lesser rate than it increased, reaching about zero when the head was positioned vertically downward. A difference in absolute amount of torsion of the right eye found between tilting the head (body) leftward and rightward could not be established. However, no difference in counterrolling could be attributed to the order (clockwise or counterclockwise) in which the measurements were made. Variability in counterrolling response was found to be considerable at every position of tilt. A theory attempting to explain the mechanism of otolith organ stimulation is presented. (AUTHOR)

3,617

Miller, E. F., II, & A. Graybiel 1962 A COMPARISON OF OCULAR COUNTERROLLING MOVEMENTS BETWEEN NORMAL PERSONS AND DEAF SUBJECTS WITH BILATERAL LABYRINTHINE DEFECTS. (Naval School of Aviation Medicine, Pensacola, Fla.) BuMed Project MR005.13-6001 Subtask 1, Rept. No. 68; NASA Order No. R-47, 18 Feb. 1962

ABSTRACT: Counterrolling as a function of head(body) tilt was measured by a photographic technique in nine normal and ten labyrinthine defective (L-D) subjects to determine the functional status of their otolith organs. The findings in the normal subjects revealed a characteristic pattern of counterrolling. Ocular torsion as a function of head tilt rightward or leftward was greatest in the first 25 degrees from the upright, less from 25-50 degrees where it usually reached peak value, and thereafter in most cases tended to reverse direction. The average maximum value (counterrolling index, CI) ranged from 286 to 465 mins. of arc. The L-D subjects did not disclose the "normal" counterrolling pattern in most instances and their CI ranged from only 30-176 mins. of arc. The highly significant intergroup differences were attributed to loss of function of the auricular sensory organs; intraindividual differences in the L-D group were explained by the presence of some residual otolith function. (AUTHOR)

3,618

Miller, H., M.B. Riley, S. Bondurant, & E.P. Hiatt 1958 DURATION OF TOLERANCE TO POSITIVE G.
(Paper, 1958 Meeting of Aero Medical Association, Statler Hotel, Washington, D.C., March 24-26)

ABSTRACT: Acceleration forces of great magnitude or of long duration will be encountered with anticipated flight velocities. A study was designed to evaluate the duration of tolerance of the unprotected seated subject to a sustained positive G as produced by the human centrifuge. Fifteen subjects made thirty-one runs at 3.0, 3.5, 4.0, 4.5, or 5.0 G. Acceleration was increased 0.07 G per second and the selected G-level was maintained until a subjective limit of tolerance was reached. Electrocardiograms were monitored continuously. At 3.0 G two subjects ran until stopped arbitrarily at the limit of one hour. Tolerance varied as follows: (in minutes) 3.0 G, 18-60; 3.5 G, 3-9; and 5.0 G, 1/2-3. Tolerance was limited usually by general fatigue, neck and back pains. Blackout above 4 G, and pre-syncope (once) also occurred. Petechiae were common. There were no significant electrocardiagraphic abnormalities. It now seems evident that the unprotected human subject may safely tolerate positive acceleration for durations much longer than previously supposed. The influence of G-suits upon tolerance is now being examined. (J. Aviation Med. 29(3):243, March 1958)

3,619

Miller, I, G.B. Simon & E. Cohen 1960 A DEVICE AND TESTS FOR MEASURING INTELLECTUAL FUNCTIONS DURING ACCELERATION. (General Precision, Inc., Binghamton, N.Y.) WADD TR 60-366 May 1960. ASTIA AD 234 635

ABSTRACT: In manned space flights, a vehicle operator will be expected to perform control functions or act as a systems monitor under high levels of acceleration. To determine the extent to which man's intellectual functions might be impaired under high G, a device was designed for use with the WADD human centrifuge. This device, the Link Intellectual Functions Tester (LIFT), can be operated up to 14 G, and features automatic scoring tabulation of responses, and automatic pacing of stimulus presentation. Three test batteries of 14 one-minute tests were used to evaluate verbal, reasoning, mathematical, and perceptual abilities under the limitations of high G on the centrifuge. The median reliability on the one-minute tests was 0.27; the estimated reliability of the 14-test battery was 0.83. Until new data actually gathered during acceleration are made available, the reliability of all the tests remains undetermined for any values above 1 G. The LIFT and associated test materials constitute a diversified and useful set of materials for preliminary study of intellectual functions under acceleration, however, additional refinement and extension are recommended. (Author)

3,620

Miller, I., G. B. Simon, & E. Cohen 1960 A DEVICE AND TESTS FOR MEASURING INTELLECTUAL FUNCTIONS DURING ACCELERATION. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 60-366; ASTIA AD-243 635

ABSTRACT: In manned space flights, a vehicle operator will be expected to perform control functions or act as a systems monitor under high levels of acceleration. To determine the extent to which man's intellectual functions might be impaired under high G, a device was designed for use with the WADD human centrifuge. This device, the Link Intellectual Functions Tester (LIFT), can be operated up to 14 G, and features automatic scoring, tabulation of responses, and automatic pacing of stimulus presentation.
Three test-batteries of 14 one-minute tests were used to evaluate verbal, reasoning mathematical, and perceptual abilities under the limitations of high G on the centrifuge. The median reliability of the one-minute tests was 0.27; the estimated reliability of the 14-test battery was 0.83. Until new data actually gathered during acceleration are made available, the reliability of all the tests remains undetermined for any values above 1 G.
The LIFT and associated test materials constitute a diversified and useful set of materials for preliminary study of intellectual functions under acceleration, however, additional refinement and extension are recommended. (AUTHOR)

3,621

Miller, I. 1961 GRAVITY ANOMALIES: A SELECTIVE BIBLIOGRAPHY (Autonetics of North American Aviation, Inc.) EM-6538, ASTIA AD 255 309

ABSTRACT: A bibliography is presented of references on gravity anomalies which are representative of both foreign and domestic literature available on the subject. Articles are included which deal with theory, instrumentation, proposed projects as well as actual numerical results. There are 246 partially annotated references followed by author, source and subject indexes.

3,622

Miller, J. et al. 1953 A BIBLIOGRAPHY FOR THE DEVELOPMENT OF STRESS-SENSITIVE TESTS. (Psychological Research Associates, Washington, D.C.) PRB Technical Research Note 22, October 1953. ASTIA AD-41773.

ABSTRACT: The items in this bibliography have been selected and assembled with view to providing a survey of the background material useful in the preparation of stress-sensitive tests. It contains a list of references cited by title only and abstracts of those references which were deemed most important and having the most direct bearing on the present research.

3,623

Miller, James W. & James E. Goodson 1960 MOTION SICKNESS IN A HELICOPTER SIMULATOR
Aerospace Medicine, 31 (3): 204-212, March 1960

ABSTRACT: Simulation of operational aircraft has become an increasingly important aspect of flight training for reasons of economy, safety, expediency. In 1956 a helicopter simulator was designed and installed as a training device in Pensacol Florida, for the dual purpose of evaluating a point source system of optical projection and as a possible means of facilitating the training of helicopter pilots. During the initial stages of utilization a number of problems arose concerning the desirability of employing this device as a training instrument. One of the most serious difficulties encountered was that of so called "motion sickness" in a cockpit that did not actually move. The problem became so serious that it was one of the chief reasons for discontinuing the use of the simulator.

3,624

Miller, J.W., ed. 1962 VISUAL PROBLEMS OF SPACE TRAVEL (National Academy of Sciences, National Research Council, Washington, D.C.) June 18, 1962. ASTIA AD 276 513

ABSTRACT: The problems of space flight as they relate to the visual mechanism are discussed. Substantial portions of the Brown report are quoted in the present report. This report, in addition to updating the Brown report presents a considerable amount of additional information regarding specific critical visual problems, as well as a recently compiled, extensive bibliography of research in this field. (Author)

3,625

Miller, J.W. 1962 ACCURACY OF ORIENTATION AND POSITIONING IN HOMOGENEOUS VISUAL FIELDS

Paper: 33rd Annual Meeting of the Aerospace Medical Association, Chalfonte-Haddon Hall, Atlantic City, N.J., April 9-12, 1962

ABSTRACT: Although many studies have been conducted recently pertaining to stimulus impoverishment, few have been concerned with the problem of visual orientation in the absence of retinal stimulation. Recent studies, completed by the authors, have shown that the individual possesses a surprising amount of accuracy with respect to the positioning and re-positioning of objects in an illuminated or darkened homogeneous visual field. The data indicate that the accuracy achieved is due to an internal bodily reference system exclusive of any external co-ordinate system. In addition, the data suggest that in the absence of a stimulus background, information can be displayed effectively and arranged in terms of the observer's internal co-ordinate system. The results will be discussed in terms of their theoretical implications and with respect to the role of the visual system in high altitude and orbital rendezvous.

3,626

Miller, W.H. 1938 ANALYSIS OF THE AVIATION MEDICINE SITUATION AND RECOMMENDATIONS FOR A BUREAU PROGRAM. (Civil Aeronautics Authority, Washington, D.C.) Technical Development Rept. No. 9, April 1938.

SUMMARY: The purposes of the work reported herein are to conduct a survey of various research facilities adptable to or engaged in a study of pilot fatigue factors and outline a program of investigation. It was necessary to obtain information relative to existing or projected efforts of this nature as well as their state of attainment and desirability. Attention was given to the administration, personnel, and physical properties of many institutes and agencies. Conclusions have been reached and recommendations made for Bureau sponsorship of investigation in this field.

The main effort is toward the determination of effects of pressure changes and of anoxemia on human and animal physiology. Simulated and actual flying conditions are used to produce symptoms. Study is being made regarding centrifugal, centripetal, and gravitational forces and the resultant physiological alterations. Some study has, in the past, been made regarding the effects of acceleration, deceleration, and gravitational forces. (CAA)

3,627

Milliron, J.R. 1960 SPACE ENVIRONMENTAL EFFECTS
In: Wright Air Development Ctr., Wright-Patterson AFB, Ohio, Proceedings of WADC Space Technology Lecture Series, Volume I, Technical Areas. WADC TR 59-732, Pp. 61-74. ASTIA AD 235 424

ABSTRACT: The environments described may occur individually or in combination, and certain combinations cause more significant effects than others. The effects are a function of many variables including the components, the characteristics of the component materials, and the environmental conditions. To achieve reliable performance the designers of systems will need to acquire an understanding of the associated environments and their combined effects. Test conditions should relate directly to the actual conditions encountered in space. (Author)

3,628

Mills, G. J. 1957 DEVELOPMENT AND FABRICATION OF SUPERSONIC WIND BLAST AND DECELERATION HELMET FOR HUMANS AND CHIMPANZEES. (Holloman Air Development Center, Holloman AFB, New Mexico) Progress Report No. 2, Contract No. AF 29(600)-1104, 18 April 1957.

3,629

Ministry of Aviation 1960 TRANSLATIONS INDEX
(Technical Information and Library Services, Ministry of Aviation) TIL BIB 38 January 1960 ASTIA AD 233 563

ABSTRACT: The titles, authors and references to translations made by the Ministry of Supply (TIL) now the Ministry of Aviation (TIL) are given in this translations index.

3,630

Minkler, L. F. 1960 LOUNGE COMPARTMENT AREA, BULKHEAD AND SEAT BACK HEAD IMPACT DEVELOPMENT TESTS, MODEL 22. (Convair, San Diego) Rept. No. SL-59-364, Jan. 1960

3,631

Minneapolis-Honeywell Regulator Co 1959 ROTATIONAL SPACE FLIGHT SIMULATOR FOR THE USAF SCHOOL OF AVIATION MEDICINE. (Minneapolis-Honeywell Regulator Co., Aeronautical Div., Minneapolis, Minn.) MH Aero Document R-ED 7755, 9 Nov. 1959.

ABSTRACT: This document describes Honeywells proposal for design and fabrication of a rotational flight simulator.

3,632

Ministry of Aviation 1961 INSTRUMENTATION BIBLIOGRAPHY. (Ministry of Aviation, Great Britain) Rept. no. TIL/BIB/54 ASTIA AD-260 785, June 1961

ABSTRACT: References are given in this bibliography to published and unpublished papers on measurements, in particular, displacement, flow, stress, strain, and temperature measurements.

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Minkler, L. F. 1959 PASSENGER SEAT CRASH RESEARCH TESTS MODEL COMMERCIAL JET. (Convair, San Diego, Calif.) Rept. No. SL-59-423, 2 Dec. 1959

3,634

Minutello, R.V. 1961 F-106 FLIGHT TEST OPERATIONS. (Convair, San Diego, Calif.) Rept. no. ZC-8-652-18; ASTIA AD-256 455; May 1961

ABSTRACT: A brief summary with results is presented of the Convair flight test program of the F-106 for the time period between 1 January 1959 and the present.

3,635

Miroliubov, G.P. 1961 INCREASE OF RESISTANCE TO IMPACT ACCELERATIONS. (Povyshenie ustoichivosti k udarnym uskoreniiam) Biofizika (Moskva), 6(1):109-113. In Russian.

ABSTRACT: Experiments with mice immersed in water in a container and then dropped from different heights showed that water immersion raises their tolerance

to impact accelerations. This makes it possible to perform airdrops from six-times-greater heights. In impact accelerations, one of the main forces acting on the immersed animal is the increasing pressure of water. The effectiveness of protection accorded by immersion in water is determined by the height of the hydrostatic column of fluid above the immersed animal, the firmness of the container walls, and the distance of the animal from the bottom of the container. (Author's summary, modified) (Aerospace Med. 32(7):679, July 1961.)

3,636

Mirolyubov, G.P. 1962 ON THE PROBLEM OF THE MECHANISM OF PROTECTIVE ACTION OF FLUID MEDIA IN SHOCK ACCELERATION. Biofizika 7:468-472, 1962 (Russian)

3,637

Missiuro, W. and W. Kondratovich. 1929 [EFFECT OF FLIGHT ON PHYSIOLOGIC FUNCTIONS OF AVIATORS.] Przegl. sport. lek., 1:5-30

3,638

Missenard, A. R., & R. Gelly 1961 PROBLEMES POSES PAR L'ETUDE PSYCHOLOGIQUE DES TROUBLES DE L'ADAPTATION EN AERONAUTIQUE (PROBLEMS POSED BY THE PSYCHOLOGICAL STUDY OF ADAPTATION DISORDERS IN AVIATION) Revue de medecine aeronautique (Paris) 1(1):9-34, Sept. 1961

ABSTRACT: The following clinical aspects may be responsible for lack of adaptation of flying personnel to the aeronautic environment: emotional reactions, fear of flying, mental disorders (neurotic and psychotic states), psychosomatic disorders, functional disorders (fatigue, sleep disorders, the so-called psychasthenic disorders), anxiety, and the effects of anoxia and accelerations. Lack of adaptation may be responsible for aircraft accidents. It may appear at any time in the aviator's career: during the scholastic and training period, under daily work conditions, induced by the aircraft and its equipment, by transition to new types of aircraft, by changes in the psychological environment and problems of leadership, or by extra-aeronautical responsibilities (marriage, personal problems). A clinical case of inadaptation is reported with psychotherapy. Motivation constitutes the headstone of adaptation. Reviewed are the mechanism of adaptation, disruption of the adaptation process, selection and control of flying personnel, therapeutic and medical administrative measures, research, and the flight surgeon's responsibilities in cases of inadaptation. (J. Aerospace Medicine 33(8):1034, Aug. 1962)

3,639

Miura, Minoru 1942 ON THE INFLUENCE OF CENTRIFUGAL FORCES ON THE INTERMEDIARY CARBOHYDRATE METABOLISM (ÜBER DEN EINFLUSS DER FLIEHKRAFT AUF DEN INTERMEDIÄREN KOHLEHYDRATSTOFFWECHSEL) Tohoku Jornal of Experimental Medicine 42(2):134-177, March 1942.
Translated in J. G. B. Castor, "Acceleration (G-Forces) Research Equipment, Studies, Results and Training," Air tech. Intell. Rev. No. F-IR-127-RE; ASTIA ATI No. 12710.

3,640

Miyamoto, T., K. Noro, H. Sato 1943 RAPID FREEZING TECHNIQUE APPLIED TO THE RABBITS DURING THE ACCELERATION STRESS. Kokuigaku 1:64

ABSTRACT: Rapid freezing technique immersing the rabbit body to liquid N_2 was used in order to obtain the precise finding of that movement during G-force. Distal portion of the brain to the center of rotation showed marked ischemia, and proximal portion has congested. The heart was filled with blood and right atrium has marked congestion. There is no particular finding in the lung, liver and kidney.

3,641

Miyamoto, T., et al. 1943 ONE EXPERIMENTAL METHOD TO OBSERVE RAPIDLY FROZEN LIVING BODY. Kokuigaku, 1(1) Oct. 1943.

3,642

Mohrlock, H.F. 1957 THE DEVELOPMENT OF THE RESCU. (ROCKET EJECTION SEAT CATAPULT, UPWARD) MARK I. A.R.S. Preprint 414-57, 4-6 April 1957.

ABSTRACT: Fast-paced development of today's military aircraft permits the breaking of speed and altitude records with striking regularity. This continual increase in the flight performance enveiope has aggravated the task of design engineers in providing an escape system for each new configuration. The problems associated with escape from these high performance aircraft may be categorized as:

a. Low Level Ejection
b. Fin Clearance
c. Tumbling (Seat Instability)
d. Windblast

3,643

Money, K.E. 1959 RELATIONSHIPS BETWEEN VESTIBULAR ACTIVITY AND THE AUTONOMIC NERVOUS SYSTEM. (M.A. thesis, University of Toronto)

3,644

Money, K.E. 1961 FUNCTIONS OF THE SEPARATE SENSORY RECEPTORS OF THE NONAUDITORY LABYRINTH OF THE CAT. (Ph.D. thesis, University of Toronto)

3,645

Money, Kenneth E. & John W. Scott 1962 FUNCTIONS OF SEPARATE SENSORY RECEPTORS OF NONAUDITORY LABYRINTH OF THE CAT
Amer. J. Physiol. 202(6):1211-1220, June 1962.

ABSTRACT: A technique for plugging individual semicircular canals of cats was developed, and it was established that the plugging of a semicircular canal completely blocked its receptivity without influencing the functions of the other vestibular receptors. It was found that cats with all six semicircular canals plugged were lacking all sensitivity to angular acceleration, but they retained normal responses to linear acceleration. Results of several vestibular tests led to the conclusion that the vertical semicircular canals initiate corrections for fast angular displacements from the normal orientation when the displacements are about horizontal axes and that the otoliths initiate corrections for slow angular displacements about horizontal axes. In tests of single horizontal canals, the durations of postrotatory nystagmus were the same after rotations in opposite directions. It was concluded that in the intact animal both horizontal semicircular canals contribute equally to reception of angular acceleration in both directions.

3,646

Monnier, A. J. 1956 LE MAL DE MER: PATHOGENIE ET TRAITEMENT. (SEASICKNESS: PATHOGENESIS AND TREATMENT) (Revue de Pathologie Générale et Comparee (Paris) 56(683):1800-1830, Dec. 1956.

ABSTRACT: A comprehensive review of the literature on seasickness is presented including such topics as the place of seasickness in relation to motion sickness; incidence; individual predisposition; motion sickness; and clinical aspects. Special consideration is given to the etiology of seasickness in terms of determinant factors (vestibular, position, central nervous system); predisposing factors (visual, visceral, humoral), and psychological factors. Therapy is discussed from the standpoint of previous therapeutic measures; major therapeutic measures (antihistaminics, barbiturates, belladona derivatives, and drug combinations), and lesser therapeutic measures (position, diet, psychotherapy).

3,647

Monnier, A. J. 1956 LE MAL DE MER: NOTIONS RECENTES DE PATHOGENIE ET DE TRAITMENT. (SEASICKNESS: RECENT DATA ON PATHOGENESIS AND TREATMENT) Vie médicale (Paris) 37(2):119-128, Feb. 1956

ABSTRACT: A brief review is presented of the etiology of seasickness and motion sickness with special emphasis on the predisposing vestibular, central nervous system, and extra-labyrinthine (visual, visceral, humoral, psychological) factors. Consideration is given to drug therapy using belladona derivatives, barbiturates, and antihistaminics. Mention is made of a new type of curative and preventive treatment using a suppository containing a combination of Bellafolline (belladona alkaloid), phenobarbital, and dexamphetamine.

3,648

Montgomery, J.W., & T.S. Whitelock 1944 CARDIAC EVISCERATION AND RUPTURE. TWO CASES INCURRED SIMULTANEOUSLY IN AN AIRCRAFT ACCIDENT
Air Surg. Bull., 1:6

3,649

Montgomery, Jr., A.V. 1962 EFFECT OF SPACE ON MAN
In: National Symposium on Effects of Space Environment on Materials, St. Louis, May 7, 8, and 9, 1962. St. Louis, McDonnel Aircraft Corporation.

ABSTRACT: A few principles involved in the definition of a spacecraft environment are outlined and exemplified. These principles involve individual variations, duration of stimulus, discrete range of acceptability, and interactive effects between simultaneously applied environmental factors. (Author)

3,650

Montgomery, J.B. 1959 HUMAN SENSITIVITY TO VIBRATIONS.
(Newport News Shipbuilding and Dry Dock Company)
Unpublished Report of SNAME S-6 Panel, April 1959.

3,651

Moon, V.H. 1938 SHOCK AND RELATED CAPILLARY PHENOMENA.
(London: Oxford University Press, 1938)

3,652

Moore, A.D. 1940 PERCEPTION OF DISORIENTATION DURING LANDING OF AN AIRPLANE Science 92:477-478, 1940

3,653

Moore, E. W. & R. L. Cramer 1961 PERCEPTION OF POSTURAL VERTICALITY. BACKGROUND AND APPARATUS. (USAF School of Aerospace Medicine, Brooks AFB, Tex.) Rept 61-84, Aug. 1961

ABSTRACT: An apparatus for the study of perception of postural orientation was described. It was designed to tilt in the lateral plane and to permit the recording of responses by an ink tracing. With this device, it will be possible to develop experimental research procedures to be used in vestibular physiology and standardized clinical techniques to be used by USAF otolaryngologists. (Tufts)

3,654

Moore, E.W. & R.L. Cramer 1962 PERCEPTION OF POSTURAL VERTICALITY. EFFECTS OF FLYING EXPERIENCE UPON REDUCTION OF ERROR (School of Aerospace Medicine, Aerospace Medical Div., Brooks AFB, Tex.) SAM-TDR-62-72; June 1962

ABSTRACT: Test pilots were compared with nonflyers in their ability to estimate a function of the postural vertical. To minimize kinesthetic cues, the subjects were asked to bisect an angle between 30 degrees left body tilt and the vertical with visual references eliminated. The analysis of the average error and slope for each day of three daily sessions showed no differences between the experimental groups. However, a significant reduction in error demonstrated habituation over the three-day period with a uniform linear reduction within each day. Therefore, habituation was demonstrated for all subjects, but flying experience seems to have no relationship to a person's reduction of error in estimating a function of the postural vertical. (AUTHOR)

3,655

Moore, F., Jr. 1959 SUPERSONIC EJECTION TESTS AT SMART. (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: To investigate further and attempt to define more accurately the human tolerance limits to open ejection seat escape, a program of supersonic

tests was conducted at the SMART facility during the fall of 1956 and spring of 1957. Chimpanzee subjects were ejected and successfully recovered at speeds from approximately MO.9 to M1.4. The problems of equipment and instrumentation design are discussed; a brief resume of test results and conclusions as well as test philosophy will be summarized. An 8 minute 16 mm. color sound film is available for presentation which traces a typical test run from start to finish, including a description of specialized test equipment. (J. Aviation Med.30(3):195, March 1959)

3,656

Moore, J. O. and B. Tourin 1954 A STUDY OF AUTOMOBILE DOORS OPENING UNDER CRASH CONDITIONS. (Automotive Crash Injury Research, Cornell Univ., Med. College, New York, 1 Aug. 1954)

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Moore, J. O., et al. 1954 A STUDY OF INJURIES SUSTAINED BY OCCUPANTS OF AUTOMOBILES INVOLVED IN INJURY-PRODUCING ACCIDENTS. (Automotive Crash Injury Research. Cornell Univ. Med. College) 15 April 1954

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Moore, J.O., B. Tourin, and J.W. Garrett 1955 A STUDY OF CRASH INJURY PATTERNS AS RELATED TO TWO PERIODS OF VEHICULAR DESIGN. A COMPARATIVE STUDY OF ACCIDENT AND INJURY FACTORS IN 1940-49 AUTOMOBILES AND 1950-54 AUTOMOBILES. (Cornell U. Medical College, New York, N.Y.) Contract DA 49-007-md-483, Rept. no. T.R. 4, March 1955. ASTIA AD 103 311

ABSTRACT: "Herein analyzed are accident and injury data on 417 automobiles involved in injury-producing rural accidents during 1953 and 1954 and selected by controlled sampling techniques. The data are analyzed to compare cars manufactured from 1940 to 1949 with cars manufactured from 1950 to 1954 to determine whether 'newer' cars produce more or less injury the 'older' cars are involved in similar injury-producing accidents, (b) 1940-54 and 1940-49 cars produce various injury effects with nearly identical frequency, and (c) the structural and mechanical causes of injury in 1950-54 and 1940-49 cars are similar. Thus, the data in this report show that 15 years of passenger automobile design have, at best, produced no advance in 'crash-worthiness' or decrease of traumatic effects when injury-producing accidents occur." (contractor's abstract)

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Moore, J. O. 1958 A STUDY OF SPEED IN INJURY-PRODUCING ACCIDENTS: A PRELIMINARY REPORT. American Journal of Public Health and the Nation's Health 48(11): 1516-1525, Nov. 1958.

See also: Traffic Safety 3(2), June 1959.

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Moore, J. O., B. Tourin, J. W. Garrett, & R. Lilienfeld 1959 CHILD INJURIES IN AUTOMOBILE ACCIDENTS. (Automotive Crash Injury Research of Cornell Univ.)

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Moore, W. L., Jr., & B. Rowen 1963 DYNA-SOAR (X-20) AND AEROSPACE PLANE (Paper, Lectures in Aerospace Medicine, School of Aviation Medicine, Brooks AFB, Texas, 4-8 February 1963)

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Moracek, M. 1962 AERIAL COMBAT OF A FIGHTER AIRCRAFT WITH A SLOW MOVING TARGET. (Foreign Technology Division, Air Force Systems Command, Wright-Patterson AFB, Ohio) FTD-TT-62-1356/1, ASTIA AD-292184
Source: Kridla Vlasti, (1):19-20

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Moralevich, A. 1960 ANIMAL ASTRONAUTS
Komsomol'skaya pravda P. 4; 6 July 1960.

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Morant, R.B. 1959 THE VISUAL PERCEPTION OF THE MEDIAN PLANE AS INFLUENCED BY LABYRINTHINE STIMULATION J. Psychol 47:25-35, January 1959

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Morehouse, L. E., R. Cochran and W. Reeves 1948 THE INFLUENCE OF POSITIVE RADIAL ACCELRATION FROM HEAD TO FOOT UPON THE RAPIDITY OF MAXIMUM VOLUNTARY MOVEMENTS OF MAN. (University of Southern California, School of Medicine, Los Angeles) Contract N6ori77, Task Order 1, 7 April 1948. ASTIA TIP U52657.

ABSTRACT: Following an observation of the effect of 2,3,4, and 5 G's upon the maximum rate of voluntary movement (tapping), compared with the rate at 1 G, the following findings were noted.

1. The rate of maximum voluntary movement is depressed during the stress of positive G.
2. The depression in maximum rate of voluntary movement under G is probably due to the dynamic force of gravity upon the skeletal and muscular mass of the parts in motion, rather than to a relaxation of the central nervous system. A G-suit offers no protection against the stress. Recovery of maximum rates of voluntary movement is immediate following the cessation of radial acceleration.
3. As far as the rate of voluntary movement is concerned, the pilot of high speed aircraft does not need to support large parts of his arm inorder to make rapid movements with his hand and fingers.

3,666

Morehouse, L. E. and J. G. Wells 1948 AN ELECTROMYOGRAPHIC STUDY OF THE EFFECTS OF VARIOUS POSITIVE G FORCES UPON THE PILOT'S ABILITY TO PERFORM STANDARDIZED PULLS ON AN AIRCRAFT CONTROL STICK. (University of Southern Calif., School of Medicine, San Francisco, Calif.) June 29, 1948 ASTIA TIP U2866

ABSTRACT: Electromyographic analysis of the activity of the Biceps Brachii, Triceps Brachii, and Latissimus Dorsi during 10, 20, 30, 40, and 50 pound pulls on an aircraft control stick under conditions of 1, 2, 3, 4, and 5 G were made on a well-trained subject who exerted pulls with his arm held in a flexed position. These observations were repeated with the arm held in an extended position and again in an intermediate position. The findings are summarized as follows: The Biceps Brachii, Triceps Brachii, and Latissimus Dorsi act as co-contractors in exerting a pull on an aircraft control stick. The extent of the contribution each muscle makes to the total action is altered when the arm position is changed. When the arm is pulling in an extended position the Biceps Brachii dominates the action. With the arm held in flexion or in an intermediate position during the pull, the Triceps Brachii is brought strongly into action. The effect of positive G on stick pull is to increase the activity of all the muscles controlling the stick.

The effect of G is greatest during light pulls (10-20 pounds) and least during heavy pulls (40-50 pounds). The effect of positive G on muscular cativity is least when the arm is held in a position intermediate between flexion and extension. The decrease in muscular activity required to exert pulls on an aircraft control stick as the arm position is shifted from flexion to extension is proportional to calculated values of increased involuntary pull due to gravity as the arm position is shifted from flexion to extension. The linear relationship between calculated values of involuntary pull and experimental values of muographic activity indicates that the reduction in pulling effort as the arm is extended from a flexed position is a dynamic, not a physiological phenomenon. As far as muscular dynamics is concerned, the best arm position of a pilot seated in a conventional upright position and operating a control stick is one which is intermediate between flexion and extension. The stick should be loaded from 40 to 50 pounds as the muscular adjustment to positive G is minimal under these conditions. (Contractor's abstract)

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Morehouse, L.E. and J.G. Wells 1951 AN ELECTROMYOGRAPHIC STUDY OF THE EFFECTS OF VARIOUS POSITIVE G FORCES UPON THE PILOT'S ABILITY TO PERFORM STANDARDIZED PULLS ON AN AIRCRAFT CONTROL STICK. (University of Southern Calif., School of Medicine, Los Angeles) Contract N6ori77, Task 1, 31 March 1951.

ABSTRACT: Electromyographic analysis of the activity of the Biceps Brachii, Triceps Brachii, and Latissimus Dorsi during 10, 20, 30, 40, and 50 pound pulls on the aircraft control stick under conditions of 1,2,3, 4 and 5 G were made on a well-trained subject who exerted pulls with his arms held in a flexed position and again in an intermediate position.

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Morehouse, L.E. and J. G. Wells 1954 AN ELECTROMYOGRAPHIC STUDY OF THE EFFECTS OF VARIOUS POSITIVE G FORCES UPON THE PILOT'S ABILITY TO PERFORM STANDARDIZED PULLS ON AN AIRCRAFT CONTROL STICK. (University of Southern Calif., School of Medicine, Los Angeles) ASTIA AD- 206 272, 28 May 1954

ABSTRACT: Electromyographic analysis of the activity of the Biceps Brachii, Triceps Brachii, and Latissimus Dorsi during 10, 20, 30, 40 and 50 pounds pulls on an aircraft control stick under conditions of 1, 2, 3, 4, and 5 G were made on a well-trained subject who exerted pulls with his arm held in a flexed position. These observations were repeated with the arm held in an extended position and again in an intermediate position.

It was found that as far as muscular dynamics is concerned, the best arm position of a pilot seated in a conventional upright position and operating a control stick is one which is intermediate between flexion and extension. The stick should be loaded from 40 to 50 pounds as the muscular adjustment to positive G is minimal under these conditions.

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Moreland, J. D. 1960 LOADING TESTS ON THE HUMAN CADAVER CHEST. (Dept. of Scientific & Industrial Research, Road Research Laboratory) Research Note No. RN/3786/JDM, June 1960

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Morgan, C.W., & W.L. Moore 1956 CUSHIONING FOR AIR DROP, PART V THEORETICAL AND EXPERIMENTAL INVESTIGATIONS OF FLUID-FILLED METAL CYLINDERS FOR USE AS ENERGY ABSORBERS ON IMPACT. (Structural Mechanics Research Lab., Texas University, Austin, Texas) Contract No. DA-19-129-qm-150, 20 Dec. 1956. ASTIA AD 122 376.

ABSTRACT: In this report is described the design, construction and testing of energy absorbers utilizing metal cylinders either empty or fluid-filled. Energy is absorbed in the crumpling of the metal walls and in imparting kinetic energy to the contained fluid as it is discharged through properly designed orifices in the wall of the container. An equation is derived for the area and spacing of orifices in the wall of the container. An equation is derived for the area and spacing of orifices required to maintain a constant retarding force due to liquid pressure during the crushing of the cylinders. The design of the fluid-filled cylinders is based on this constant retarding force in addition to the force required to crumple the walls of the empty cylinder. The predicted performance of these energy absorbers is shown to be verified by free-fall dynamic tests. The resisting force and the energy absorbed as computed from the force-displacement curves are given. Seamless steel and aluminum tubing, commercial sheet steel cans, and cylinders formed from galvanized sheet steel were tested. A comparison of the various materials is made on the basis of cost per unit of energy absorbed.

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Morgan, H. 1955 BEHAVIOR OF TEXTILES UNDER IMPACT CONDITIONS; AND OTHER ABSTRACTS. (Paper, 22nd Shock and Vibration Symposium, Wright Air Dev. Center, Wright-Patterson AFB, Ohio, 22-23 March 1955)

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Morgan, R., R. D. Summers, & S. P. Reimann 1942 EFFECTS OF VARIOUS TYPES OF MOTION OR DIFFERENCES IN HYDROSTATIC PRESSURE BETWEEN ENDS OF A SEMI-CIRCULAR CANAL. Arch. Otolaryng. 36:691-703

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Morin, L. 1961 LA PHYSIOLOGIE DE L'ESPACE (The Physiology of Space) Laval medical (Quebec), 32(2):161-177, Sept. 1961. In French.

ABSTRACT: This is a review of the physiological effects and ecological problems of space flight. The astronaut will be subjected to acceleration, deceleration, weightlessness, vibration, noise, monotony, extreme temperatures, and the danger of meteorites and radiations.

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Moritz, A.R. 1954 PATHOLOGY OF TRAUMA 2nd Ed. (Philadelphia: Lea & Febiger, 1954)

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Morris, D. P., Jr., D. E. Beischer, & J. J. Zarriello 1958 STUDIES ON THE G-TOLERANCE OF INVERTEBRATES AND SMALL VERTEBRATES WHILE IMMERSED. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. No. NM 19 01 11; ASTIA AD-203 026; March 1958
See also J. Avia. Med. 29(6):438-443, 1958

ABSTRACT: The purpose of this work was to determine the tolerance to acceleratory forces in certain invertebrates and small vertebrates while immersed.

Animals whose habitat is water can be exposed in their natural abode to extra-ordinary high G-forces for prolonged periods of time. Euglena gracilis survived exposure in the ultracentrifuge at 212,000 G for four hours. The limiting conditions for small fishes (Lebistes reticulatus) were 10,000 G for thirty seconds. The chance of survival for small terrestrial mammals is greatly increased in the submersed state. In this condition mice while on oxygen survived a force of 1300 G for sixty seconds. (CARI)

SECOND ABSTRACT: The tolerance to acceleratory forces in certain invertebrates and small vertebrates while immersed was determined. Findings revealed that animals whose habitat is water can be exposed in their natural abode to extra-ordinary high G-forces for prolonged periods of time. Euglena gracilis

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Morris, D. P., Jr., D. E. Beischer, & J. J. Zarriello 1958 STUDIES ON THE G-TOLERANCE OF INVERTEBRATES AND SMALL VERTEBRATES WHILE IMMERSED.
J. Avia. Med. 29(6):438-443
See also (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. No. NM 19 01 11; ASTIA AD-203 026; March 1958

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Animals whose habitat is water can be exposed in their natural abode to extraordinary high G-forces for prolonged periods of time. Euglena gracilis survived exposure in the ultracentrifuge at 212,000 G for four hours. The limiting conditions for small fishes (Lebistes reticulatus) were 10,000 G for thirty seconds. The chance of survival for small terrestrial mammals is greatly increased in the submersed state. In this condition mice while on oxygen survived a force of 1300 G for sixty seconds. (CARI)

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Morris, G. J., et al. 1954 DESCRIPTION AND PRELIMINARY FLIGHT INVESTIGATION OF AN INSTRUMENT FOR DETECTING SUBNORMAL ACCELERATION DURING TAKE-OFF. (National Advisory Committee for Aeronautics, Washington, D. C.) NACA TN 3252, Nov. 1954

ABSTRACT: The instrument is actuated by longitudinal acceleration and impact pressure. A preliminary evaluation from flight tests of a prototype instrument mounted in a jet trainer has been made. The instrument was found to be satisfactory.

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Morrison, R. B., & J. L. Patterson 1945 ACCELERATIVE FORCES ACTING ON THE HUMAN BEING IN FLIGHT AND ON THE HUMAN CENTRIFUGE. (Naval School of Aviation Medicine, Pensacola, Fla.) Research Rept. X-723., 11 Sept. 1945

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Morrison, S.C. 1956 SLED ENVIRONMENT INVESTIGATION PLAN. (Thompson Ramo Wooldridge, Inc., LosAngeles, Calif.) Report no. GM TN 10; WDD Document no. 56-6549; ASTIA AD-217 304

ABSTRACT:

This report includes:
Aerojet General Corp, Azusa, Calif. WS 107A TEST SLED. TEST PLAN FOR NOSE SECTION ENVIRONMENT AND ROCKET MONITORING. 29 Feb. 1956

Morrow, C.T. and R.B. Muchmore 1954 SHORTCOMING OF PRESENT METHODS OF MEASURING AND SIMULATING VIBRATION ENVIRONMENTS. Jnl. of Applied Mechanics. Paper no. 55-SA-2 5 Jan. 1954

A sled vibration environment investigation has been established as a part of the WS 107A - WS 315A sled test program. The purpose of the sled test program is to determine the effects of sled acceleration on certain specimen missile components to be carried in the nose sections of two liquid-fueled rocket sleds. The purposes of this note are to outline the environment study. (Author)

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Morrow, C.T., D.P. LeGalley & L.D. Ely 1961 PROCEEDINGS OF THE FOURTH AFBMD/STL SYMPOSIUM, ADVANCES IN BALLISTIC MISSILE AND SPACE TECHNOLOGY, VOLUME 2. PROPULSION (LIQUID, SOLID, NUCLEAR, PLASMA, ETC.) AUXILIARY RE-ENTRY. (Space Technology Labs., Inc., Los Angeles, Calif.); ASTIA AD 274 225.

ABSTRACT: This volume contains 36 unclassified, contributed papers in the following fields: Propulsion (liquid, solid, nuclear, and plasma), Auxiliary power systems, Preliminary design, Aerodynamics and structures, Hypersonics, and Re-entry. (Author)

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Mortensen, M.A. 1923 BLOOD-PRESSURE REACTIONS TO PASSIVE POSTURAL CHANGES. AN INDEX TO MYOCARDIAL EFFICIENCY. Am. J. Med. Science 165:667-675

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Morton, G. and D. McEachern 1942 EXPERIMENTAL STUDIES ON THE SUSCEPTIBLE INDIVIDUAL MOTION SICKNESS (NRC, Canada) Report No. C 750, August 1942

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Morton, G. 1942 SUSCEPTIBILITY OF ANIMALS TO INDUCED MOTION SICKNESS (NRC, Canada) Report No. C 746, August 1942

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Morton, G., & Lehman, P. 1949 NEW MOTION SICKNESS PREVENTIVE. Bull. U.S. Army M. Dep., 9:335

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Morway, D.A., R.G. Lathrop, L. Hitchcock, & R.M. Chambers 1963 THE EFFECTS OF PROLONGED WATER IMMERSION ON THE ABILITY OF HUMAN SUBJECTS TO MAKE POSITION AND FORCE ESTIMATIONS. (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-6115, June, 1963.

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Moseley, Alfred L. 1962 PATH OF BODY TRAVEL
(In: Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, pp. 323-332)

ABSTRACT: One of the basic principles to be formulated in understanding of deceleration injuries concerns the path of body travel. This must be evaluated on an objective basis because the testimony of survivors is useless. In death cases involving the fixed-object collision, the descriptions may be made: (a) at the moment of impact the deforming structures exhibit a deceleration gradient; (b) the rear of the vehicle exhibits vertical motion; (c) the long axis of the vehicle pivots about the front of the vehicle in a horizontal plane. Items (b) and (c) occur simultaneously.

As an operational matter, it is observed that the path of body travel may be predicted by a connecting line between the seated position of the occupant and the impact site. This is referred to as the expected path of body travel. When the prediction is applied to the cases, it is seen that on occasion the path diverges. The actual path is referred to as the observed path of body travel. Special investigation procedures are required to understand the reason for the discrepancy.

The design of structures for protection during sudden deceleration must take into account the expected path of body travel for the possible impact locations. The design of a given device has application only when it is in the body deceleration path.

Multiple impacts occur as decelerative forces are dissipated. Designs for protection must be adequate for several impacts at the same location occurring during a fraction of a second.

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Moseley, A. L. 1962 VARIETIES OF AUTOMOBILE DEATH. (In M. K. Cragun, ed., The Fifth Stapp Automotive Crash and Field Demonstration Conference, Sept. 14-16, 1961). Pp. 94-104.

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Moseley, H.G. June 1955 INJURIES INCURRED IN AIRCRAFT ACCIDENTS. Military Medicine 116:440-445

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Moseley, H.G. 1956 AN ANALYSIS OF 2,400 PILOT ERROR ACCIDENTS. (Paper, Aero Medical Association, twenty-seventh annual meeting, chicago,Illinois) Directorate of Flight Safety Research, USAF, Norton AFB, California, Report No. M-40-56

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Moseley, H.G. 1957 AIRCRAFT ACCIDENT INJURIES
(Paper, 1957 Meeting of Aero Medical Association, Denver, Colo., May 6-8)

ABSTRACT: The injuries incurred by all occupants of Air Force aircraft involved in accidents during calendar years 1953 and 1955 have been reviewed. All traumatic lesions, both fatal and nonfatal, have been analyzed as to type, location, aspect and frequency. Insofar as possible, the injuries have been related to identifiable causes such as force of deceleration, body position and objects inflicting injury. The role of protective equipment and factors bearing on the prevention of such injuries have been explored. (J. Aviation Med. 28(2):212)

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Moseley, H. G. 1957 AERO MEDICAL INVESTIGATION OF AIRCRAFT ACCIDENTS
(Directorate of Flight Safety Research, Norton AFB, Calif.) 25 Jan. 1957

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Moseley, H.G., 1957 U.S. AIR FORCE EXPERIENCE WITH EJECTION SEAT ESCAPE; (PROBLEMS OF ESCAPE FROM HIGH PERFORMANCE AIRCRAFT: A SYMPOSIUM)
J. Aviation Med. 28(1):69-73

SUMMARY: Escape from high performance aircraft by use of the ejection seat to date has been attended with an incidence of 23 percent fatalities and 14 per cent major injuries. The great majority of ejection attempts were medium and low altitudes and medium and low speeds. The outstanding cause of fatalities has been inability to separate from the seat and deploy the parachute prior to striking the ground when ejection was attempted at low altitudes, particularly when the aircraft was out of control or in a dive. Airspeed has had little effect upon the outcome, with the exception that ejection attempts at or near the speed of sound may be attended with incapacitating results of deceleration with the type of seat now being used. It is concluded that if the fatality rate is to be lowered, there must be improved provisions for escape at low altitudes and low speeds where the great majority of emergencies occur, and that if escape at supersonic speeds where the great majority of emergencies occur, and that if escape at supersonic speeds is to be successful, the effects of deceleration and other phenomena must be mitigated.

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Moseley, H. G. 1957 INFORMAL MEDICAL REPORT - USAF AIRCRAFT ACCIDENTS. 1 JULY THROUGH 31 DECEMBER 1957. (Aero Medical Safety Div., Directorate of Flight Safety Research, Office of the IG. J. S. Air Force)

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Moseley, H.G., and Stembridge, V.A., 1957 THE HOSTILE ENVIRONMENT AS A CAUSE OF AIRCRAFT ACCIDENTS.
J. Aviation Med. 28(6):535-540

SUMMARY: The frequency of the causative events in aircraft accidents in the U.S. Air Force is divided into three categories: unsafe acts (58 per cent), unsafe conditions (28 per cent), and cause undertermined (14 per cent). In a tabulation of the physical and physiologic factors governing the pilot's environment which may lead to an aircraft accident, these adversities are responsible for many of the "unsafe acts" accidents and probably play a leading role in many of the "cause undetermined" accidents. Particular consideration is given to four major problem areas: the adversity of space, the adversity of altitude, and adversity of velocity, and the adversity of intolerance. The areas demanding attention and which are the most promising of reward, indicate the necessity for a thorough study of: (1) the pilot's environment, (2) the pilot's actions, (3) cockpit factors, and (4) pathologic investigation. When confronted with a "cause undetermined" accident, the aeromedical specialist should consider it due to an environmental or physiologic adversity until proven otherwise.

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Moseley, H. G. 1958 AIRCRAFT ACCIDENT INJURIES IN THE US AIR FORCE. A REVIEW OF 2,011 CASES IN 1953 AND 1955.
J. of Aviation Medicine 29(4):271-282, April 1958

ABSTRACT: During the calendar years 1953 and 1955, over 8,000 persons were involved in major U. S. Air Force aircraft accidents. Eighteen and seven-tenths per cent of these occupants received fatal injuries and 5.2 per cent received major injuries. However, 76.1 per cent received monor or no injury. Most fatalities were caused by multiple traumatic lesions. Most major non-fatal lesions were fractures, especially of the vertebrae. Burns and surface wounds were frequent. The head and the distal third of the extremities received the majority of injuries and were associated with failing of these unsecured body portions during deceleration. When impact forces in deceleration were moderate or negligible, there were few injuries; when impact was severe, injury was frequent and often fatal; when it was extreme, fatal results were the rule. In all accidents there was increased injury if the seat tore loose or if the seat belt was not used. If the occupant was in a seat facing the rear of the aircraft, he was less liable to be injured than if he faced forward. This was especially true in low impact accidents where the seat was more liable to remain moored to the floor.

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Moseley, H.G., F.M. Townsend and V.A. Stembridge 1958 PREVENTION OF DEATH AND INJURY IN AIRCRAFT ACCIDENTS.
AMA Arch. Indus. Health 17(2):111-117, Feb. 1958

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Moseley, H. G. and A. F. Zeller 1958 RELATION OF INJURY TO FORCES AND DIRECTION OF DECELERATION IN AIRCRAFT ACCIDENTS
J. of Aviation Medicine 29(10):739-749, October 1958

ABSTRACT: All major cargo and transport type aircraft accidents in the U. S. Air Force during a two-year period were reviewed to determine the path that such aircraft follow during actual crashes and to relate this to variations in aircraft attitude and to injury of occupants. The results indicate that the airframe tends to follow its established course even though major components are destroyed. With decreased velocity, major course and attitude deviations may result primarily from striking impeding objects. Most injuries are sustained when the aircraft is experiencing little deviation from its established path. The most obvious and most easily effected remedial measures would involve improvement of structural and retention strength of aircraft seats and moorings. These should be designed to provide maximum protection against fore to aft deceleration with additional consideration being given to designing for relatively small yaw deviations.

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Mosely, H.G. 1958 INJURIES SUSTAINED IN EJECTION SEAT ESCAPE
(Report by Directorate of Flight Safety Research, Hq., USAF, 31 Mar. 1958)

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Moseley, H. G. & R. H. Shannon 1958 USAF EJECTION ESCAPE EXPERIENCE, 29 AUGUST 1949 THROUGH 30 JUNE 1958 (USAF, Directorate of Flight Safety Research, Norton AFB, Calif.) Rept. M 12 58, Nov. 1958

ABSTRACT: This study analyzes 1,462 United States Air Force ejection seat emergency escapes from the period 29 August 1949 through 30 June 1958. Results to personnel are studied in relation to altitude, airspeed, attitude, availability and use of automatic equipment, and other pertinent factors. Problem areas associated with ejection escape from high performance aircraft were sought although few cases of attempted escape at supersonic speeds were available. Recommendations designed to reduce the incidence of unsuccessful (fatal) ejections are made in the areas of 1) operations and training, and 2) research and development.

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Moseley, J.D. & J.P. Stapp 1958 THE EFFECTS OF RAPID DECELERATION: LETHAL AND INJURIOUS LIMITS.
(Paper, 1958 Meetinf of Aero Medical Assn., Statler Hotel, Washington, March 24-26, 1958)

ABSTRACT: Twenty experiments using chimpanzee subjects were conducted on the rocket sled track facility at Holloman Air Force Base, New Mexico. After acceleration to supersonic speeds the sled was decelerated by a water brake system. Injurious levels were found at 120 G with rate of onset in excess of 5,000 G per second. Lethal effects were noted at 237 G with rate of onset 11,250 G per second. (J. Aviation Med. 29(3):245)

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Moseley, H.G. 1959 AIRCRAFT ACCIDENT FATALITIES: A CHALLENGE TO AVIATION MEDICINE. (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: During World War II, approximately 70 per cent of USAF combat fatalities were due to aircraft accidents. During the same period, over 14,000 military personnel were killed in aircraft accidents in the United States. Since this time there has been no significant decline in deaths due to this cause, and aircraft accidents currently account for more fatalities among USAF flying personnel than all diseases and other injuries combined. Concerning future flight, increased aircraft performance carries increased destructive potential. The causes of aircraft accidents and fatalities are known and are not expected to change significantly. These causes are discussed in detail and remedial measures are reviewed. The role and responsibilities of aviation medicine in this enterprise are emphasized. (J. Aviation Med. 30(3):196, March 1959)

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Mosely, J.D. and J.E. Cook 1960 VISCERAL DISPLACEMENT IN BLACK BEARS SUBJECTED TO ABRUPT DECELERATION.
Aerospace Med. 31(1):1-8, Jan. 1960.
See also (Air Force Missile Development Ctr., Holloman AFB, N. Mex.) AFMDC TN 60-6; ASTIA AD 234 200

ABSTRACT: Eight American black bears, utilized in abrupt deceleration studies, showed considerable promise as comparative abrupt deceleration subjects. They approximate man's confirmation and weight and stand alone easily on the rear limbs with the head at a normal inclination. Their tolerance to plateau, onset and duration g depends entirely upon positioning and restraint as does man. In the rearward facing position based upon necropsy findings and statements from human volunteer subjects, it appears that the bears' tolerance to abrupt deceleration of less than 0.2 seconds durations is close to that of man. In the forward facing position with a full harness they have sustained g levels with reversible lesions which would be unusually painful and not recommended for human volunteers. (Author)

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Moseley, J.D. 1961 TO WHAT EXTENT CAN ANIMALS INSTEAD OF MAN BE USED IN IMPACT TESTING. (Paper, Symposium on Impact Acceleration Stress, Brooks AFB, Texas, Nov. 27-29, 1961)

ABSTRACT: The general use and reasons for use of animal subjects in impact testing are examined. The selection of different species for testing is discussed with emphasis on the selection by body area to be examined. The differences in tolerance criteria are discussed with emphasis on the need for human and animal tests using performance decrement as added means of assessing effects.

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Motobayashi, F. and M. Oshima 1957 A METHOD OF MEASUREMENT OF AVIATION FATIGUE BY THE ACCELERATION LOAD. (Institute of Labour Science) March 1957.

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Moul, M. T., A. A. Schy & J. L. Williams 1961 DYNAMIC STABILITY AND CONTROL PROBLEMS OF PILOTED REENTRY FROM LUNAR MISSIONS (National Aeronautics and Space Administration, Washington, D.C.) NASA TN D 986, Nov. 1961.

ABSTRACT: A fixed-base simulator investigation was made of stability and control problems during piloted re-entry from lunar missions. Re-entries were made within constraints of acceleration and skipping, in which the pilot was given simulated navigation tasks of altitude and heading angle commands. Vehicles considered included a blunt-face, high-drag capsule, and a low-drag lifting cone, each of which had a trim lift-drag ratio of 0.5. Three-axis automatic damping was included and results were presented for various damper-failure conditions. (Tufts)

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Mowrer, O.H. 1932 CONCERNING THE NORMAL FUNCTION OF THE VESTIBULAR APPARATUS. Ann. Otol., 41:412-421

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Mowrer, O.H. 1934 ANALYSIS OF EFFECTS OF REPEATED BODILY ROTATION WITH ESPECIAL REFERENCE TO POSSIBLE IMPAIRMENT OF STATIC EQUILIBRIUM Ann. of Otol. 43:367-386

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Mowrer, O. H. 1934 THE MODIFICATION OF VESTIBULAR NYSTAGMUS BY MEANS OF REPEATED ELICITATION. Comp. Psychol. Monog. 9(45):1-48

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Mowrer, O. H. 1934 INFLUENCE OF "EXCITEMENT" ON THE DURATION OF POSTROTATIONAL NYSTAGMUS. Arch. Otolaryng., Chicago 19:46-54

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Mowrer, O.H., 1935 SOME NEGLECTED FACTORS WHICH INFLUENCE THE DURATION OF POST-ROTATIONAL NYSTAGMUS. Acta Oto-Laryng. 22: 1-23

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Mowrer, O. H. 1935 THE NYSTAGMIC RESPONSE OF THE PIGEON TO CONSTANT ANGULAR ACCELERATION AT LIMINAL AND SUPRALIMINAL INTENSITIES. J. Comp. Psychol. 19:177-193

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Mowrer, O. H. 1935 THE ELECTRICAL RESPONSE OF THE VESTIBULAR NERVE DURING ADEQUATE STIMULATION. Science 81:180-181

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Mowrer, O. H. 1936 "MATURATION" OR "LEARNING" IN THE DEVELOPMENT OF VESTIBULAR AND OPTOKINETIC NYSTAGMUS. J. Genet. Psychol. 48:383-404

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Mowrer, O. H. 1937 THE INFLUENCE OF VISION DURING BODILY ROTATION UPON THE DURATION OF POST-ROTATIONAL VESTIBULAR NYSTAGMUS. Acta oto-laryngol. 25:351-364

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Mozell, M. M., & D. C. White 1958 BEHAVIORAL EFFECTS OF WHOLE BODY VIBRATION. (Naval Air Development Ctr., Johnsville, Pa.) NADC MA-5802; ASTIA AD-156 470 28 Jan. 1958

See also J. Avia. Med. 29:716-724

ABSTRACT: A study was made of the effect of whole body vibration on the ability of humans to read the digits of an aircraft mileage indicator and their ability to do a tracking task which simulated the control of an aircraft. Vertical sinusoidal vibration of frequencies ranging between 0 and 50 cycles per second (cps) with amplitudes of 0.05, 0.1, and 0.16-inch double amplitude were used. It is concluded that increasing the frequency of vibration above 8 cps has an increasingly detrimental effect on visual performance. This effect reaches a maximum between 40 and 50 cps. The increase of amplitude of vibration from 0.05 to 0.1-inch double amplitude has no effect upon visual performance. Therefore, a case was made for using frequency and amplitude rather than G as vibration coordinates. It is further concluded that vibration, within the limits of the experiment, has little effect upon tracking ability. (AUTHOR)

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Mueller, C. E. G. 1961 CARDIOVASCULAR EFFECTS OF FORWARD ACCELERATION. In Bergeret, P., ed., Bio-Assay Techniques for Human Centrifuges and Physiological Effects of Acceleration. (London, New York, Paris: Pergamon Press, 1961) AGARDograph 48. Pp. 119-129.

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Mueller, D.D. 1962 RELATIVE MOTION IN THE DOCKING PHASE OF ORBITAL RENDEZVOUS (Aerospace Med. Div., 657oth Aerospace Medical Research Lab., Wright-Patterson AFB, Ohio) AMRL-TDR-62-124; Proj. no. 7184, Task no. 718405; Dec. 1962;

ABSTRACT: The purpose of this report is to analyze the relative motion which exists between an interceptor and target vehicle in the final stages of orbital rendezvous. Four distinct types of nearby parking orbits were defined. It was assumed that a man wearing an extravehicular suit and a self-maneuvering unit would exit the interceptor and traverse the remaining distance to the target. Both two impulse transfers and continuous thrust, line-of-sight transfers were analyzed. It was found that the direction in which the man should aim himself to make a two-impulse transfer depends only on the time he wished to consume in the rendezvous and does not depend on the distance to be traveled. Comparisons of fuel consumption for the two-impulse technique and the line-of-sight technique were made and an optimum transfer combining both these techniques was suggested. The results of this study indicate that Coriolis forces and tidal effects cannot be neglected even at the relatively short ranges associated with orbital docking.

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Müller, B. 1956 FLUGMEDIZINE: KOMPENDIUM DER LUFTFAHRTMEDIZIN (Aviation Medicine: Compendium of Aviation Medicine)
(Dusseldorf: Droste, 1956) Nordrhein-Westfalen. Ministerium fur Wirtschaft und Verkehr. Verkehrswissenschaftliche Veroffentlichungen. Heft 34.

ABSTRACT: This monograph surveys the field of aviation medicine and is intended for use by medical students, students of aerotechnology, physicians, engineers, and fliers interested in aeromedical problems. The chapters deal with the historical development of aviation and aviation medicine, high-altitude flight and the effects of altitude, acceleration and centrifugal forces, motion sickness, sensory organs and sensory illusions in flight, orientation as to the position in space and movement, psychophysiology of fliers, flight hygiene, flight accidents, physical and psychological examinations of fliers, flying fatigue -- symptoms and therapy, and some problems of space medicine.

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Mullin, C. S. Jr. 1953 ACUTE ANXIETY REACTION VS. "BLAST CONCUSSION"
U. S. Armed Forces Med. J. 4:1748-1752.

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Murcia, G. F. 1961 THE PROGRESSIVE ACCELERATION-DECELERATION TEST IN VESTIBULAR EXPLORATION.
In Rev. Esp. Otoneurooftal. 20:410-415, Nov.-Dec. 1961 (Spain)

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Murphy, A.C. 1949 GROUND SEAT EJECTION TEST ON XF-90 AIRPLANE
(Lockheed Aircraft Corp., Burbank, Calif.) Oct. 1949. ASTIA ATI 65300

ABSTRACT: Ground seat ejection test was conducted on an XF-90 fighter airplane, to determine the suitability of the seat installation. The seat attained a velocity of 54 ft/sec and an acceleration of 13 g's. It reached a vertical height of 35 ft above the cockpit and traveled a horizontal distance of 72 ft. The seat was successfully caught in the net, and no damage was sustained by the airplane, except over the claw on the actuator disconnect, however, this did not interfere with the ejection of the seat. The catapult seat installation was found satisfactory for flight.

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Murphy, C. W. & R. A. Cleghorn 1956 STUDY ON ALTERNATIONS IN [illegible] JET FLYING
Canad. J. Biochem. Physiol. 34:534-542.

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Mur Vilaseca, Tomas 1953 LA ASTRONAUTICA. QUE DEBEMOS PENSAR ACERCA DE LA POSIBILIDAD DE LOS VIAJES POR EL ESPACIO? (Astronautics. What Ought We to Know About the Possibility of Voyages Through Space?)
Rev. Obras Publicas 101: 269-279, June 1953

ABSTRACT: Survey of astronautics, including propulsion of a space vehicle, historical outline, fundamental equations of the rocket, the space station, and the trip to the moon.

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Mustin, G.S. 1960 SIMPLIFIED APPROACH TO DESIGNING SHOCK ISOLATION FOR THE ROTATIONAL DROP TEST. (Paper, 28th Symposium on Shock, Vibration and Associated Environments, The Departmental and Commerce Auditoriums, Washington, D.C., February 9-11, 1960) ASTIA AD 244 857

ABSTRACT: Previously published papers on the rotational drop test appear to be analyses of existing designs or require certain unwarranted assumptions concerning distributions of accelerations. No satisfactory designer's approach to the use of nonlinear cushioning materials for rotational drop test shock mounting has been found in the literature. This paper summarizes an approach found to be useful in designing with shock mounts and covers an extension of the method to tangent elasticity.

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Myers, D.A. 1942 CAN THE HUMAN BODY KEEP PACE WITH THE AIRPLANE?
California & West. Med., 56:287-293

ABSTRACT: Keen perception is an essential factor in pilot-make-up, especially perception of the surroundings and the environment, as well as the ability to estimate quickly all situations, including those of approximate altitude of the airplane, character of the terrain, direction of the wind, etc.

Some of the most important maintenance problems which aviation medicine has to deal with are: oxygen and altitude flying; altitude sickness; blacking out; effect of glare, cold, heat and light; effects of flight on the eyes; bends or decompression sickness; aerial equilibrium and spatial orientation (blind flying); aero-embolism and anoxia.

During altitude flights the nitrogen in the blood is given off in the lungs, and that in the tissues begins to enter the blood stream. If the ascent is fast, nitrogen bubbles form in the blood and tissues. If the tissues have a high fat content and poor blood supply, they become favorable sites for bubble formation. Nitrogen bubbles have been shown in the spinal fluid at 18,000 feet; and in the blood and tissues. Sulfathiazole was used orally and locally in large doses. The tiny particles of rock, sand, carbon or gunpowder remaining on the cornea after removal of larger fragments will usually disappear within a couple of days with little or no loss of vision following application of atropine and a 5 per cent sulfathiazole ointment in a white petrolatum base. The American Optical Malingering apparatus was found best for detection of malingerers. Various methods of testing malingerers and hysteric subjects are discussed.

ACCELERATION

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Nack, A. 1946 THE FIST LAND AIRPLANE CATAPULT K1 12 (GENE! ALLUFTZEUGMEISTER FIB-6 BERLIN-ADLERSHOF DIE FIST-LANDFLUGZEUGSCHLEUDER K1 12)

ABSTRACT: A description is given of the Fist mobile airplane catapult. It is sued for assist take-off of heavily loaded airplanes, and take-off on short and soft runways. It supplies additional required acceleration forces which ordinarily cannot be supplied by propeller thrust. The catapult consists of a main and an auxilliary unit. The main unit accelerates the airplane by means of a "brake cable" and detaches it from the airplane after completed acceleration. Operation of the catapult is explained in detail.

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Nadel, A. B. 1958 HUMAN FACTORS REQUIREMENTS OF A MANNED SPACE VEHICLE. (General Electric Co., Santa Barbara, Calif.) Rept. RM 58TMP 10, Apr. 1958

ABSTRACT: This report presents an analysis of human factors requirements of a manned space vehicle in light of present knowledge. One section deals with the physical environment of the operator, covering the effects of physical stimuli from space external to the craft, their possible effects on the operator and protective measures needed. Another section is concerned primarily with inputs from space received via the sensory system of the operator. Phenomena apprehended through the perceptual system are described together with their possible effects and practices recommended to avoid undesirable effects. The information processing function (information items needed, displays, and display-control relations) is discussed at length.

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Nadel, A. B. 1959 SUPPORTING MAN IN SPACE: 1970-1975 (General Electric Co., Santa Barbara, Calif.) RM 59 TMP-85, 30 Nov. 1959

ABSTRACT: This report discusses progress in space technology that is expected to take place by 1970 and anticipates several bold adventures into space during

the period 1970-1975, such as successful trips to the moon and the beginning of interplanetary travel (Mars, Venus, etc.). Needed requirements and capabilities for such accomplishments are discussed in the following areas: 1) the physical environment - atmosphere, gravitational forces (acceleration and zero g), temperature, and radiation; and 2) acoustic noise and vibration.

3,729

Nagoya U. Research Inst. of Environmental Medicine 1962 ANNUAL REPORT, 1962. (Nagoya U. Research Institute of Environmental Medicine, Japan) In Japanese.

ABSTRACT: Contents include:

1. "Annual Review of Progress in the Aeromedical Department" Fushiro Motobayashi, p. 1-2
2. "Preliminary Study on the Biological Phenomena In Rocket Flight" Shigeru Ando and Sadaharu Takagi, P. 2-4
3. "How is the Mento-Physical Condition Measured? (1. Preliminary Study)" Fushiro Motobayashi, Sukeo Sugimoto, Tamotsu Somiya, and Sadaharu Takagi, p. 5-12.
4. "Neuroglial Response and a Theory of Neuroglialneuronal Interaction" Genyo Mitarai, p. 12-17.
5. "Adient Reaction Potential and Abient Reaction Potential as a Function of the Fistance (From the Object (3) Tamotsu Somiya, P. 17-21.
6. "Experimental and Theoretical Studies on Behavior in Space" Tamotsu Somiya, p. 21-31.

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Napier, A. 1963 SUPERSONIC SCARECROW. AFTER SOLVING THE "RAILBIRD" PROBLEM, ROCKET SLED ZIPS ON AT 3,753 MPH. National Observer 2(36):8, 9 Sept. 1963.

ABSTRACT: The fastest known earth-bound vehicle is the spike-nosed rocket sled used on the long track (35,000) at Holloman AFB, New Mexico, which has hit a peak velocity of 3,753 mph. (over mach's). This was partly possible because a solution to the 5 year-old "railbird problem" was found. A "bird bouncer" sled is now run along the track 60 feet ahead of the test sled on runs to clear birds from the acceleration track. (CARI)

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Napier, D. & Son n.d. INSTRUCTIONS FOR OPERATING AND MAINTAINING THE NAPIER 100 g CENTRIFUGE (Gt. Brit.) ASTIA AD-40 785

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National Aeronautics and Space Administration 1962 RESULTS OF THE SECOND UNITED STATES MANNED ORBITAL SPACE FLIGHT (National Aeronautics and Space Administration, Washington, D. C.) NASA SP-6

ABSTRACT: This document presents the results of the second United States manned orbital space flight conducted on May 24, 1962. The performance discussions of the spacecraft and launch systems, the modified mercury network, mission support personnel, and the astronaut, together with analyses of observed space phenomena and the medical aspects of the mission, from a continuation of the information previously published for the United States manned orbital Flight, conducted on February 20, 1962, and the two manned suborbital space flights.

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NATIONAL RESEARCH COUNCIL, Washington, D.C. See U.S. National Research Council

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National Research Council of Canada 1942 PROCEEDINGS OF THE FOURTH MEETING OF THE SUB-COMMITTEE ON SEASICKNESS OF THE SUB-COMMITTEE ON NAVAL MEDICAL RESEARCH OF THE ASSOCIATE COMMITTEE ON MEDICAL RESEARCH, 27 NOV. 1942. (National Research Council of Canada)

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National Research Council of Canada, Ottawa 1944 PROCEEDINGS OF THE 13TH MEETING OF THE ASSOCIATE COMMITTEE ON AVIATION MEDICAL RESEARCH. (National Research Council of Canada, Ottawa, 25 Feb. 1944)

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National Research Council, Canada 1944 PROCEEDINGS OF THE 14TH MEETING OF THE ASSOCIATE COMMITTEE ON AVIATION MEDICAL RESEARCH (National Research Council, Canada) 29 Sept. 1944

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National Research Council 1944 MEMORANDUM ON TEMPORARY DUTY OF W/CW.R. FRANKS TO SUB-COMMITTEE ON ACCELERATION OF THE UNITED STATES NATIONAL RESEARCH COUNCIL MAYO AERO MEDICAL UNIT, ROCHESTER, MINNESOTA. (National Research Council, Canada) Report # C-2681, 23 February 1944

ABSTRACT: This liaison report covers the meeting of the above Sub-Committee. The recent medical researches on acceleration are reviewed.

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Navarrane, P. 1956 LE MAL DES TRANSPORTS (TRAVEL SICKNESS) Revue du praticien (Paris) 6(19):2095-2104, 1 July 1956

ABSTRACT: A general discussion is presented of motion sickness with emphasis on its etiology and pathogenesis, clinical aspects, and susceptibility of persons. Preventive measures considered in during airplane flight include the use of the seat belt in turbulent weather, use of ear plugs to eliminate vibrations, and the use of dark glasses. Chemical measures used in prevention and therapy include central nervous system depressants (barbiturates); parasympathicolytics (belladonna and hyosciamine alkaloids); synthetic antihistaminics (dramamine, nautamine), or chlorpromazine. The following measures are recommended for persons susceptible to motion sickness during airplane flight: chlorpromazine or antihistaminics prior to departure and use of belladenaldexamphetamine suppository at the first symptom.

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Naylor, J.L. 1932 THE EFFECT OF ACCELERATIONS ON HUMAN BEINGS. J. Roy. Aero Soc. 36:251

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Naylor, J.L. 1932 MAN'S ABILITY TO WITHSTAND HIGH ACCELERATIONS STUDIED. Astronautics, pp. 6-7. 20 June, 1932.

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Neal, E. 1926 VISUAL LOCALIZATION OF THE VERTICAL Amer. J. Psychol., 37:287

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Nebiker, F.R. 1961 FEASIBILITY STUDY OF AN INFLATABLE TYPE STABILIZATION AND DECELERATION SYSTEM FOR HIGH-ALTITUDE AND HIGH-SPEED RECOVERY. (Goodyear Aircraft Corp., Akron, Ohio) WADD TR 60-182, Dec. 1961. ASTIA AD 272 754.

ABSTRACT: On the basis of the theoretical and experimental wind tunnel test data obtained, it was concluded that an inflatable sphere is a practicable stabilization and deceleration system for initial recovery from high-altitude, high-speed flight regimes (up to Mach 4.0 at 200,000 feet). Inflatable spheres tested were fabricated utilizing standard manufacturing methods and readily available materials. The recovery system tested exhibited considerable potential as an initial stabilization and deceleration recovery system for a disoriented or tumbling high-altitude, high-speed payload. Included are theoretical and wind tunnel test data on the effects of various shaped primary bodies on a secondary spherical body at various trailing distances. Also included is a limited amount of experimental data on flight testing of a full-scale operational unit. (Author)

3,743

Neely, S.E., & R.H. Shannon 1958 VERTEBRAL FRACTURES IN SURVIVORS OF MILITARY AIRCRAFT ACCIDENTS. J. Aviation Med. 29(10):750-753, Oct. 1958.

SUMMARY: Vertebral fractures are a significant problem in the medical management of aircraft accident survivors. The responsible medical officer should be prepared to recognize and handle this type of injury. Because the rate of these injuries is increasing, improved methods of restraint and protection for the vertebral column must be found. The most frequent type of major non-fatal injury, vertebral fracture, was examined and analyzed in terms of the role seats and seat cushions play and in terms of the force factors involved. Suggestions for counteracting the apparent causes of vertebral injury are set forth.

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Neely, S. E., et al. 1960 INJURY AND FATALITY USAF AIRCRAFT ACCIDENTS (Directorate - Flight Safety and Missile Safety Research) Rept. M-3-60, March 1960

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Nefedov, P. 1960 THE PRIDE OF THE 20TH CENTURY
Izvestiya P. 1; 24 August 1961

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Neiswander, R.S. & H.T. Armstrong 1947 MOTION ASPECTS OF FLIGHT STIMULATION (Link Aviation Devices, Inc., Binghamton, New York) Eng. Rept. No. 164.233

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Nelson, D.M. 1957 A MEANS OF OBTAINING HIGH ACCELERATION AT A LOW RATE OF INCREASE IN TRACK TESTS WITH EXISTING SOLID-PROPELLANT MOTORS. (Naval Ordnance Test Station, China Lake, Calif.) NAVORD Report 5561, 1 June 1957. ASTIA AD 140 402

ABSTRACT: A technique for obtaining high acceleration with low acceleration rates in track testing, using available solid-propellant rocket motors, is described. The technique consists of mounting motors having differing thrust characteristics in opposite directions on a test sled and then firing the motors at certain intervals so that the additive effect of their thrust produces the desired acceleration and acceleration rate. A comparison of theoretically predicted and actual sled performance for a SNORT missile-component test using this technique is made. (Author)

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Nelson, S.R.C. 1948 EJECTION OF PILOTS FROM AIRCRAFT
In Marcus, Henri et al, Shock and Vibration Bulletin No. 7, Naval Research Rept. No. S-3229, Pp. 47-58, ASTIA ATI 75 153

ABSTRACT: Tolerance to vertical accelerations and resistance of the body to forces of certain durations are discussed. Observations are made on the effects of air blast upon the body. Safety harness and related automatic devices are described. The problems of installing the gear in aircraft and educating the pilots in the use of the equipments are outlined.

3,749

Newbert, H.K.P. 1954 NOTES ON THE RESPONSE OF A LINEAR VIBRATION SYSTEM TO IMPACT LOADING (Royal Aircraft Establishment, Gt. Brit.) March 1954, ASTIA AD-31 376

ABSTRACT: "In the course of investigations into the effect of impact loading the general equations for deflection, velocity and acceleration of a linear system of one degree of freedom with velocity damping have been derived for a case of a mass being dropped onto a spring (with negligible mass). Response curves are plotted and discussed for two idealized cases of aircraft landing,

and for a drop table test. The possible errors for a proposed integrating touch-down velocity meter are discussed. Frequency spectra for three typical impact curves have been computed, and the error introduced when measuring the impact with an accelerometer of inadequate frequency response is discussed." (RAE summary)

3,750

Neubert, H. K. P., & R. W. Corbin 1954 A NEW BARIUM TITANATE ACCELERATION TRANSDUCER OF A HIGH SENSITIVITY. (Royal Aircraft Establishment, Great Britain) TN No. INSTN. 147, Dec. 1954

ABSTRACT: A general purpose barium titanate acceleration transducer has been designed and two prototypes have been tested for their sensitivity, linearity and frequency response. Errors due to transverse acceleration and temperature are discussed. Its output voltage is comparable with that of vibration transducers of the moving coil type and with acceleration transducers of the unbonded strain gauge type, but it covers a wider field than any of these in range as well as in frequency.

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Neukirch, F. 1937 EINE VERSUCHSPERSON MIT AUSGESPROCHENEN ÄNDERUNGEN DES KREISLAUFES BEI STELLUNGSWECHSEL (A Test Subject with Pronounced Changes in the Circulation During Change of Position)
Skandinavisches Archiv für Physiologie (Berlin) 77: 60-62

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Neuman, H. Aug. 1956 AT THE AEROMEDICAL SECTION OF THE LEARNED MEDICAL COUNCIL ATTACHED TO THE CHIEF OF THE MAIN MILITARY ADMINISTRATION. (AF Technical Translation, AFOIN, Rept. AF 1019403, 13 Aug. 1956)

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Neumann, H. L., J. F. Hegenwald, Jr., & W. R. Santschi 1962 HUMAN SUBJECT GROUND AND WATER IMPACT TESTS OF THE XB-70 ESCAPE CAPSULE. (Paper, 33rd Annual Meeting of the Aerospace Medical Assoc., 9-12 Apr. 1962, Atlantic City, N. J.)

ABSTRACT: A testing program was accomplished to validate the performance of the capsule during ground and water impact. Tri-axial acceleration histories were

obtained for capsule seat structures and for the head and chest of both anthropometric dummy and human subjects under conditions simulating design parachute descent velocities. The engineering aspects of the impact attenuation system are described briefly as well as test methodology and facilities. Physiological responses to the impacts are discussed and acceleration and photographic data of dummy and human subjects are correlated. (J. Aerospace Medicine 33(3):366, Mar. 1962)

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Neustater, W.L. 1946 WHAT IS A "BLACKOUT"? A STUDY OF FIFTY CASES. J. Roy. Army M. Corps 85:139-142

ABSTRACT: Of the 50 cases examined, 25 described a loss of consciousness. 16 a blacking out of the visual field with no loss of consciousness or hearing and 9 are described serious symptoms to which the term did not apply. It is stated that 45 of the 50 cases showed a history of psycho-neurosis.

3,755

Newbauer, J. 1959 TRAINING AN ASTRONAUT. Astronautics, Sept. 1959. Pp. 31

ABSTRACT: This article is a review of the schedule maintained by the seven Project Mercury astronauts at Langley Research Center in preparation for the first man-in-space flight.

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Newell, H. E., Jr. 1952 CHARACTERISTICS OF THE HIGH-ALTITUDE ROCKET AS A RESEARCH TOOL. In White, C. S. & O. O. Benson, Jr., eds., Physics and Medicine of the Upper Atmosphere, A Study of the Aeropause (Albuquerque, N. Mex.: Univ. of New Mexico Press, 1952) pp. 405-411

3,757

Newell, H. E., Jr. 1959 U.S., RUSSIAN SPACE EFFORTS COMPARED Aviation Week 71:36, 37, 41, 43, 47, 49-50, Dec. 1959

ABSTRACT: Both the U. S., and Soviet satellites and space probes have produced valuable scientific results. Some spectacular discoveries and achievements are

shown in table form. In addition to the more spectacular output, satellite and space-probe flights are turning out a steady flow of information and results that build up gradually an impressive advancement of mankind's knowledge of the earth and outer space. This review relates the impression that U. S. and USSR scientists are at about equal stages of advancement.

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Newell, H. E. 1963 A WORLD IN SPACE
(National Aeronautics and Space Administration, Washington, D. C.)
NASA AL-B-2-63; N63-13744; Feb. 1963

ABSTRACT: The following areas of space exploration are discussed: geophysics, astronomy, cosmology, extraterrestrial life, manned space flight, space engineering, space environment, measurement of space phenomena, and space phenomena on earth. (NASA)

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Newton, J. A. 1951 THE HUMAN FACTOR IN AIRCRAFT ACCIDENTS.
J. Royal Aeronautical Society 55(482):110-115, Feb. 1951

ABSTRACT: It has been claimed that flying accidents are inevitable due to the necessary reliance on the skill, judgment, memory, and physical and psychological conditions of the human being. Since human error in aircraft operation is less likely to be reduced by improving the human being than by simplifying the task given him, efforts to reduce accidents by providing better personnel and training have not produced an appreciable result. Too high a dependence has been placed on the infallibility of the human organism in every aspect of aerial operation. Everyone in aviation should realize the limits to which man can be subjected.

Most pilots go through four stages in their pilot careers. In the first, flying is exciting and glamorous, bringing a sense of power which may lead the pilot to take undue risks unknowingly. At this time his mind can be molded in the wise use of his powers. The second stage (reached usually after two to four years of experience) may occur gradually or abruptly; the newness has worn off, and the pilot has learned the structural, mechanical and performance limitations of his plane and appreciates the hazards of flying. After about ten years, the third psychological stage is reached, characterized by gradual increase in conservatism. Sustained stresses at work or at home may have produced a marked apprehension towards his occupation. This occasions one of the most critical situations in the career of an airman--the conflict between necessity (to earn a living by flying) and fear (of flying) creates a tension. The fourth stage is not usually reached until the late thirties when the airman has successfully passed through the preceding stages and has acquired that conservatism resulting from increased age and sagacity.

In selecting flying personnel, it is still hard to detect every case of imbalance, nor will careful initial selection entirely eliminate possible later deterioration.

Accidents directly attributed to human error are normally classed as: (1) Errors of judgment, (2) poor technique, (3) disobedience of orders, (4)carelessness, (5) negligence. These main causes result from lack of experience (perhaps the main cause of accidents), poor physical condition or the presence of physical defects, the psychological condition of the airman at the time, or poor reaction. Temperament and habit play a big role in accident frequency. (Journal of Aviation Medicine 23(1):89, Feb. 1952)

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Newton, John M. 1959 TRAINING EFFECTIVENESS AS A FUNCTION OF SIMULATOR COMPLEXITY
(U.S. Naval Training Device Center, Port Washington, New York) Technical Report: NAVTRADEVCEN 45. 1 ASTIA AD 230 996

ABSTRACT: The purpose of this study was to compare the effectiveness of training devices having various degrees of simulation of an operation task. The task selected for study was one-man control in course and depth of a high-speed submarine. The performance of depth changing only, course changing only and simultaneous depth and course changing were measured on submarine steering and diving trainers. Although there were no significant differences among the proficiency scores obtained under the 5 conditions, the general trend is for the mean scores to be ranked in order of simulator complexity. Thus, scores of the subjects trained on the same simulator on which they were tested were consistently higher; subjects trained on the PACE computer were second, followed by those trained with the 20-amplifier Donner computer, 18-amplifier Donner computer with motion in tilt-table and the 18-amplifier Donner computer with no motion in the tilt-table. For training device design, this study provides valuable information on the degree to which an operational situation can be simulated for effective training to occur. The results of this study indicate that the submarine equations of motion can be satisfactorily approximated by an analog computer program employing either 18 or 20 amplifiers. However, in view of the increase in effectiveness at relatively small increase in cost, the 20-amplifier trainer is recommended.

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New York Academy of Sciences 1958 SYMPOSIUM ON MAN IN SPACE: A TOOL AND PROGRAM FOR THE STUDY OF SOCIAL CHANGE. Ann. N.Y. Acad. Sci. 72:167-214

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Michael, D.N Man in Space: a tool and Program for the study of social changes
Lasswell, H.D. Men in space
Frank, L.K. Cultural implications of man in space

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Nichols, G. 1954 DYNAMIC RESPONSE OF RESTRAINED SUBJECT DURING ABRUPT DECELERATION. (Northrop Aircraft Inc., Hawthorne, Calif.) Rept. No. NAI-54-585

ABSTRACT: The tolerance of the human body to the forces, external and internal, encountered during periods of abrupt deceleration has become a factor of considerable importance in modern aviation. When a decelerating force is applied to the supporting vehicle, the subject is exposed to a realistic condition of abrupt deceleration. The G-time pattern of force applied to the supporting test vehicle can be controlled within limitations of the test facility. The G-time pattern encountered by a restrained subject, however, is a dependent complex function---the dynamic response of the combined subject restraint system to the basic forcing function (G-time pattern) applied to the supporting vehicle. The object of this study is to indicate the relationship of the many variables involved in the action and to determine, for given basic forcing functions, the effect that varying the characteristics of various elements of the system has upon the response force patterns imposed upon the restrained subject.

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Nicholson, F.T. 1957 CHANGES IN AIRCRAFT SIMULATION FOR HUMAN CENTRIFUGE (Naval Air Development Center, Johnsville, Pennsylvania) NADC Technical Note 57-44-DB, 30 July 1957

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Nicoll, N.R. 1954 DESIGN OF THE LIFE COMPARTMENT NECESSARY FOR SPACE TRAVEL Brit. Interplan. Soc. J. 13:277-282, Sept. 1954

ABSTRACT: The composition of the life compartment of a spaceship is dealt with and an overall weight of under one ton is developed as being realistic. The compartment is of double-wall construction, containing equipment for atmosphere control, variations in g and other necessities for the survival of a crew of thirteen for 15 days.

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Nieto Boque M. 1961 GRAVITY AND ITS REPERCUSSIONS ON MAN. STUDY OF ITS PHYSIOLOGICAL ACTION IN "TERRESTRIAL MAN" FOR THE PURPOSE OF UNDERSTANDING ITS ACTION ON "PLANETARY MAN".
In Bol. Cons. Gen. Codeg. Med. Esp. 24:11-32, April 1961 (Spain)

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Nikolaev, A.G. & P.R. Popovich 1962 MY ZHILI I RABOTALI V KOSMOSE (We Lived and Worked in Space) Priroda (Moskva), (9):10-16, Sept. 1962

ABSTRACT: The authors relate their experiences on the orbital flights of Vostok-3 and Vostok-4. While in flight, they did not experience vestibular disturbances, lack of appetite, or insomnia. No unpleasant sensations resulted when moving in the cabin. They regard a six-hour sleep as adequate. Psychologically the most unpleasant moment during the flight was the re-entry. In the opinion of both cosmonauts, a prolonged space flight does not impair the physical capacity of the human organism. (Aerospace Med. 34(8):769, Aug. 1963)

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Nikolayev, A. 1960 ASTRONAUTS ARE DONNING HELMETS
Sovetskaya Rossiya (Moscow) P. 4; 19 May 1960.

ABSTRACT: This article deals with the medical and biological problems which must yet be solved before a human astronaut can be sent into interplanetary space. The principle factor which adversely affects the organisms of humans and animals at high altitudes is oxygen insufficiency. Another problem is great acceleration during take-off. Acceleration seriously affects blood circulation unless the passenger is wearing an anti-G suit. Weightlessness is the third important problem that will be encountered beyond the earth's gravitational pull. Absence of gravitational pull is beneficial to the heart. Respiration and the function of the gastrointestinal tract change substantially in outer space. Disruption in muscular coordination and disorientation have been noted during the period of weightlessness. Supplying the crew of a space vehicle with food and water is a difficult problem. (CARI)

3,768

Nikolayev, A. 1960 ASTRONAUTS PUT ON SPACE SUITS
Sovetskaya Rossiya P. 4; 19 May 1960.

3,769

Novikov, K. & B. Shchandronov 1960 ALTITUDE IS 450 km
Sovetskaya Rossiya P. 4; 20 May 1960.

3,770

Niven, J.I. and Graybiel, A. 1953 DIRECTIONAL SENSITIVITY OF SEMICIRCULAR CANALS FOLLOWING UNILATERAL LABYRINTHECTOMY IN MAN. J. Appl Physiol. 6(6):379-386

ABSTRACT: It has been established that angular acceleration is a sufficient stimulus for the semicircular canals. Another problem, that of whether a given semicircular canal may respond to rotation in either direction in its own plane, has not been answered as satisfactorily. One school of thought holds that response is unilateral, in the direction of rotation. The other holds that there is a two-way response in a given canal, depending on the direction of rotation.

In this study, to find the responses in humans, tests of the duration of oculogyrol illusion were made in patients who had had one labyrinth removed. Periods of twelve to twenty-nine months had elapsed between the operation and these experiments. The patients were exposed to clockwise and counterclockwise rotations at speeds of 1 to 10 rpm. The duration of the oculogyrol illusion and of sensations of apparent bodily rotation after motion was stopped were used as indicants of vestibular functions. Contrary to expectation, no consistent differences were found in durations following rotation in both directions.

The theory of unidirectional sensitivity has been generally attributed to Ewald's Law). He stated that the horizontal semicircular canal is maximally stimulated by an ampullopetal flow of the endolymph causing nystagmus toward the side of the maximally stimulated canal, and minimally stimulated by ampullofugal flow causing nystagmus to the oppostie side. Actually, the findings in this study seem to support a didirectional sensitivity although with a bias in favor of a particular direction. The phrase "directional preponderance" as used by some workers would be preferable.

3,771

Niven, J. I., & A. Graybiel 1953 POSTURAL EQUILIBRIUM IN MAN FOLLOWING UNILATERAL LABYRINTHECTOMY. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-6001.1.34., 16 Jan. 1953, ASTIA AD-8763

ABSTRACT: Standing tests are not of value in discriminating unilateral malfunctioning of the otolith organs. There is no especial advantage in the use of tilted standing boards and indeed, at angles of tilt greater than 20°, effects due to loss of equilibration may be confounded with those due to the overcoming of sliding friction. Five individuals with unilateral labyrinthectomy displayed a considerable reduction in the length of time they were able to maintain a standing position on one leg with vision excluded. Average times ranged from 2.06 to 5.83 seconds with the right leg and 2.36 to 5.75 seconds with the left leg. (Authors' summary)

3,772

Niven, J. I., & A. Graybiel 1953 RESIDUAL EFFECTS ATTRIBUTABLE TO THE SEMICIRCULAR CANALS FOLLOWING UNILATERAL LABYRINTHECTOMY IN MAN. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-6001.1.36., 21 May 1953, ASTIA AD-17 610

ABSTRACT: It is known that angular acceleration is a sufficient stimulus for the semicircular canals. It has not been established so well as to whether the response of individual canals is bidirectional or unidirectional, especially in the case of man. Ewald's Law states that a given horizontal semicircular canal is maximally sensitive to ampulopetal flow resulting from ipsilateral rotation. In this study five unilaterally-labyrinthectomized, female subjects were exposed to clockwise and counterclockwise rotations at speeds of 1 to 10 rpm. The duration of the oculogyral illusion and of sensations of apparent bodily rotation following cessation of rotation were used as indicants of vestibular functions. Contrary to expectation, no consistent significant differences could be found in durations following rotation in both directions. It was concluded that Ewald's Law as usually defined does not hold for man. (Authors' summary)

3,773

Niven, J.I. 1958 PREVIEW OF THE HUMAN ANGULAR ACCELERATION DEVICE. Contact 16(1):26-28.

3,774

Niven, J. I., & W. C. Hixson 1961 FREQUENCY RESPONSE OF THE HUMAN SEMICIRCULAR CANALS. I. STEADY-STATE OCULAR NYSTAGMUS RESPONSE TO HIGH-LEVEL SINUSOIDAL ANGULAR ROTATIONS. (Naval School of Aviation Medicine, Pensacola, Fla.; In cooperation with National Aeronautics and Space Administration) Rept. No. 58; Proj. MR005.13-6001; ASTIA AD-262 788; 10 March 1961

ABSTRACT: The use of a transition technique for quantifying nystagmic response to semicircular canal stimulation by high level, sinusoidal angular accelerations is presented. The frequency response characteristics were evaluated from corneo-retinal potential recordings obtained at rotation frequencies from 0.02 to 0.20 cps with a constant peak acceleration of 40 degrees. It was found that the human labyrinth behaves as a heavily-damped, second-order mechanical system during steady-state stimulation. (AUTHOR)

3,775

Noble, C. E. 1949 THE PERCEPTION OF THE VERTICAL. III. THE VISUAL VERTICAL AS A FUNCTION OF CENTRIFUGAL AND GRAVITATIONAL FORCES. J. Exp. Psychol. 39(6):839-850, Dec. 1949

SUMMARY: 1. This research has been concerned with establishing the quantitative

relathinship obtaining between the resultant of centrifugal and gravitational forces and the judgment of visual verticality in three Ss deprived of a visual frame of reference in a human centrifuge.

2. The experimental procedure was as follows: Ss were placed individually in a human centrifuge and exposed to eight different velocities of rotation. A luminous line was presented in darkness, and S was required to adjust it to phenomenal verticality a number of times under both stationary and rotary conditions, according to the psychophysical method of average error.

3. Statistical analysis of the data was made in terms of constant and variable errors.

4. The function investigated has been found to be a linear relationship; i.e., the visual vertical varies directly with the angle of resultant force.

5. There were individual differences in constant and variable errors during stationary conditions, but the combined data indicated that judgment of the visual vertical was both accurate ($\overline{CE} = -0.38^{\circ}$) and percise ($\sigma = 1.30^{\circ}$).

6. Intra-individual differences were greater during rotation than during stationary conditions.

7. These findings are interpreted as confirmation of Mach's hypothesis of the physical force determinants of psychological verticality. They are also consistent with the viewpoint that visual orientation, under the conditions of these experiments, is primarily dependent upon somesthetic factors rather than upon visual Gestalten.

3,776

Noble, Clyde E. 1949 THE PERCEPTION OF THE VERTICAL. IV. THE VISUAL VERTICAL AS A FUNCTION OF CENTRIFUGAL AND GRAVITATIONAL FORCES
(U.S. Naval School of Aviat. Med., Pensacola, Fla. and Tulane University, La.)
Joint Project Report No. 7 Proj. NM 001 037 ASTIA ATI 80 465
See also: J. Exper. Psych. 39: 839

ABSTRACT: This investigation was designed to establish the quantitative relationship obtained between the resultant of centrifugal and gravitational forces and the perception of the visual vertical in humans deprived of a visual frame of reference. Three Ss were used in a series of experiments in a human centrifuge which was provided with blackout arrangements and electrical devices for recording the angle of resultant force and Ss determinations of the visual vertical. Ss were exposed to eight velocities of rotation, varying from 4 rpm. to 11 rpm. They were required to adjust a luminous collimated line to phenomenal vertically a number of times under both stationary and rotary conditions, according to the psychophysical method average error. The results of these experiments are interpreted as evidence in support of Mach's hypothesis, that subjects adjust the visual vertical in accordance with the resultant of centrifugal and gravitational forces. They are also consistent with the viewpoint that visual orientation, under the specified conditions, is primarily dependent upon postural factors.

3,777

Noble, C.E. 1949 THE PERCEPTION OF THE VERTICAL. IV. THE VISUAL VERTICAL AS A FUNCTION OF CENTRIFUGAL AND GRAVITATIONAL FORCES. J. Exper. Psych. 39: 839-

See also: U.S. Naval School of Aviat. Med., Pensacola, Fla. Proj. NM 001 037 Joint Rept. No. 7 with Tulane University

ABSTRACT: The quantitative relationship between the resultant of centrifugal and gravitational forces, and the perception of the visual vertical in humans deprived of a visual frame of reference, was established. The experiments were performed on a human centrifuge provided with blackout arrangements and electrical devices for recording the angle of resultant force and the test-subjects' determinations of the visual vertical. Statistical analysis of the data was made in terms of constant and variable errors. The visual vertical was found to vary directly with the angle of resultant force. The results of the experiments are interpreted as evidence in support of Mach's hypothesis that subjects adjust the visual vertical in accordance with the resultant of centrifugal and gravitational forces.

3,778

Noble, H & L.P. Domzalski 1961 EVALUATION OF HUMAN SUBJECT REACTION IN THE FORWARD AND AFT FACING SEATED POSITIONS. (Air Crew Equipment Lab., Naval Air Material Center, Philadelphia, Pa.) Report No. NAMC-ACEL-424, 9 Feb. 1961. ASTIA AD 259 071

ABSTRACT: This report presents a comparative examination of the reactions of human subjects to simulated crash acceleration forces, when seated in a standard Navy passenger seat aligned in either the forward of aft facing position. Environmental parameters such as seat acceleration, and velocity; anthropomorphic dummy motion and acceleration; human subject motion and acceleration; and distribution of seat member loads during a series of simulated crashes are discussed. (Author)

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Noble, R.L. & J.B. Collip 1942 A QUANTITATIVE METHOD FOR THE PRODUCTION OF EXPERIMENTAL TRAUMATIC SHOCK WITHOUT HEMORRHAGE Quart J. Exper. Physiol., 31: 187

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Noble, R. L. 1945 OBSERVATIONS ON VARIOUS TYPES OF MOTION CAUSING VOMITING IN ANIMALS. Canad. J. Res. E. 23: 212-225

3,781

Noble, R.L 1946 STUDIES ON EXPERIMENTAL MOTION SICKNESS Bull New Eng. Med. Ctr. 8:49

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Noble, R.L. 1946 TREATMENT OF EXPERIMENTAL MOTION SICKNESS IN HUMANS. Can. J. Res. E. 24:10-20

3,783

Noble, R.L., E.A. Sellers, and C.H. Best 1947 THE TREATMENT OF MOTION SICKNESS (A REVIEW OF THERAPEUTIC STUDIES). Canad. M.A.J., 56:417

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Noble, R.L. 1948 MOTION SICKNESS: WITH SPECIAL REFERENCE TO AIRSICKNESS. Practitioner 160:453-458.

3,785

Noble, R.L. & N.B.G. Taylor 1953 ANTIDIEURETIC SUBSTANCES IN HUMAN URINE AFTER HEMORRHAGE, FAINTING, DEHYDRATION AND ACCELERATION. J. Physiol. 122:220-237

ABSTRACT: The urine of human subjects, voided after venesection, fainting and black-out due to centripetal acceleration, has been extracted by a method employing adsorption on zinc ferrocyanide and the extracts tested for anti-diuretic activity by the rat method of Burn.

In fourteen venesection experiments, seven subjects fainted and seven did not. There was no quantitative correlation between the amount of blood withdrawn and the occurrence of fainting.

Three additional subjects fainted following physical or psychic trauma not associated with venesection or more than slight blood loss.

All subjects who fainted subsequently excreted an antidiuretic substance in the urine.

No antidiuretic substance was found: (1) in the urine of subjects who did not faint; (2) in the pre-syncopal urine of the subjects who fainted; and (3) in the urine voided before or after black-out.

The failure to detect antidiuretic substance in the urine of normal subjects should not be taken as a statement that such urine contains no anti-duretic substance. The point to be made is that, under standardized conditions of extraction and assay, antidiuretic substance was found under experimental conditions and not in the controls.

The excretion of antidiuretic substance appears to be related directly to fainting and only indirectly to the stimulus which initiates the faint or to cerebral anoxia. Fainting and black-out are basically different reactions.

Our observations are in agreement with the hypothesis of Brun et al. that there is a liberation of hormone from the neurohypophysis during or after fainting.

3,786

Noble, R.L. 1955 MEDICATION FOR MOTION SICKNESS PRIOR TO AND DURING WORLD WAR II. Int Rec Med 168:1-12, Jan 1955

3,787

Nolan, A. C., H. W. Marshall, L. Cronin, & E. H. Wood 1962 DECREASES IN ARTERIAL OXYGEN SATURATION AS AN INDICATOR OF CARDIOPULMONARY STRESS DURING FORWARD (±Gx) ACCELERATION. (Paper, 33rd Annual Meeting of the Aerospace Medical Assoc., Atlantic City, N. J., 9-12 April 1962)

ABSTRACT: Blood oxygen saturation was recorded by ear oximetry and by cuvette oximetry in blood withdrawn continuously from the radial artery during 3-4 minutes at 2.1, 3.7, 5.4 and 6.5 G in eight subjects. Observations were made when air and 99.6% oxygen were breathed. Thoracic roentgenograms were obtained before the 30-50 seconds and 5 minutes after 5.4 and 6.5 G. In five subjects pressure was recorded in the aorta, radial artery, right atrium, esophagus and rectum (intra-abdominal). While air was breathed, a progressive decrease in arterial oxygen saturation from control value of 97.5% occurred with increasing levels of G, beginning about 10-25 seconds after onset of peak acceleration, which attained a stable level of 87.5% by cuvette and 86% by earpiece after 130 seconds at 5.4 G. When the centrifuge was stopped, a return toward control value occurred, but recovery was incomplete during the ensuing 1 minute or more. When oxygen was breathed, the decrease was prevented or its onset delayed, and its magnitude reduced, 93% being the minimal figure obtained. Comparative studies in the mercury couch (legs flexed) position and with legs extended parallel to the floor of the cockpit yielded closely similar results. Progressive increase in right atrial pressure occurred with increasing G, reaching a mean of 29 mm. Hg (3 times control) at 5.2 G. Esophageal pressure increased similarly, but to a lesser mean of 20 mm. Hg (control -1) at 5.2 G. It is postulated that the oxygen desaturation is due to blood flow past atelectatic alveoli in dependent portions of lungs, atelectasis resulting from increased segmental blood volume and pressure due to hydrostatic effects, plus an apparent increase in intrathoracic pressure. Changes indicative of atelectasis in lower lung fields were demonstrable roentgenographically after exposures to 5.4 and 6.5 G when oxygen was breathed. (J. Aerospace Medicine 33(3):347, Mar. 1962)

3,788

Nolan, A.C., H.W. Marshall, L. Cronin, W.F. Sutterer & E.H. Wood 1963 DECREASES IN ARTERIAL OXYGEN SATURATION AND ASSOCIATED CHANGES IN PRESSURES AND ROENTGENOGRAPHIC APPEARANCE OF THE THORAX DURING FORWARD ($+G_x$) ACCELERATION Aerospace Medicine 34(9): 797-813

ABSTRACT: Progressive decreases in arterial oxygen saturation with increasing degrees of forward acceleration have demonstrated in eight normal subjects. At 5.6 G, arterial oxygen saturation began to decrease from the control value of 97% after about 10 to 20 seconds and reached an average value of 86% after 130 seconds of exposure. Changes compatible with atelectosis were seen in thoracic roentgenograms made after exposures to 5.6 and 6.4 G when 99.6% oxygen was breathed. It is postulated that arterial desaturation during forward deceleration is due to flow of pulmonary capillary blood past poorly ventilated or atelectatic alveoli in dependent portions of the lungs, so that large veno-arterial shunts are created. The atelectosis is thought to result from the increased effective weight of the blood and lung parenchyma caused by acceleration resulting in increased segmental blood volume, increases in intravascular and extravascular pressures due to hydrostatic effects in the dependent regions of the lungs plus associated increases in intrapleural pressure in these regions.

3,789

Nonweiler, T. 1951 DESCENT FROM SATELLITE ORBITS USING AERODYNAMIC BRAKING Brit. Interplan. Soc. J. 10:258-274, Nov. 1951.

Also in Carter, L.J. ed. The Artificial Satellite. Proceedings of the Second International Congress on Astronautics (London, British Interplanetary Society, 1952), pp. 26-42.

3,790

North American Aviation 1960 CENTRIFUGE PROGRAM FOR A3J-1 SPIN SIMULATION, ENCLOSURES 8-20, JANUARY, 1960. (North American Aviation, Inc., Los Angeles, Calif.)

3,791

North American Aviation, Inc. 1960 TECHNICAL FEATURES OF THE DYNAMIC FLIGHT SIMULATOR (G SEAT). (Columbus, Ohio) Report No. NA 60 H-442, 12 Sept. 1960.

3,792

North American Aviation, Inc., 1961 AERIAL AND SLED TESTING OF THE B-70 AIRCREW ESCAPE CAPSULE. (North American Aviation, Inc., Los Angeles) Rept. no. NA 60-1133, ASTIA AD-268 511, Oct. 1960

ABSTRACT: Aerial and sled ejection tests are described wherein the B-70 escape capsule has passed or favorably exceeded specification in the following categories: (1) parachute deployment through complete range of indicated airspeeds. (2) rate of descent; (3) low altitude airdrops of capsule; (4) 20,000 and 40,000 ft airdrops of capsule; and (5) safe escape at ground level at airspeeds of 90 knots through maximum. Remaining to be tested are performance at high Mach number and high dynamic pressure, with continued development in the areas of ground and water impact and environmental control. (Author)

3,793

North American Aviation, Inc. 1961 PROJECT APOLLO; PRE-CONTRACTURAL DOCUMENTATION AND ORBITAL RENDEZVOUS: A LITERATURE SURVEY (North American Aviation, Inc. Downey, Calif.) Rept. no. SID 61-470, 29 Dec. 1961

ABSTRACT: A review of literature on Project Apollo and Orbital Rendezvous, in two parts, from August 1959 to December 4, 1961 is given. The references are listed alphabetically by corporate author and periodical title in one alphabet. Following the bibliography are both author and subject indexes. (Author)

3,794

North American Aviation, Inc. 1962 PARAGLIDER SPACE SCIENCES COMMITTEE BRIEFING (North American Aviation, Inc. Space and Information Systems Div., Downey, Calif.)20 July 1962 NAA-SID-62-915

3,795

North Atlantic Treaty Organization 1955 COLLECTED PAPERS ON AVIATION MEDICINE. (presented at Aero Medical panel meetings of the Advisory Group for Aeronautical Research and Development, Palais de Chaillot, Paris.) (London: Butterworth Scientific Publications, 1955)

See entry under AGARD, NATO 1955.

3,796

North, W. C., & J. A. Wells 1952 MODIFICATION BY PREVIOUS TRAUMA AND TEMPERATURE OF TOLERANCE TO TUMBLING SHOCK IN RATS. (Dept. of Pharmacology, Northwestern Univ. Med. School, Chicago, Ill.)

ABSTRACT: It has been reported that rats subjected to previous trauma become resistant to an otherwise surely fatal amount of tumbling by the method of Noble and Collip. In our studies a significant degree of protection from normally fatal trauma (700 turns) was provided by tumbling rats at 400 turns 24 hours previously. This protection was complete if the pretrauma was given 48 hours before, and absent if given 0.5, 3, or 6 hours prior to testing. Another experiment demonstrated that the amount of preliminary trauma was of importance; 100 and 200 turns 24 hours before tumbling did not confer tolerance to 700 turns, whereas 300 and 400 turns did. Tolerance thus acquired appears to persist over a period of at least 6 months. Variation in susceptibility to other types of shock with temperature change has been reported. In our studies significant protection can be conferred by heating rats at 40 degrees C. for 4 hours immediately after tumbling is significantly greater than that of unheated controls. Placing rats in a refrigerator at 4 degrees C. for 4 hours before, or 4 hours after tumbling did not alter their mortality. Adrenalectomized animals are more susceptible than normal rats to this type of trauma, but prolonged administration of cortisone or ACTH to intact rats failed to affect their susceptibility to tumbling.
(Federation Proceedings 11(1):380, 1952)

3,797

Northrop Aircraft Inc., Mfr. n.d PHOTO, CREW DECELERATION DEVICE.

ABSTRACT: This is a human decelerator--a device built in 1947 for producing and studying the effects on human beings of the conditions that occur in crashing, ditching, and parachute-opening shock. Controlled decelerations up to 50 G for a duration of 0.1 second can be obtained. (coming to a full stop in 3 ft from 60 mph is equal to 46.6G)

This 1500 lb tubular--steel carriage operates on a 2,000 ft railroad track. Speeds up to 200 mph are attained by using 1 to 4 rocket motors. This decelerator is now in the museum at Wright-Patterson AFB, Ohio.

3,798

Northrop Aircraft, Inc. Sept. 1946 INVESTIGATION OF BRAKE SHOES FOR CREW DECELERATION DEVICE, PROJECT 27. 25 Sept. 1946 (not prepared for distribution)

3,799

Northrop Aircraft, Inc. Oct. 1947 STATUS REPORT - CREW DECELERATION DEVICE, PROJECT 27. Rept. No. SP-1, 31 October 1947

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Northrop Aircraft, Inc. 1955 NORTHROP DEMONSTRATION DECELERATOR
Northrop Aircraft, Inc., Report Nr NAI-55-821, September 1955.

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Northrop Aircraft, Inc. 1955 EQUIPMENT FOR ABRUPT DECELERATION EXPERIMENTATION (Northrop Aircraft, Inc.,) Rept. NAI-55-202, Feb. 21, 1955

3,802

Northrop Corporation 1960 THE SPACE STABILITY SIMULATOR, AN ADVANCED CONCEPT IN SPACE TRAINING DEVICES DESIGNED AND ENGINEERED BY ADVANCED SYSTEMS SECTION (Norair Division, Hawthorne, California) June 1960

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Norton, F.H. and E.T. Allen 1921 ACCELERATIONS IN FLIGHT.
(National Advisory Committee for Aeronautics) NACA Rept. No. 99.

3,804

Norton, F.H. and F.P. Warner 1921 ACCELEROMETER DESIGN.
(National Advisory Committee for Aeronautics) NACA Rept. No. 100

3,805

Norton, F.H. & T. Carroll 1923 THE VERTICAL, LONGITUDINAL AND LATERAL ACCELERATIONS EXPERIENCED BY AN S.E. 5A AIRPLANE WHILE MANEUVERING. (National Advisory Committee for Aeronautics, Washington, D.C.) NACA Rept. No. 163.

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Norton, T.W., & L.E. Manning 1932 THE PHYSIOLOGY OF ACCELERATION. ASTRONAUTICS, No. 21, 4-6, 20 July 1932

3,807

Noto, E. and G. Sortino 1951 SINDROME DI KUMMEL-VERNEUIL APPARENTEMENTE CONSECUTIVA A INCIDENTE DI VOLO (Kummel-Verneuil Syndrome Apparently Following An Airplane Accident) Rivista di Medicina Aeronautica, Rome, 14:480-484, July-Sept. 1951

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Notterman, J.M. 1960 VISUAL DSICRIMINATION OF VELOCITY AND ACCELERATION (Princeton U., N.J.) Project 9778(805); Contract AF 49(638)-381; AFOSR, DLS

ABSTRACT: Research will be undertaken on the human ability to detect velocity and acceleration differences, and on the relation of perceived to actual velocity as it influences response capability. This exploratory work on the correlation between the human's visual error-detection characteristics and error-correction behavior has as its objectives the addition of new knowledge relating to visual discriminatory processes, and theoretical implications with respect to visual sensory and perceptual mechanisms.

3,809

Numeroso, N. 1951 UN LABORATORIO VOLANTE PER RICERCHE PSICO-FISIOLOGICHE. (A Flying Laboratory For Psychophysiologic Research) Rivista di Medicina Aeronautica, Rome, 14:111-116, Jan.-March 1951

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Nuttall, J. B., & W G. Sanford 1956 SPATIAL DISORIENTATION IN OPERATIONAL FLYING. (Directorate of Flight Safety, USAF) Publication M-27-56, 12 Sept. 1956

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Nuttall, J. B. 1958 THE PROBLEM OF SPATIAL DISORIENTATION. J. American Medical Assoc. 166(5):431-438, Feb. 1958

ABSTRACT: Eighteen cases of spatial disorientation due to illusions of attitude and motion are summarized in this article and used to illustrate the

frequency with wnich this type of disorientation causes aviation accidents. The following factors contributing to the illusions of attitude and motion are considered: (1) misinterpretation of gravitational forces, (2) erroneous sensations of rotation, and (3) Coriolis acceleration, or the illusion caused by head movement. The recommendations which are made concern the more thorough indoctrination of pilots in the causes of spatial disorientation and the necessity for better cockpit designs.

ACCELERATION

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3,812

Oakes, W. F., & J. H. Hollis 1959 EFFECTS OF ACCELERATION FORCES ON LEVER PRESSING BY THE WHITE RAT. Psychol. Rept. 5:143-147

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Oberth, H. 1929 CITES TSIOLKOVSKII ON IMMERSION IN LIQUID TO COUNTERACT G
In Wege zur Raumschiffahrt (Munich: Oldenburg, 1929) p. 108

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Oberth, H. 1929 ACCELERATION
In Wege zur Raumschiffahrt (Munich: Oldenburg, 1929) pp. 90-99

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Oberth, H. 1954 MENSCHEN IM WELTRAUM
(Dusseldorf: Econ, 1954)
English Translation: MAN INTO SPACE
(New York: Harper, 1957)

3,816

Oberth, Hermann 1957 MAN INTO SPACE, NEW PROJECTS FOR ROCKET AND SPACE TRAVEL.
(New York: Harper, 1957)

ABSTRACT: "One of the earliest and most widely known of the rocket research pioneers gives here some of his theories regarding man's first ventures into space. He discusses rocket satellites, the equipment necessary for individual survival, and the construction of space stations and vehicles for exploration of the moon..." (Booklist 53:553, July 1957)

3,817

O'Bryan, T.C., & H.G. Hatch 1959 LIMITED INVESTIGATION OF CRUSHABLE STRUCTURES FOR ACCELERATION PROTECTION OF OCCUPANTS OF VEHICLES AT LOW IMPACT SPEEDS. (National Aeronautics and Space Administration, Washington, D.C) NASA Technical Note D-158, Oct. 1959. ASTIA AD 227 649

ABSTRACT: A limited investigation was made to determine the characteristics of three materials to see how they can be applied for human protection against accelerations encountered at low impact speeds. As a result, if given man's physiological tolerance to abrupt acceleration, which has not yet been well defined, an alleviation system can be designed. Foamed plastics require considerable depth to provide a given stopping distance for impact alleviation and their use would require some control of rebound. They can be made soft enough to obtain the low onset of acceleration that may be necessary for man where depth is not limited. Aluminum honeycomb is an efficient material for impact load alleviation from the standpoint of usable material depth and it exhibits very little rebound. The stiffness of the material results in a very high initial onset rate of acceleration. For many installations this may be controlled by reducing the initial loading area of contact to get the material to start failing. (Author)

3,818

O'Donnell, A. 1958 LIST OF R.A.E. TRANSLATIONS ISSUED UP TO 30TH SEPTEMBER, 1958 (Royal Aircraft Establishment, (Farnborough) Ministry of Supply, London, W.C. 2) Library Bibliography No. 208 October, 1958 ASTIA AD 214325

ABSTRACT: This list supersedes the previous list (Library Bibliography No. 191). A number of the earlier translations in this list were subsequently issued as R.T.P. Translations, and have only been included for completeness.

3,819

O'Donnell, A. 1961 LIST OF R.A.E. TRANSLATIONS ISSUED UP TO 30TH SEPTEMBER, 1961. (Royal Aircraft Establishment, Farnborough) Library Bibliography No. 231, Oct. 1961. ASTIA AD 266614

ABSTRACT: This list supersedes the previous list (Library Bibliography No 225). A number of the earlier translations in this list were subsequently issued as R.T.P. Translations, and have only been included for completeness.

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Ogg, Richard N. 1957 PILOT DESCRIBES STRATOCRUISER DITCHING. Aviation Week, 66(12):133-142, 25 March 1957

3,821

Ogle, D.C. 1952 NEW CONCEPTS IN AVIATION MEDICINE Military Surgeon, 110(2): 87-91

ABSTRACT: The first part of the paper is dedicated to a brief review of the advances and problems of aviation medicine. Aviation medicine is not-as it is widely believed- a "general practice" type of medical endeavor; it is a science and a profession in its own right, tying together a variety of branches of medical and related natural sciences as well as engineering and such remote fields as astronomy and meterorogy. - In the second part the author discusses briefly, but in more detail, techniques developed recently to determine the effects of aging on flight personnel. A laboratory method is discussed for measuring the degree of physiological aging by making use of the correlation between the cholesterol content of the blood and arteriosclerosis (atheromatosis In conclusion, periodical, standardized, and exhaustive physical tests of pilots and airplane crews are recommended.

3,822

Ogle, D.C. 1957 PEOPLE FOR SPACE VEHICLES: SPACE MEDICINE. In: The Age of Space, pp. 25-29. (Birmingham, Ala: Southern Research Inst. 1957)

ABSTRACT: Many areas must be fully studied before the selection and training of human candidates suitable to withstand the traumatic influence of prolonged space living. These include the provision of air, water, food, and recreation within the sealed space vehicle as well as devising a means of waste elimination . Consideration must also be given to the protection of the astronauts from accelerative and decelerative forces; management of monotony and the break-off phenomenon, and protection from the hazards of magnetic storms, cosmic and ultraviolet radiations, temperature extremes, and meteorites.

3,823

Ogle, D. C. 1957 MAN IN SPACE VEHICLE
U. S. Armed Forces Med. J. 8(11):1561-1570, Nov. 1957.

ABSTRACT: Discusses the hazards of the upper atmosphere and the physiological forces acting on man during a flight in space.

3,824

Ogle, D.C. 1958 THE THRESHOLD OF SPACE. AUQR 10:2-6.

ABSTRACT: An introduction to the AUQR's special issue 'The Human Factor in Space Travel."

3,825

Ohmura, Y., M. Kawamata & M. Oshmia, Eds. 1959 SPACE MEDICINE
Summary trans. of mono. Uchu Igaku, Tokyo, 1959.
(Office of Technical Services, W shington, D.C.)
June 24, 1959 59-18432

ABSTRACT: The summary translation consists of the title of the book, the preface, the table of contents, which lists 20 chapters by 37 authors, and the translation of 2 Japanese reference titles.

3,826

Okunev, R. A. 1961 EXPERIMENT ON THE USE OF HYPNOSIS AND SUGGESTION FOR THE PROPHYLAXIS AND TREATMENT OF MOTION SICKNESS. Voyenno-meditsinskiy zhurnal 1961(12):72

ABSTRACT: The author carried out a special investigation to study the effectiveness of hypnosis in the prophylaxis and treatment of motion sickness in artificial (revolving in a Barani chair) a natural (sea travel) conditions. Sea sickness was considerable reduced, treatment effectiveness being directly proportional to the depth of the induced trance. After the treatment course, which averaged about 30 sessions, booster sessions were necessary at least twice weekly to maintain effectiveness. No harmful effects of treatment were recorded and machine conducted sessions were as effective as those conducted by a medical hypnotist.

3,827

Oliver, R.E. 1957 THE DESIGN OF THREE HORIZONTAL MOMENTUM EXCHANGE WATER BRAKES FOR THE U.S. NOTS 'SNORT' LIQUID ENGINE SLED (AER, Inc., Pasadena, Calif.) Contract N123(60530)11868A), NOTS TP 2390, NAVORD rept. no. 7024, Dec. 1957, ASTIA AD-236 335

ABSTRACT: Three momentum exchange water brakes were designed to produce decelerations of 10.0g $\pm$ 1.0g, 5.0g $\pm$ 0.5g, and 2.5g $\pm$ 0.25g for sled weights of 4,254, 4,254, and 10,800 lbs respectively, and water-contact velocities of 1,250, 1,250, and 636

ft/sec respectively. These decelerations were to be maintained until the sled velocity decreased to 300 ft/sec. The water surface profile was not specified beforehand, but was determined in conjunction with the design of the scoop shapes. One water surface profile was to be used for all three brakes. The combination of scoop shapes and water surface profile was obtained as a compromise between simple strong-scoop designs and minimum changes in the water surface from the 'natural' profile. This aspect of the design required the calculation, by numerical methods, of several sled trajectories (space-time histories). A primary consideration in the structural design of the brakes was simplicity. The stress analysis was carried out on the basis of a design stress of one-half the ultimate stress of the material. (i.e., a safety factor of 2.0 based on ultimate strength). In order to provide an experimental check on the predicted forces on the brakes, force-measuring mounts were included in the design. (Author)

3,828

Olmer, D. & I. Jacques 1928 TRANSIENT INCREASE IN BLOOD PRESSURE AND DECREASE IN PULSE RATE PRODUCED BY LEANING FORWARD
Compt. Rend. Soc. de Biol. 99: 169-170

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Olmer, D. & I. Jacques 1928 [TRANSIENT TACHYCARDIA CAUSED BY LEANING FORWARD.]
Compt. Rend. Soc. de Biol. 98:1141-1144, April 1928.

3,830

Olof, Perey 1962 BIOMECHANICAL PROBLEMS OF THE LUMBAR SPINE
(In: Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, pp. 25-26)

ABSTRACT: This paper is a detailed report of studies made on injuries to the vertebral column. The authors studied fractures of several age groups of the vertebral end-plates. Also, the static stress which can be tolerated by the lumbar veryebrae was a subject of research.

3,831

Olson, O. C. 1945 MEETING OF THE 4TH CRASH INJURY CONFERENCE OF THE COMMITTEE ON AVIATION MEDICINE OF THE NATIONAL RESEARCH COUNCIL. (Aero Med. Lab, Air Tech. Service Command, Wright Field, Ohio) Memo Report TSEAL-3-698-32, 10 March 1945.

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Oppenheimer, M.J. & E.A. Spiegel 1940 ACQUISITION OF CONDITIONED REACTIONS TO ANGULAR ACCELERATION AFTER CORTICAL LESIONS
Proc. Soc. exper. Biol. a. Med. 45:411-420 1940

3,833

Ordway, F. I., III, & H. E. Canney, Jr. 1955 THE RESPECTABILITY OF ASTRONAUTICS AS REFLECTED BY RECENT DEVELOPMENTS IN THE UNITED STATES. In Hecht, F., ed., Bericht uber den V. Internationalen Astronautischen Kongress, Innsbruck, 5-7 Aug. 1954 (Wien, 1955) pp. 226-247

ABSTRACT: Traces the activities of various scientific disciplines toward the space flight goal.

3,834

Ordway, F. I., III, & H. E. Canney, Jr. 1955 PHYSICAL AND MEDICAL RESEARCH OF THE UPPER ATMOSPHERE AND APPROACHES TO SPACE. In Hecht, F., ed., Bericht uber den V. Internationalen Astronautischen Kongress, Innsbruck 5-7 Aug. 1954 (Wien, 1955) pp. 238-244

3,835

Ordway III, F.I., & H.E. Canney, Jr. 1955 ASTRONAUTICS IN THE UNITED STATES Journal of Astronautics 2:9-13 Spring; Summer, pp 57-61, 77.

ABSTRACT: Part I quotes and comments on the ideas of some leading rocketeers on the possibilities of space flight; Part II discusses US developments in the field.

3,836

Ordway, F.I., III 1958 A SURVEY OF ASTRONAUTICAL PERIODICALS
Sky and Telescope 17:169-171, Feb. 1958

ABSTRACT: Surveys the leading periodicals, arranged by country, that are devoted primarily to rocketry and astronautics. Many include space flight and artificial satellite material.

3,837

Ordway, F. I., III, J. P. Gardner, and M. R. Sharpe, Jr. 1962 BASIC ASTRONAUTICS: An Introduction to Space Science, Engineering, and Medicine. (Englewood Cliffs, N. J.. Prentice-Hall, Inc., 1962) (In C. W. Besserer and F. E. Nixon, Eds., The Prentice-Hall Space Technology Series, Mar. 1962).

3,838

Ordway, F. I. 1962 ANNOTATED BIBLIOGRAPHY OF SPACE SCIENCE AND TECHNOLOGY, WITH AN ASTRONOMICAL SUPPLEMENT.
(Washington Arfor Publication, 1962)

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O'Reilly, J.N. & S.R. Gloyne 1941 BLAST INJURY OF LUNGS The Lancet 241:423-8, Oct 11, 1941

3,840

Orlacchio, A. W., & G. Hieber 1957 ACCELEROMETERS--WHICH TYPE FOR THE JOB? Electron. Industr. & Tele-Tech 16:75-77, March 1957

ABSTRACT: The acceleration range, frequency response and accuracy of seven types of accelerometers are discussed. Ambient temperature conditions are also considered.

3,841

Orlacchio, A. W., & G. Hieber 1957 TRENDS IN ACCELERATION MEASUREMENT IRE Trans. I-6(2):93-98, June 1957

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Orlebar, A. H. 1933 DISCUSSION OF THE PAPER "The Physiological Limitations of Flying." J. Roy. Aero. Soc. 36:402.

3,843

Ormerod, F.C. 1960 FUNCTION OF THE INNER EAR
(London U, Gt. Brit.) Contract AF 61(052)-221; Project 9777(805); AFOSR, DLS

ABSTRACT: The objective of this research is to elucidate the mechanism by which physical energy is transformed into nerve activity within the inner ear, particularly of the vestibular portion. The composition of the intimate structures of this area will be investigated, as well as the nature of their secretory products. Chemical substances known to alter the function of the ear will be applied and their effects on the secretory epithelium explored by isotopic techniques. Physiological and histological changes after degeneration of certain nerve fibers will be followed. These experiments will be done in various normal, injured and congenitally abnormal animals.

3,844

Orr, W.A. and J.W. Tucker 1958 GETTING MAN INTO SPACE
Aviat. Age 28:30-31, 102-105, March 1958

ABSTRACT: An overall view of the problems involved in space flight.

3,845

Orr, W. A. & J. W. Tucker 1958 DEVELOPMENT OF MANNED SPACE FLIGHT
Aviatiion Age 28:14-20, March 1958.

ABSTRACT: A visual summation of the many factors determining the development of manned space flight.

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Osborn, G.R. 1941 PULMONARY CONCUSSION ("BLAST") Brit. Med. J. 1:506-510

3,847

Ostroumov, G. 1961 AN INTERVIEW WITH YURI GAGARIN
Soviet Rev. 2(5):47-52, May 1961.

ABSTRACT: An interview with the world's first astronaut, Yuri Gagarin, as reported in Izvestia on April 14, 1961, is reprinted here. Questions relating to the astronaut's emotional reactions toward his mission, sensations on weightlessness, what he could see from the spaceship, and various personal items are answered. (Tufts)

3,848

O'Sullivan, J. J. 1958 SPACE FLIGHT GROUND FACILITY REQUIREMENTS PROBLEMS - LAUNCHING FACILITIES.
(The RAND Corporation, Santa Monica, California) Rept. No. P-1431, 24 February 1958.

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Oswald, W.C. 1957 JEEP SEAT RIDE TEST
U.S. Army Contract No. DA-11-022-ORD-2480 14 Oct. 1957

3,850

Ozolins, G. and V. Pelipeiko 1960 CILVEKS PASAULES TELPA (Man in Space)
Astronomiskais kalendars 1960 gadam (Rīga), 8:102-112, (in Latvian).

ABSTRACT: This is a status report of the progress made towards space flight in the past year. Findings from laboratory experiments, rocket flights, and artificial satellites are briefly summarized in regard to the biological effects of weightlessness, g-forces, dysbarism, oxygen regeneration, etc. It is suggested that the gas exchange cycle may be better maintained by an artificial atmosphere of an oxygen-helium mixture, wherein nitrogen is replaced by helium. Among the problems raised are (1) the importance of maintaining the diurnal cycle on longer flights, (2) the movement of air within the cabin, and (3) the possible reaction of the human organism to the lack of rare gases in the cabin atmosphere.

ACCELERATION

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3,851

Pace, N. 1958 PROBLEMS IN SPACE PHYSIOLOGY
Publ. Astronaut. Soc. Pacific, 70(415):349-359, Aug. 1958.

ABSTRACT: A review of problems encountered in space flight including air content and pressure, waste disposal, food and water, radiation, g tolerance, and weightlessness.

3,852

Page, H. E. 1950 VERTIGO INCIDENCE AMONG NAVAL AVIATORS
(Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 110 500. 16., 15 March 1950

3,853

Palmer, D.F. 1961 AN ACCURATE SHOCK CALIBRATOR FOR ACCELEROMETERS (Sandia Corp.) SCTM 96-61 (73)

ABSTRACT: A pendulum device using a force transducer is found to be an accurate shock calibrator for accelerometers.

3,854

Palmer, M. A., & R. S. Harper 1955 TECHNICAL PHOTOGRAPHY (HIGH SPEED - BLAST BIOLOGY) (U. S. Atomic Energy Commission, Wash., D. C.) Operation TEAPOT Rept. WT-1197, Dec. 1955 ASTIA AD-109 762

ABSTRACT: "The purpose of this project was to provide the photographic requirements for Civil Effects Test Group projects concerned with the biological phenomena of blast. Preshot and postshot photographs were obtained of animals and/or structures utilized by the above projects. High-speed motion picture sequences of group-shelter interiors containing animals were attempted-two during Apple I and two during Apple II. Traid 16-mm cameras were utilized at a speed of 200 frames sec. Cameras started at H-2 sec and ran for a total of 20 sec. For various reasons, only one of the sequences was at all successful. Medical photographs of gross

specimens were obtained at the time of autopsy of experimental animals. Documentary and technical photographs were obtained for a project studying missile behavior Styrofoam cells showing evidence of missile penetration were photographed in a specially constructed grid providing a system of coordinates for accurate reference A recommendation for such a project to maintain on-site processing facilities was made. Several conclusions were drawn regarding changes necessary to better assure motion picture results under extreme circumstances."

3,855

Palmer, M. A. 1958 HIGH-SPEED MOTION PICTURE PHOTOGRAPHY AS AN AID IN BIO-MEDICAL INVESTIGATION. (London: Pergamon Press, 1958) AGARDograph 25

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Palmisano, C. 1951 STUDIO DEL TONO LABIRINTICO E DEI RIFLESSI VEGETATI-VOLABIRINTICI IN SOGGETTI IMBARACTI SU NAVI DI SUPERFICIE E STUDIO DELLE VARIAZIONI DELL'ECCITABILITA VESTIBOLARE PER LO STI'MOLO FIXICO DI MOVIMENTI NAVE NELLA NAUPATIA (Labyrinth Tone and Autonomic Labyrinth Reflexes in Sailors and Variations of Vestibular Excitability Due to the Physical Stimulus of Ship Movements in Seasickness)
Annali di medicina navale e coloniale (Rome) 56(4): 424-426. July-Aug. 1951.

3,857

Pando, M. Velasco 1958 [ARTIFICIAL SATELLITES AND INTERPLANETARY TRAVEL: PHYSIOLOGICAL EFFECTS OF CHANGE IN GRAVITY.]
Revista de la Real Academia de Ciencias de Medris 52(2):141-145

ABSTRACT: A corrected and extended version of an analytical study on the launching of space rockets. Attempts to correlate a mathematically basic physiological and physical parameter.

3,858

Paolucci, G. 1961 [BODY LESIONS IN RELATION TO DECELERATION VALUES AND IMPACT TIME]
Rivista Di Medicine Aeronautica E Spaziale 24:234-244.

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Paolucci, G. 1961 [CORPOREAL LESIONS AS A FUNCTION OF DECELERATION VALUES AND DURATION OF IMPACT]
In Riv. Med. Aero. 24:234-244, April-June 1961 (Italy)

3,860

Pape, R. W., & D. E. Goldman 1960 OBSERVATIONS ON DAMAGE TO EXPERIMENTAL ANIMALS EXPOSED TO MECHANICAL VIBRATION. (Paper, 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960)

ABSTRACT: Anesthetized male cats have been exposed to mechanical vibration in the range from 5 to 20 cps. Pulmonary hemorrhage and evidence of traumatic myocardial damage may occur if the acceleration exceeds about 5 G for a sufficient time. Both the frequency and severity of the injuries increase as the acceleration increases. When the acceleration exceeds about 10 G, death may result from the exposure. Minimal injury is indicated by delayed changes in cardiac potentials, which may, however, be reversible. Confirmatory evidence is obtained from post mortem and histological examination of tissues. Other observations have revealed a definite effect of the method of supporting the animals during exposure. (Aerospace Med. 31(4):317)

3,861

Pappas, Angelo 1961 REPORT OF HAZARD CLASSIFICATION TEST ON ROCKET CATAPULT MK2
(Ogden Air Materiel Area, Hill Air Force Base, Utah) November 1961
OOY-TR-61-44 ASTIA AD 267 292

ABSTRACT: The Safety and Inspection Branch requested the Explosives Evaluation Branch to conduct the necessary tests to establish the hazard classification of the completely assembled Rocket Catapult MK 2 used in the F-106A and F-106B aircraft.

To establish the hazard classification of the complete assembly, tests were devised to determine if propagation would occur between explosive items. One rocket motor of a catapult in a shipping container was primed and detonated to determine if propagation would occur between the two rocket motors of the catapult within the container.

Tests to determine propagation from one container to another were not performed because no propagation occurred within the single container.

The cook-off tests to determine the effect of fire on the firing mechanism, igniters and rocket motors resulted in ignition of one or both of the twin rocket motors of the catapult.

In the cook-off tests, five rocket motors ignited out of the six tested. Three catapults were used each containing two twin rocket motors.

As a result of these tests it is recommended that the explosive hazard classification of Quantity Distance Class 2, Storage Compatibility Group F and ICC Class B be assigned to the Rocket Catapult MK 2.

3,862

Parin, V. V. 1957-1959 O DEYATEL'NOSTI AKADEMII MEDITSINSKIKH SSU ZA 1957-1959 GG. (Activity of the Academy of Medical Sciences USSR in 1957-1959)
(Trans. of Akademiya Meditsinskikh Nauk SSSR. Vestnik, 15(5):8-22, 1960)
(Office of Technical Services, Washington, D.C.) 60-41255

3,863

Parin, V.V. 1959 CERTAIN OUTCOMES AND FUTURE PROSPECTS OF RADIOELECTRONICS EMPLOYMENT IN MEDICINE AND BIOLOGY
(Trans. of Akademiya Meditsinskikh Nauk SSSR. Vestnik, 14(5):27-40, 1959)
(Library of Congress, Washington, D.C.) 59-13768

3,864

Parin, V. and V. Yazdovskiy 1959 COSMIC BIOLOGY
Trans. of Bol'shaya Meditsinskaya Entsiklopediya (USSR) 13:1176-1182, 2d ed., 1959.
July 13, 1960 JPRS: 5029

ABSTRACT: The accumulation of experimental data by means of rockets and artificial earth satelities has made it possible to solve many medical-biological problems associated with the penetration of man into space.

3,865

Parin, V. V. 1960 MAN IN SPACE
Tekhnika molodezhi 1960(11):19

ABSTRACT: The author describes the problems still to be solved before man can expect to set out on space travels. These problems include environmental effects upon the organism and the elaboration of methods and means to ensure its normal functioning. In the first place it is necessary to study, in all details, the factors of the means intended to safeguard the vital action of the organism and general flying safety. The knowledge of acceleration effects if also of importance. Seclusion over a long time in an isolated and narrow room, as is the flyers' cabin, is apt to cause severe psychological complications. The absence of habitual stimuli, the complete silence, darkness, weightlessness, perturbation in the normal alternation of day and night, work and rest, may cause distrubances in the psychic sphere and in blood circulation as well. Food and water supplies are one of the main problems, and so is the study of nutritive conditions. The conquest of space has to go through three stages: instruments, animals, man. The first two stages are being pushed on by powerful efforts, and have already yielded abundant and valuable material. While man has not yet launched on space travels himself, he has nevertheless succeeded in gaining insight into the mystery of space thanks to the latest complicated trials.

3,866

Parin, V.V. 1960 MAN WILL FLY TO THE STARS
Trans. of Zdorov'e (USSR) 6(11):2-3, 1960.
(Office of Technical Services, Washington, D.C.)
April 3, 1962 62-24914

3,867

Parin, V.V., M. Naydenov and others 1960 ELECTRONICS IN BIOLOGY AND MEDICINE
(Trans. from Znaniye-Sila (USSR) (4):8, 10-11, 1959)
(Office of Technical Services, Washington, D.C.) 60-11874

3,868

Parin, V.V. 1960 ON THE EVE OF THE SOLUTION OF THE PROBLEM
Trud P. 2; 17 May 1960.

3,869

Parin, V. V., V. N. Chernigovskii, & V. I. Iazdovskii 1960 SOME RESULTS AND PERSPECTIVES OF RESEARCH IN THE AREAS OF COSMIC BIOLOGY. Izvestiia Akademii Nauk SSSR, Seria Biologicheskaia 25(1):3-18, Jan.-Feb. 1960
German Translation: Sovietwissenschaft: Naturwissenschaftliche Beitrage (Berlin) No. 7:677-689, July 1960
Abstract: Aerospace Medicine 31(11):958, Nov. 1960

ABSTRACT: The first stage of Soviet studies in cosmic physiology consisted in launching six rockets with two dogs in each. In this experimental series the possibility was proved of animal survival in a hermetic cabin during a rocket flight to an altitude of 100 km at a velocity up to 4212 km/hr. In the second series (nine rockets with two dogs in each) it was shown that the animals can be rescued when kept in nonhermetic cabins, by catapulting from altitudes as high as 100 km, and at velocities of 700 to 725 m/sec, as well as from 50-km altitudes, and velocities ranging from 1000 to 1150 m/sec. During the flight the condition of the animals was physiologically quite satisfactory. In the third series the altitudes were increased to 200-212 km, and some details of the experiment were modified. The results were on the whole similar to those referred to previously. Similar results have also been obtained from dogs in further experiments at altitudes up to 450 km. The experiment carried out on the second artificial Soviet satellite (Sputnik II) rendered it possible to study the effect upon the organism of acceleration, noise, and vibrations from the moment of launching up to entering the orbit as well as of prolonged absence of gravitation during the orbital flight. The general conclusion to be drawn from the biological experiment on the second Sputnik is that conditions still more like those of cosmic flight than those obtained in rockets are fairly well tolerated by highly organized

animals. The experiments should therefore be continued and extended still more actively. To solve the problem of the flight of the first cosmic ship with a man aboard, it is necessary to develop scientifically grounded principles of selection of people for this purpose. As to regeneration of the air, food provision, water supply, elimination of excretions, these questions are to be considered as more or less settled for relatively short cosmic flights. Prolonged journeys necessitate the development of devices which would transform the cosmic ship into a kind of a closed microcosm with its own cycle of substances.

3,870

Parin, V. 1960 GREAT EVE
Izvestiya P. 3; 17 May 1960.

3,871

Parin, V. V. 1960 FASTER AND HIGHER
Zdorov'ye (Moscow) 5:1-2, May 1960

ABSTRACT: The author recounts a number of electronic, atomic, and other marvels which would confront this man, after which he discusses the conquest of space, one of the most intriguing of contemporary problems. Space medical scientists have concluded that the efficiency and normal activity of a human organism is not disrupted in any way as a result of weightlessness. A long period of weightlessness may cause an inaccurate idea of the position of articles in space, a sensation of falling, mild vertigo, and weakness. All these manifestations are the result of disturbance of the normal function of the organs of equilibrium and the apparatuses of perception situated in the skin, muscles, tendons, etc. Sufficient data on the effects of acceleration on the organism have been collected. Experiments in which dogs were sent to altitudes of 100-450 kilometers, performed in the USSR since 1950, have made it possible to conclude that a living organism tolerates accelerations satisfactorily if it is placed in the cabin in the proper position. The action of G forces can be reduced considerably if special compensating garments which compress certain parts of the body and prevent vessels from being overfilled with blood, are worn. (CARI)

3,872

Parin, V. 1960 GET TO KNOW: SPACE BIOLOGY
Trud P. 3; 15 October 1960.

3,873

Parin, V. 1961 THANKS TO THIS DAY LIFE IS WORTH LIVING
Vestnik vozdushnogo flota 4: 53-55

3,874

Parin, V.V. & V.I. Iazdovskii 1961 PUT' SOVETSKOI KOSMICHESKOI FIZIOLOGII (Advances in Space Physiology in the Soviet Union)
Fiziologicheskii zhurnal SSSR (Moskva) 47(10): 1217-1226, Oct. 1961

ABSTRACT: The first and second stages of animal experiments in Soviet space medicine and biology were carried out with rocket flights. Satisfactory data were obtained on physiology and behavior under space-equivalent stresses and on the adequacy of heremetic cabins, cabin equipment, space suits, and recovery equipment. The orbital flight of the dog, Laika, confirmed that a highly organized organism can survive space flight in a satisfactory condition. Other satellite flights with different types of animals allowed continuous observations of their condition throughout the flight and during landing. The final stage was preceded by the selection and training of cosmonauts. The training program subjected the cosmonauts to simulated stresses gradually increasing in intensity until the levels expected in space were exceeded. Careful medical observations were made throughout the training. The results of this preparation were seen in the successful flight of Gagarin. In Titov's flight prolonged weightlessness affected his vestibular sense organs but not his efficiency. Recovery after the flight was rapid.

3,875

Parin, V. V. and V. K. Yazdovskii 1961 ADVANCES IN SOVIET SPACE PHYSIOLOGY. LIFE SUPPORT SYSTEMS: SOVIET LITERATURE.
Trans. of Fiziologicheskii Zhurnal (USSR) 47(10):1217-1226, 1961.
(Office of Technical Services, Washington, D.C.)
July 3, 1962 62-32110

3,876

Parin, V. 1961 TRAINING FOR SPACE FLIGHT
Znaniye - sila 1961(4):23-24

ABSTRACT: The article comments on the suggestion advanced recently by a group of American scientists of creating a "cyberneticized man". Such a man could function normally in space on, say, the moon without the encumbrance of a space suit. However, there is no guarantee that he would function benignly for prolonged periods. Better results, would be achieved by pretraining future astronauts to function under space conditions. Proper physical and psychological training of the astronaut is the best preparation for space flight, together with the development of all devices and equipment necessary to sustain life. Man can withstand

considerable gravitational stress if he is located transversely to the rocket's line of movement so that the stress acts laterally and not from head to foot along the body. Repeated exposure to acceleration was found to increase the subject's endurance. Automatic devices incorporated in the spacesuit could be set to constrict certain parts of the body depending on the acceleration. American scientists the author feels, underestimate the body's physiological and mental reserves. (CARI)

3,877

Parin, V. V. 1961 THE ROLE OF SPACE MEDICINE IN REALIZING THE FIRST MANNED SPACE FLIGHT. Meditsina i kosmicheskiye polety; sbornik 1961(9):4-12

ABSTRACT: The space flight by Yuriy Gagarin was the final stage of the initial period of space exploration, i.e., that of becoming familiar with space conditions Investigations were started 10-12 years ago into space medicine and biology. Dogs and small animals were used to ascertain the physiological reactions of space conditions. Acceleration from zero to first cosmic velocity with its displacement effect was one factor of great physiological importance. Another factor was the vibration transferred from the rocket to the beings in the capsule. The animal tests indicated that manned space flight in Soviet space-ships did not endanger health and working capacity of the astronaut. (CARI)

3,878

Parin, V. V. 1961 COSMOS -- EARTH.
Trans. of Ogonek (USSR) 39(17):26-27, 1961.
(Office of Technical Services, Washington, D.C.)
Jan. 21, 1963 63-15529

ABSTRACT: A nontechnical review of Soviet space biology experiments.

3,879

Parin, V. V. 1961 HOW THE FLIGHT WAS READIED.
Trans. of Zdorov'e (USSR) 7(6):4-5, 1961.
(Office of Technical Services, Washington, D.C.)
Jan. 18, 1963 63-15525

ABSTRACT: An account on medical and biological experiments, performed in preparation for the Soviet manned space flight program.

3,880

Parin, V. 1961 BIOLOGY AND SPACE.
Translated by Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio. Trans. no. FTD-TT-61-168, 21 November 1961 of Izvestiya, p. 6, 28 March 1961. ASTIA Doc. No. AD-267 714.

ABSTRACT: This report is a record of the problems solved by Soviet scientists in the field of space biology and medicine.

3,881

Parin, V.V. 1961 PRIMENENIE RADIOELEKTRONIKI V MEDITSINE I BIOLOGII
(Application of Radio-Electronics to Medicine and Biology)
(Trans. of mono. Elektronika v Meditsine (Electronics in Medicine) Moscow/Leningrad, p. 19-37, 1960)
(Office of Technical Services, Washington, D.C.) 61-28051

3,882

Parin, V. 1961 [BIOLOGY, TECHNIQUES AND SPACE]
Przeglad techniczny 1961(31):6-7

ABSTRACT: The article describes and praises Soviet space achievements, broadly outlines the need for close cooperation between the various scientific fields participating in the space program and the training of cosmonauts. After mentioning the April 12, 1961 flight of Gagarin, the author points out that a new science has been created as a result of the exacting demands of cosmic flight-space biology and medicine. In contradiscinction to the former concepts of biology, space biology and medicine are closely related and combine a number of other fields. A number of factors may influence the living organism in space. These were first determined in animals by the radiotelemetering method. The results of these first investigations in space physiology showed that during flight, right up to peak velocity and again during the space vehicle's deceleration period, the living organism is subjected to great strains on the heart and careful increase in acceleration; careful medical control was carried out during all training stages, assuring the perfect health of the cosmonaut. (CARI)

3,883

Parin, V. 1962 CAPACITIES OF THE HUMAN ORGANISM: DEFENSE MECHANISMS AND ADAPTATIONS IN CONDITIONS OF MAXIMUM OVERLOAD AND THE STATE OF WEIGHTLESSNESS.
In Perspect Biol. Med. 5:527-533, Summer 1962.

3,884

Parin, V. V. et al 1962 DEVICES TO PROTECT THE ORGANISM FROM G-FORCES AND IN THE WEIGHTLESS STATE.
Trans from Meditsinskli Rabotnik (USSR) 25:3, Feb. 6, 1962.
(Office of Technical Services, Washington, D.C.)
March 21, 1962 62-24337

3,885

Parin, V. V., V. I. Yazdovskiy, & O. G. Gazenko 1962 [EFFECT OF G FORCES ON THE CENTRAL NERVOUS SYSTEM](USSR) Meditsinskiy rabotnik, 6 Feb. 1962, p. 3, cols. 3-5

ABSTRACT: It is noted that reactions of astronauts to acceleration in actual space flight are more marked than indicated by data obtained in centrifuge tests and that the accompanying emotional stresses affect the response of the organism to various physical factors. In view of this, a study has been undertaken to determine the mechanism by which G forces affect the central nervous system. Certain pharmacological agents have been used to lessen or change the bioelectric reaction of the respiratory and cardiovascular systems to effects of excess G's. The ultimate goal of this study is to establish objective criteria which would enable biosensors to detect incipient functional disorders and to activate counter measure equipment before physiological malfunctions develop.

3,886

Parin, V. 1962 SPACE MEDICINE REACHES ANOTHER STAGE
Moscow News, April 7, 1962, page 9

ABSTRACT: The author states that the numerous tests of all life-sustaining systems the thorough evaluation of the state of animals during the flights and for a long time after their recovery have led to the conclusion that man's space flight was fully prepared from both the technical and the medical points of view.
Both Gagarin's and Titov's flights opened up wonderful prospects for space research It has become clear that manned space flight can last for many days. The author feels sure that after the creation of a closed ecological system, man will be confronted with unlimited opportunities for the exploration of outer space. (CARI)

3,887

Parin, V.V. & O.G. Gazenko 1962 SOVIET EXPERIMENTS AIMED AT INVESTIGATING THE INFLUENCE OF THE SPACE FLIGHT FACTORS ON THE ORGANISM OF ANIMALS AND MAN. (Paper, 3rd International Space Science Symposium and Fifth COSPAR Plenary Meeting, April 30 - May 9, 1962, Washington, D.C.) NASA N 62-15217.

ABSTRACT: This is a presentation of the results of the biological experiments

conducted on Space ship-satellites II, III, IV, and V and of scientific observations made during Gargarin and Titov's flights aboard space ships Vostok I and II. The physiological reactions to various flight stresses were not fatal. Neither the cosmonauts nor the animals had any observable change in health. The most important task is the study of the influence on the human organism of the various flight stress factors, including emotion strain.

3,888

Parin, V.V., O.G. Gazenko, & V.I. Yazdavkiy 1962 THE POSSIBILITY OF PROTECTIVE ADAPTATIONS OF THE ORGANISM AND LIMITS OF ADAPTATION UNDER CONDITIONS OF MAXIMUM OVERSTRAIN AND WEIGHTLESSNESS. Vestnik Adad. Med. Nauk SSR (Moscow, JPRS-15187, NASA N 62-17962 10 Sept. 1962.

ABSTRACT: A study is made of the possibility of protective adaptations and limits of adaptation of an organism under conditions of maximum overstrain and weightlessness. A study of the rate of blood circulation and oxygen content in arterial blood shows a direct dependence of the degree of blood oxygenation on the rate of circulation. This can serve as evidence of the active participation of the hemodynamics of the lesser pulmonary circulation in blood oxygenation during transverse overloads. As a result of ground experiments and human space flights, the limits of admissible values of prolonged accelerations have been established; and preliminary results on the possibility of raising the physiological tolerance of man to the action of accelerations by the training exercise method have been obtained. An alteration of afferentation was observed under conditions of weightlessness after prolonged space flight. (STAR)

3,889

Parin, V., V. Yazdovskiy, & O. Gazengko 1962 SPACE MEDICINE REPORT FBIS, USSR & East Europe, No. 23, 1 Feb. 1962.

ABSTRACT: The effects of space flight factors and man's potential defensive adaptation mechanisms under the conditions of maximum acceleration and weightlessness were the subject of a paper presented to a current session of the USSR Academy of Medical Sciences in Moscow.

Three groups of factors encountered in outer space are discussed in this paper. The first group of physical factors includes extremely low barometric pressures, ionizing radiations, meteorites, and so on. The second group of factors, depending on the rocket flight itself, include noise, vibration, acceleration, and weightlessness. The third group of factors affecting the cosmonaut depend on conditions inside the spaceship and safety facilities for the crew in flight. Scientists believe that the strongest operating factors of space flight are acceleration, weightlessness, cosmic radiation, and emotional tension. (CARI)

3,890

Parin, V. V., & O. C. Gazenko 1962 SOVIETS GIVE VOSTOK PHYSIOLOGICAL DETAILS Aviation Week and Space Technology, May 28, 1962, pp. 67, 71

ABSTRACT: The first flights of the astronauts were made in paths already tested in launchings of space ships with animals aboard. Animals in this case were specific indicators of danger. Close investigation of animals during flight and after recovery to Earth enabled us to conclude that there are no considerable changes dangerous for life and health of cosmonauts. A combination of physiological methods and the corresponding medical research apparatus was used in order to make studies of the influence of space flight factors on the cosmonaut's organism. During Gagarin's and Titov's flights physiological methods were used chiefly for the purposes of physician's control.
Before the launch, at all the portions of the flight trajectory and after it the Gagarin's health was satisfactory. After lift-off during the gradual increase of velocity of the ship the heart rate increased to 140-158 beats per minute, the respiration rate was 20-26. At the end of the powered period, the heart rate decreased to 109 beats and the respiration rate reduced to 18 per minute. Gagarin pointed out some unusual sensations under conditions of zero-gravity, though no disorders of functions were observed, he felt and performed his program well. When he approached the Earth his respiration became not frequent, smooth and calm. In three hours after landing indices were fixed characteristic of the normal, calm condition of the space pilot. (CARI)

3,891

Parin, V.V. 1962 ROZHDENIE KOSMICHESKOI BIOLOGII (Birth of Space Biology) Priroda (Moskva), (10):9-11. Oct. 1962. In Russian.

ABSTRACT: Beginning with 1949, high-altitude rocket experiments have definitely established the feasibility of manned space flight. During 1960-61 a wide selection of biological objects were tested on Sputniks 3, 4, and 5. A wealth of information has been gained during these flights, which made it possible to take concrete steps toward manned space flight. Since no adverse effects were observed on the first orbital flight in Vostok-1 by Iu. A. Gagarin, it was considered possible to extend the duration of orbital flights. Since G.S. Titov reported vestibular disturbances during the flight in Vostok-2, special corrective measures had to be devised. Subsequent flights of A.G. Nikolaev (Vostok-3) and P.R. Popovich (Vostok-4) have completely vindicated the training methods used previously, and laid a firm foundation for further manned exploration of space. (Aerospace Medicine 34(8):769, Aug. 1963)

3,892

Parin, V.V. 1963 MAN IN COSMOS
Smena, No. 13, 1961, pp. 22-23
(Translation Services Branch, Foreign Technology Division, Wright Patterson AFB, Ohio) FTD-TT-62-1606/1, 17 Jan. 1963. ASTIA AD 295 805

ABSTRACT: Overload is one of the serious problems faced by a cosmonaut during space flight. Scientists are now trying to solve the problem by placing the cosmonaut dressed in an airtight suit into a special chamber filled with liquid. In it, he will be situated in a suspended state. It is hoped that the specific weight of the liquid will become equalized with the specific weight of the cosmonaut and thus, make it possible for him to endure overloads. Observations of animals on board cosmic ships explained that the vital activity of the organism under conditions of weightlessness is normal. One of the yet unsolved problems of space flight is that of radiation. One method under investigation to increase the stability of the organism to radiation is by artificially slowing down the vital processes in the organism. This would be done by cooling the living organism.

3,893

Parin, V.V. 1963 THE COSMONAUT IS FEELING FINE, SAID A SOVIET SCIENTIST
Literaturnaya Gazeta, Aug. 15, 1961, p. 1
(Translation Services Branch, Foreign Technology Division, Wright-Patterson AFB, Ohio) FTD-TT-62-1602/1, Jan. 17, 1963. ASTIA AD 295 798

ABSTRACT: A discussion of the good physical condition of both Yuriy Gagarin and German Titov during and following their space flights provides scientists with a good outlook for future space flights. After the flights, scientists concluded that weightlessness does not interfere with normal activities. Moreover, it does not appear to be a hindrance in manual control of the ship. Furthermore, Titov spent 24 hours in the cabin of the Vostok-2 in which time, day and night changed 17 times. This change in the customary time period had no effect on the health of the cosmonaut. Titov's flight also proved that weightlessness has no adverse effect on the functions of man's organism. Finally, the flight proved that man can without greater strain and without harm live under conditions of cosmos--for a time necessary to carry out such flight.

3,894

Parin, V.V. 1963 IT HAS BEEN ACCOMPLISHED
Smena, No. 7, 1961. pp. 3-4
(Translation Services Branch, Foreign Technology Division, Wright-Patterson, AFB, Ohio) FTD-TT-62-1607/1, 18 Jan. 1963. ASTIA AD 295 805.

ABSTRACT: Behind the flight of Communist Yuriy Alekseyevich Gagarin are years of scientific achievements in the field of space flight. An unforgettable day

was when the first soviet satellite weighing 83.6 kg made a round trip around our planet. From that memorable day, more than three years have passed. The flight of the Dog Layka and later, the first trip of the Zoo-Botanical Garden headed by dogs Byelka and Strelka. Dogs were used instead of monkeys because it is difficult to train a monkey to calm behavior under flight conditions. The blast off of dogs can be carried out without chemically doping their nervous system. After the flights of various dogs, came photography of the reverse side of the moon. Finally, flights of the third, fourth, and fifth cosmic ships. All of these flights brought about the conclusion by scientists that mans flight into the cosmos on board a soviet space ship is connected with no danger to his health or life.

3,895

Parin, V.V. 1963 COSMOS, MEDICINE, MAN
Komosomol'skaya Pravda, 10 March 1961, 1 p.
(Translation Services Branch, Foreign Technology Division, Wright-Patterson AFB, Ohio) FTD-TT-52-1603/1, Jan. 17, 1963. ASTIA AD 295801

ABSTRACT: Four questions were directed to Prof. active member of the Academy of Medical Sciences USSR, V.V. Parin. His answers to the following four questions are contained in this report: (1) What is the characteristic trait of cosmic investigations, carried out in our country? (2) Has the analysis of data obtained during the flight of the second ship-satellite been completed? What new facts have these investigations given to medicine? (3) What is the effect of cosmic flight conditions on the higher nervous activity? (4) Why are dogs employed in the role of experimental animals in cosmic investigations?

3,896

Park, J. 1942 THE CORRELATION BETWEEN SWING SICKNESS AND AIR SICKNESS AND HISTORY OF MOTION SICKNESS.
(British Air Ministry, Flying Personnel Research Comm., Farnborough) FPRC Rept. No. 485, August 1942.

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Park, J. 1942 AIRSICKNESS IN GLIDERS.
(Flying Personnel Research Committee, Air Ministry) F.P.R.C. Rept. 510, December 1942

3,898

Parker, G. H. 1961 ENGAGEMENT LIMITATIONS OF STEEL WIRE WHEN USED AS A VEHICLE ARRESTING DEVICE. (Air Force Missile Development Ctr., Holloman AFB, N. Mex.) MDC TDR 61-38; Proj. No. 6876; ASTIA AD-270 863; Dec. 1961

ABSTRACT: Extensive tests were performed in the past using steel cables with hemp cores as pendants of arresting gear, but little attention was directed towards the limitations of a homogeneous steel wire as the pendant of an arresting device. In a series of sled tests on the Holloman track, limits for successful engagement velocities were partly established for steel wire. The phenomena that exist at the engagement of vehicle and arresting device are considered, and a comparison made of experimental results with predicted theoretical values. (AUTHOR)

3,899

Parker, J.F., Jr. H.E. Price et al. 1957 AVIATION MEDICAL SAFETY TRAINING: RECOMMENDED TRAINING AIDS AND DEVICES (Psychological Research Associates, Arlington, Va.) Technical rept. NAVTRADEVCEN 1339-28-3; 31 Aug. 1957; ASTIA AD-150 185

3,900

Parkin, G.B. 1945 BLOWER TUNNEL TESTS ON THE FLIGHT PATH OF A MAN EJECTED NORMALLY FROM AN AEROPLANE MOVING AT HIGH SPEED. (Royal Aircraft Establishment, Farnborough) Technical Note No. Aero. 1618, March 1945. Appendix 4 to Lovelace, W.R., E.J. Baldes, & V.J. Wulff, The Ejection Seat for Emergency Escape from High Speed Aircraft, ASTIA ATI 7245

SUMMARY: Blower tunnel tests have been made to determine the flight path of a man when ejected with the seat from an aircraft. It has been found that for the pilot to clear safely the tail unit of a Meteor travelling at 750 F.P.S. his ejection velocity should not be less than 50 F.P.S. if he and the seat are free to part or 40 F.P.S. if he is attached to the seat. He is liable to be rotated in any direction at a rate up to 1 1/2 revs./sec. while travelling from cockpit to tail, when ejected from the aircraft at this air speed. (Author)

3,901

Parnell, J., E. L. Beckman, & L. H. Peterson 1953 DEVELOPMENT OF BIOLOGICAL RESEARCH APPARATUS FOR USE IN ACCELERATION AND DECELERATION STUDIES. PHASE I. THE EVALUATION OF PRESSURE TRANSDUCER SYSTEMS. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5206; ASTIA AD-1061; 15 Jan. 1953

ABSTRACT: Response measurements were made of various pressure transducers, transducer fittings, and coupling systems using pressure-step function, sine-wave pressure, and absolute calibration techniques. The accurate standard methods of

transducer-system evaluation demonstrated that these systems may be treated as lumped systems. A capacitance-type transducer with a long polyvinyl catheter was used as the test system for consideration of a transducer system with more than 1 degree of freedom. Measurement of physical constants of this system were carried out and the electrical-transmission-line theory was applied to the catheter Theoretical consideration was given to the effect of varying physical constants upon the response of the system. A damping segment, based on the theoretical concepts, improved the amplitude vs frequency response of the system and reduced acceleration artifacts.

3,902

Parry, J. H., Jr. 1962 U. S. ARMY NATIONAL GUARD. H-13E HELICOPTER ACCIDENT AMITYVILLE, NEW YORK, 5 JANUARY 1962. (Aviation Crash Injury Research, Phoenix, Ariz.) Rept. AvCIR 62-7; Contract DA 44-144-tc-802, TREC TR 62-64, Aug. 1962, ASTIA AD 285787L

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Partel, G. 1960 XI CONGRESSO ASTRONAUTICO INTERNAZIONALE (XITH INTERNATIONAL ASTRONAUTICS CONGRESS) Rivista Aeronautica, Italy, 36(10):1517-1561, Oct. 1960

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Passavanti, L. 1955 DEVELOPMENT OF BIOLOGICAL RESEARCH APPARATUS FOR USE IN ACCELERATION AND DECELERATION STUDIES. PHASE III. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 303; 31 Dec. 1955

ABSTRACT: Infrared sensitivity of the television camera has been found to be of no practical value. A snooperscope type of image converter was used with negative results. The object of using a TV camera with infrared lighting is to reduce the light on the subject so as not to interfere with the subject's ability to view signal lights. These become difficult to see when the subject is under G near the blackout level.

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Passera, A.L. and R.G. Willoh,Jr. 1956 AN OPTIMUM SWITCHING CRITERION FOR A THIRD-ORDER CONTRACTOR ACCELERATION CONTROL SYSTEM (National Advisory Committee for Aeronautics, Washington, D.C.) Aug. 1956, TN 3743, ASTIA AD-105 243

ABSTRACT: "A switching criterion for optimum performance of a third-order contactor acceleration control system having complex roots is presented. Analytical and analog computer methods are utilized to determine this criterion. The resulting optimum transient responses are presented and compared with those of an equivalent linear system" (NACA Abstract)

3,906

Passey, G. A. 1948 ACCELERATORY PATTERNS IN FLIGHT OF AIRCRAFT; INSTRUMENTS AND TECHNIQUES OF MEASUREMENT.
(A report of research under contract with the Office of Naval Research. February 1948)

3,907

Passey, G.E. and F.E. Guedry, Jr. 1949 THE PERCEPTION OF THE VERTICAL: III. ADAPTATION EFFECTS IN FOUR PLANES J. Exp. Psychol 39:700-707

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Passey, G. E. & F. E. Guedry 1949 THE PERCEPTION OF THE VERTICAL. III. ADAPTATION EFFECTS IN FOUR PLANES.
(U.S. Naval School Aviation Medicine & Research, Pensacola, Fla.) Proj. No. NM 001 037, Research Rept. NM001 110 500.6., June 21, 1949.

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Passey, G. E. 1949 THE PERCEPTION OF THE VERTICAL. VI. ADJUSTMENT TO THE VERTICAL WITH NORMAL AND TILTED VISUAL FRAMES OF REFERENCE. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 110 500.10., 22 Nov. 1949

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Passey, G. E., & J. T. Ray 1950 THE PERCEPTION OF THE VERTICAL. X. ADAPTATION EFFECTS IN THE ADJUSTMENT OF THE VISUAL VERTICAL. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 110 500.17., 20 Oct. 1950
ASTIA ATI 14320

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Passey, G.E. 1950 THE PERCEPTION OF THE VERTICAL: I. ADJUSTMENT TO THE VISUAL VERTICAL FROM VARIOUS MAGNITUDES OF BODY TILT (U.S. Naval School of Aviation Medicine, Pensacola, Florida and Tunland University) Report No. 15, Project NM 063.01.15, 10 March 1950.

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Paton, C. R., E. C. Pickard & V. H. Hoehn 1940 SEAT CUSHIONS AND THE RIDE PROBLEM. S.A.E. Journal 47:273-283, July 1940.

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Patrick, L. M. n.d. IMPACT DAMAGE TO INTERNAL ORGANS (Department of Engineering Mechanics, Wayne State Univ.)

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Patrick, L. M., H. R. Lissner, M. Lebow, & F. G. Evans 1960 EFFECTS OF CONTROLLED ACCELERATIONS ON STRAIN IN THE INTACT VERTEBRAL COLUMN. Anat. Rec. 136:256, Feb. 1960

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Patrick, L. M. 1962 CAUDO-CEPHALAD STATIC AND DYNAMIC INJURIES TO THE VERTEBRAE. In M. K. Cragun, ed., The Fifth Stapp Automotive Crash and Field Demonstration Conference, Sept. 14-16, 1961, Pp. 171-181.

3,917

Patrick, Lawrence M. & F. Gaynor Evans 1962 IMPACT DAMAGE TO INTERNAL ORGANS
In: Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, pp. 159-171

ABSTRACT: Contusions, lacerations, and ruptures of the thoracic, abdominal, and pelvic viscera, arising from the various types of stresses and strains produced by impacts to different parts of the human body in automobile and aircraft accidents, are discussed. Results indicate that damage or injury produced in the human body by acceleration is due to the internal organs behaving as viscoelastic materials. Furthermore, the magnitude of the stress and acceleration, or dynamic response, can be increased by the elasticity of the human torso, as is known from the theory of elastic structures.

3,918

Patterson, J. L., Jr., J. T. Doyle, D. W. Richardson, S. I. Said & E. L. Hardie 1961 THE CIRCULATION AND RESPIRATION IN INDUCED ACUTE HEAD INJURY. (Paper, Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Materal Center, Philadelphia, Penn., June 14-15, 1961).

ABSTRACT: Circulatory and respiratory responses to severe cranial injury

inflicted by a sledgehammer have been studied during the processing of 15 unanesthetized cows (Bes taurus) in the abattoir.

The results demonstrate that in these animals respiration was the function critically affected. It appears probable that in the early post-injury period, the brain must recover from the concussion sufficiently to reinstitute breathing or be rapidly and irreversibly trapped by the falling arterial O_2 and rising CO_2 tensions. The possibility of salvage of some of these animals by artificial respiration in the early post-injury period is suggested.

3,919

Pavlok, Jan 1958 BIOLOGICKE ZABEZPENCENI MEZIPLANETARNICH LETU (Biological Safety in Interplanetary Flights)
Vojenske zdravotnicke listy (Prague) 27(6): 257-262, 1958

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Payne, C. F., Jr., & R. A. Bosee THE MECHANISM AND CAUSE OF VERTEBRAL INJURIES SUSTAINED ON EJECTIONS FROM U. S. NAVAL AIRCRAFT. (Air Crew Equipment Lab., Naval Air Material Center, Philadelphia, Pa.)

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Payne, C.F., Jr., & R.A. Bosee 1962 THE MECHANISM AND CAUSE OF VERTEBRAL INJURIES SUSTAINED ON EJECTION FROM U.S. NAVAL AIRCRAFT. (Paper, 33rd Annual Meeting of the Aerospace Medical Assoc., 9-12 April 1962, Atlantic City, N.J.)

ABSTRACT: Considering the available evidence, the basic mechanism responsible for the high incidence of vertebral injury on ejection from U.S. Naval aircraft is the concentration of inertial and restraint force components on the front of the vertebrae by spinal felxion. Flexion occurs because of poor positioning, lack of support, and inadequate restraint of the body. Until further improvements are mace in these areas and spinal flexion kept to a minimum, it will not be possible to subject the body to its potentially tolerable limit of ejection acceleration without perpetuating the high incidence of vertebral injury.
(Aerospace Medicine 33(3):348, Mar. 1962)

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Payne, C. F. 1963 STUDY OF PHYSIOLOGICAL STRESSES WITH EJECTION LOADS. (Air Crew Equipment Lab., Naval Air Material Center, Philadelphia, Pa.) NAEC ACEL 467, 8 July 1963. ASTIA AD 409 465L.

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Payne, C. F., Jr. 1963 STUDY OF PHYSIOLOGICAL STRESSES WITH EJECTION LOADS. (Paper, Thirty-Third Annual Meeting of the Aerospace Medical Association, April 1962, Atlantic City.)

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Payne, P. R. 1960 THE PHYSICAL BASIS FOR HUMAN FACTORS ACCELERATION CRITERIA AND EXPERIMENTAL DATA. (Stanley Aviation Corporation, Denver, Colorado) Stanley Aviation Report No. 743, July 1960.

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Payne, P.R. 1960 ANALYSIS OF B-58 CAPSULE LANDING IMPACT TRANSVERSE ACCELERATION DATA WITH HUMAN AND DUMMY OCCUPANTS. (Stanley Aviation Corporation, Denver, Colorado) Stanley Aviation Report No. 742.

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Payne, P.R. 1960 THE PHYSICAL BASIS FOR HUMAN FACTORS ACCELERATION CRITERIA AND EXPERIMENTAL DATA. (Stanley Aviation, Denver, Colo.) Report No. 743, July 1960.

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Payne, P.R. 1960 PRELIMINARY INVESTIGATION OF THE DYNAMICS OF A MAN-CARRYING CAPSULE SUBJECTED TO EXTERNAL FORCES. (Stanley Aviation Corp.) Rept. No. 1189, 8 June 1960

3,928

Payne, Peter R. 1961 AN ANALOG COMPUTER WHICH DETERMINES HUMAN TOLERANCE TO ACCELERATION
(Paper, National Academy of Sciences Symposium on "Impact Acceleration Stress", Nov. 27-29, 1961, Brooks Air Force Base, San Antonio, Texas)

ABSTRACT: The purpose of this paper is to describe and demonstrate a small analog computer which is designed to show the physiological effect of short period acceleration on man. An arbitrary acceleration-time history can be set up on the front of the computer by "plotting" a graph with sliding beads. Calibrated dials enable the dynamic characteristics of the restraint system to be specified, and the computer can then be started. A mater reads out the peak value of the "Physiological Index", which is an arbitrary numerical scale. An analog of this type is only as good as the experimental data upon which

its analogy is based. but within this limitation it can be used to:
(a) Assess the tolerability of any short period acceleration
(b) Vary the dynamic characteristics of the restraint system in order to minimize the physiological effect of a given acceleration
(c) Feed in rational physiolgical information to an engineering optimization program for an aerospace vehicle
(d) Correlate experimental information by correcting for the difference introduced by different restraint systems
(e) Plan experimental test programs, thus permitting many "feeling the way" experiments to be eliminated, with substantial savings in time and money.

The paper concludes with a description of possible future developments and particularly the inclusion of non-linear terms and the long period acceleration tolerance limits established in centrifuge testing.

An appendix deals with the statistical theory of scatter in the tolerance of individuals, in which an Individual Tolerance Index is defined. Such a concept could become important in such fields as the optimization of space vehicle re-entry trajectories, for example, and in including physiological components in the reliability model of an aerospace vehicle.

3,929

Payne, P. R. 1961 THE DYNAMICS OF HUMAN RESPONSE TO ACCELERATION. (Paper, 32nd Annual Forum of the Aerospace Medical Association, Chicago, April 24-27, 1961)

ABSTRACT: Although most of the published work on human tolerance and response to short period acceleration is wholy empirical in character, there is no reason why this subject should not benefit from the mathematical back-up which has proved virtually indispensible in most other engineering disciplines. Important pioneering work in this respect has already been carried out at WADD by the Bio-Medical Laboratory team, who are investigating the response of the human body to sinusoidal oscillations. The purpose of the present summary is to describe in a very simplified form, the work of Stanley Aviation on the response to a "step" or irregular linear acceleration input.

It is shown that a simple linearized single degree of freedom dynamic model adequately explains most of the experimental data obtained so far, that it leads to more logical methods of correlating experimental results, and that it permits extrapolation of allowables into areas for which no experimental evidence now exists.

Future developments expected from a NASA-funded program are outlined, and an appendix contains an introduction to the theory of the most elementary dynamic model. In the interest of brevity, the discussion is limited to the case of positive spinal acceleration, but is equally applicable to all other vectors.

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Payne, P. R. 1961 TECHNICAL PROPOSAL: INVESTIGATION OF THE DYNAMICS OF HUMAN RESTRAINT SYSTEMS.
(Frost Engineering Corp., Denver, Colo.) Rept. 77-1, July 1961.

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Payne, Peter R. 1961 THE DYNAMICS OF HUMAN RESTRAINT SYSTEMS. (Paper, National Academy of Sciences Symposium on "Impact Acceleration Stress." Brooks AFB, Texas , 27-29 November 1961)

ABSTRACT: Acceleration is most logically divided into three distinct regimes, from a physiolgical point of view. (1) In an impact acceleration, where velocity change is the important criterion, a cushion or any other resiliency in series with the man is always beneficial, in that it reduces the physiological effect of the shock. (2) In a short period acceleration, which may be roughly defined as having a duration of less than one second, the effect of the restraint system may be either harmful or beneficial, depending upon its dynamic characteristics. (3) For long period accelerations, where "hydraulic" limitations predominate, restraint dynamics are of no importance, and we are concerned primarily with adequate support.

In the case of impact accelerations, the only parameter of importance is the total energy which the restraint system can absorb before bottoming, so that a pure spring could yield as great an attenuation as a visco-elastic cushion. But for short period accelerations, both damping and "bottoming depth" assume enormous importance, whilst the energy absorption capability becomes relatively unimportant.

Although some simple generalizations can be deduced from closed form solutions to analytically simple acceleration input histories, an analog computer must be used to determine the optimum restraint dynamics for minimum phsyiological effect from the irregular accelerations usually experienced in practice. Since a restraint system is merely a damped spring system, in the normal engineering sense, it is obviously both more accurate and far less expensive to determine the optimum parameters by this means, however. To try to determine even optimum cushion characteristics by experimental means is almost impossible, unless we are concerned with a relatively fixed acceleration time history, such as the thrust of an ejection seat catapult.

Considerable gains from these techniques are seen for the future, in that we hope to reduce the physiological shock of accelerations imposed by existing vehicles and escape systems, by means of relatively simple changes in the restraint systems. It is quite possible that the materials currently used -- in cushions for example -- are nowhere near the true optimum, and that quite dramatic improvements can be obtained.

Secondly, many physiological tests will be wasted, or at least less useful than they might be unless we have a reliable means of currecting for the different restraint systems used.

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Payne, P. R. 1961 INVESTIGATIONS OF CREW ESCAPE SYSTEM SURFACE IMPACT TECHNIQUES FOR ADVANCED AEROSPACE VEHICLES. (Frost Engineering Corp., Denver, Colo.) Rept. No. 74-1, July 1961

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Payne, Peter R. and Ernest L. Stech 1962 HUMAN BODY DYNAMICS UNDER SHORT-TERM ACCELERATION
(Frost Engineering Development Corporation, 830 South Lipan Street, Denver 23, Colorado) U.S. Navy Contract #167-19747X Report #115-2 June 23, 1962

ABSTRACT: This report reviews the development of the theory of "body dyanmics" and shows how it can be used to obtain solutions to important engineering problems.

3,934

Payne, Peter R. 1962 PRELIMINARY STUDY OF ACCELERATION PROTECTION FOR CREW MEMBERS OF A SHIP SUBJECTED TO AN UNDERWATER EXPLOSION
(Frost Engineering Development Corporation, 830 South Lipan Street, Denver 23, Colorado) U.S. Navy Contract No. 167-18, 423X Report No. 115-1 March 12, 1962

ABSTRACT: This report is the end product of a study performed for the David Taylor Model Basin to determine the feasibility of applying dyanmic analysis and specialized analog computer techniques to a unique problem in human tolerance to impact and accelerations. This is the special case of injuries caused to shipboard personnel by the effect of nearby underwater explosions on the ship structure.

Two extremely valuable findings have resulted from this study: From examination of the dynamics of "take-off" in some detail, it is concluded that laboratory measurements of this parameter with the HYGE acceleration tester will enable us to calculate, for the first time, the damping losses in the human body. The theory also shows that more precise estimates of the natural frequency of the human body can be obtained from the same measurements.

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Payne, P. R., et al. 1962 DETERMINATION OF VARIABILITY IN HUMAN TOLERANCE TO SHORT TERM ACCELERATION. (Frost Engineering Corp., Denver, Colo.) Tech. Prop. No. 146-1, 6 Aug. 1962

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Payne, P. R., et al. 1962 THE LIMITS OF HUMAN TOLERANCE TO LONG-PERIOD ACCELERATION. (Frost Engineering Development Corp., Denver, Colo.) Tech. Prop. No. 151-1, 20 July 1962

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Payne, P. R. 1962 SUPPLY OF SPECIAL PURPOSE COMPUTERS AND CONSULTING SERVICES IN CONNECTION WITH HUMAN TOLERANCE TO ACCELERATION. (Frost Engineering Dev. Corp., Denver, Colo.) Prop. No. 120-1, 5 March 1962

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Payne, P. R. 1963 A DYNAMIC MODEL OF THE HUMAN BODY SUBJECTED TO SPINAL ACCELERATION WHEN SITTING ERECT.
(Frost Engineering Dev. Corp., Colo.) Tech. note 122-103, Jan. 1963.

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Payne, R.B., E.W. Moore, and J.L. Bethurum 1952 THE EFFECT OF CERTAIN MOTION SICKNESS PREVENTIVES UPON PSYCHOLOGICAL EFFICIENCY (Sch. Avn. Med. Randolph AFB) Proj. No. 21-32-019, August 1952 ATI 171316

ABSTRACT: The effects of selected drugs (hyoscine, dramamine, benadryl, and benadryl-hyoscine) upon a wide variety of psychological processes are systematically explored by standardized testing techniques. The drugs differ widely from one another in magnitude of effects produced, but they uniformly impair implicit processes more than explicit processes.

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Payne, R. B. & G. T. Hauty 1953 THE EFFECT OF MOTION SICKNESS PREVENTIVES UPON CERTAIN PERCEPTUAL MOTOR COMPONENTS OF THE PILOTS' TASK.
(Sch. Avn. Med., Randolph AFB, Tex.) Proj. No. 21-1601-0004, Rept. No. 3, May 1953.

ABSTRACT: Sixty-four subjects received preliminary training on a complicated compensatory pursuit task involving simulated aircraft instruments and controls, then continued work for four hours under conditions designed to appraise the side effects of certain motion-sickness preventives. A significant, persistent, adverse effect having a latency of about one hour was produced by a mixture consisting of 0.65 mg. hyscine hydrobromide and 50 mg. diphenhydramine hydro-chloride (benadryl-byoscine), but performance under hyoscine alone was indistinguishable from those of control and lactose groups.

3,941

Payne, R.B. Osier, D.R. and P.A.S. Tomlinson 1953 THE EFFECTS OF CERTAIN MOTION SICKNESS PREVENTIVES UPON NAVIGATOR PROFICIENCY (Sch. Avn. Med. Randolph AFB) Project No. 21-1601-004, Report No.1, May 1953

3,942

Payne, R. B. 1955 SOME EFFECTS OF MOTION SICKNESS REMEDIES UPON PSYCHOLOGIC PERFORMANCE. Internat. Record Med. 168:32

ABSTRACT: Studies on the antihistamine and anticholingeric drugs have been emphasized by three considerations: (1) The pharmacologist desires a rough simple index of autonomic activity so he can better understand the drug's prophylactic mechanisms; (2) Transportation industries wish to find the most potent remedy against motion sickness with the fewest unpleasant side effects; and (3) Military aviation has had to weigh the potentialities of drugs preventing motion sickness against performance deficit due to peripheral and central impairment. Questionnaires, interviews, rating scales, checklists and other modes of subjective observation offer suitable test methods for the answers commercial transportation desires. Synthetic test situations are useful to delineating the military answers provided they are reliable estimates of what they measure, correlate with the task to which the outcomes are extrapolated and take cognizance of the interaction of such concomitant conditions as noise, vibration, anxiety, lowered oxygen tension, fatigue and motivation. The possibility of research is the scope and magnitude of impairment is unlimited. Only hyoscine and dramamine have been comprehensibly studied as to sensory functions, perceptual intellectual functions, perceptual-motor functions, and secondary factors affecting impairment so that a generalization can be made that they present a minimal, and perhaps negligible, risk of behavioral incapacitation. (J. Avia. Med. 26(4):348, Aug. 1955)

3,943

Pearson, R.G. 1957 THE EFFECTS OF MOTION-SICKNESS PREVENTIVES IN ORIENTATION IN SPACE. (School of Aviation Medicine, Randolph Air Force Base, Tex.) Report no. 58-7, ASTIA AD-152 815, Nov. 1957

ABSTRACT: Evaluations are made of the effects of meclizine, cyclizine, and promethazine on a test of spatial orientation. Dextroamphetamine sulfate, a mixture of scopolamine with diphenhydramine hydrochloride, and lactose placebo were also included in the experimental design. Ninety-six subjects were tested in a darkroom on a luminous rod-and-frame apparatus under upright and body-tilt conditions. Following this, they were randomly assigned in equal numbers to the drug treatment groups, then were tested again. Analysis of constant errors in adjusting the rod to the vertical for the post-treatment data revealed no significant drug effects. These results seemed to constitute evidence against the possibility that these drugs would have an untoward effect upon the spatial orientation of aircrew personnel.

3,944

Pearson, R. G. 1961 IMPACT-INJURY RELATIONSHIPS IN LIGHTPLANE ACCIDENTS. Reprint, Archives of Environmental Health 3:514-518. November 1961.

ABSTRACT: In the present study attention was focused more closely on not only degree of injury but also area of injury and how these are related to impact conditions for a group of occupants whose tie-down did not fail.

3,945

Pearson, Richard G. 1961
INJURY SEVERITY AS RELATED TO SEAT TIE-DOWN AND BELT FAILURE IN LIGHTPLANE ACCIDENTS
(Aviation Crash Injury Research, Phoenix, Ariz.)
Rept. no. AvCIR 61-4; TREC Tech. rept. no. 61-96 August
ASTIA AD 265 092L

ABSTRACT: The purpose of this study was to evaluate the relationship between tie-down effectiveness and injuries sustained by 1,025 occupants of light-planes involved in ground-object collisions, or in spin-stall crashes. Critical injuries to the head and upper torso were found to occur even though there was adequate seat-belt restraint. In approximately one-third of the 1,025 cases either seat failure or belt failure yet injury severity was greater when seats failed than when belts failed. The need for additional safety measures is emphasized by the findings. (AUTHOR)

3,946

Pearson, R. G. 1961 RELATIONSHIP BETWEEN IMPACT VARIABLES AND INJURIES SUSTAINED IN LIGHTPLANE ACCIDENTS (1942-1952)
Aviation Crash Injury Research, April 1961.
See also (U.S. Army Transportation Research Command, Ft. Eustis, Va.) TR 61-96, Aug. 1961.

3,947

Pedersen, A. H. 1959 PROJECT MERCURY HUMAN QUALIFICATIONS FOR DESIGN LANDING CONDITIONS. (McDonnell Aircraft Corporation, St. Louis, Missouri) Rept. 7062, Serial No. 18, 21 Sept. 1959

ABSTRACT: The objective of this program is to verify that humans can sustain the limit ground landing impact of the Mercury capsule such that pathological damage will not occur.

3,948

Pedersen, Herbert E., F. Gaynor Evans & H.R. Lissner 1949 DEFORMATION STUDIES OF THE FEMUR UNDER VARIOUS LOADINGS AND ORIENTATIONS
Anatomical Record 103(2): 159-185, Feb. 1949

ABSTRACT: (1) The results of "stresscoat" deformation studies on the femur under both static and dynamic loading were described and illustrated. Fifteen bones were subjected to vertical dynamic loading when the infracondylar plane made a laterally opening angle (3°) with the horizontal plane; 12 bones were

subjected to static and dynamic loading in the "abduction" position; and 12 bones to static torsion loading. (2) Deformation patterns characteristic of each type of loading were produced. From an examination of the pattern, the point of application of the force and hence the type of loading can be deduced. Conversely, if the point of application of the force is known, the type and site of the resulting deformation can be predicted. Such knowledge would be of particular help to the radiologist in searching for a suspected fracture as the result of a blow at a known point. (3) The deformation patterns were little affected by minor variations in the orientation of the bone. (4) All other factors being equal the degree of deformation increases with increasing load but varies inversely with the mass of the bone. (5) Additional evidence is presented that failure (fracture) of bone occurs under tension stress, the fracture starting at the site of greatest stress concentration. This was true regardless of the method of loading. (6) The spiral torsion fracture was shown to be another example of failure under tension stress and not the result of shearing stress as has often been stated.

3,949

Pedersen, N. L., J. H. Mathewson & D. M. Severy 1958 AN ENERGY-ABSORBING BARRIER FOR HIGHWAYS.
(Highway Research Board Bulletin 185, 1958)

3,950

Pedrazzini, F. 1938 DE LA CIRCULATION CEREBRO-SPINALE PARTICULIEREMENT PAR RAPPORT AUX EFFETS QUE LA FORCE CENTRIFUGE EXERCE SUR CE SYSTEME ET SUR LA CIRCULATION GENERALE CHEZ LES AVIATEURS (Cerebrospinal Circulation and Pressure of Cerebrospinal Fluid: Effects of Centrifugal Force on Cerebrospinal and General Circulation of Aviators)
Presse Medicale (Paris) 46: 1164-1167

ABSTRACT: The author quoted Heinz von Diringshofen as having noticed during his investigations: a sensation of darkness, narrowing of the visual field like that of a beginning narcosis, loss of consciousness, variation of arterial pressure and pulse frequency, with sanguinary engorgement of the lower limbs.
The author's own work was on the effect of centrifugal force on the circulatory system, and there is no specific mention of the effect on the eye.

3,951

Peiffer, H. 1939 KREISLAUF UNTER BESCHLEUNIGUNG. RONTGENKYMOGRAPHISCHE AUFNAHMEN BEI BESCHLEUNIGUNGSANDERUNG (Blood Circulation During Acceleration: Roentgen Kymographic Studies in Apes During Changes in Acceleration)
Luftfahrtmedizin 3: 82-96

3,952

Peiser, A. M. & M. Wilderson 1945 A METHOD OF ANALYSIS OF V-G RECORDS FROM TRANSPORT OPERATIONS.
(National Advisory Committee for Aeronautics, Washington, D.C.)
NACA Rept. 807 (Supersedes NACA ARR L5J04)

3,953

Pellini, W.S. 1961 ANALYSIS OF THE THERMOSTRUCTURAL REQUIREMENTS FOR THE ATMOSPHERIC RE-ENTRY OF SATELLITES AND SPACE VEHICLES. NRL. Rept. 5655, ASTIA AD- 264 753, 15 August 1961

ABSTRACT: The thermostructural requirements of re-entry vehicles are determined by the kinetic energy of the vehicle on penetration of the atmosphere and by the program of the dissipation of this energy by conversion to heat, which is generated by the aerodynamic braking effects of the atmosphere. The vehicle velocity and entry angle may be classed as approach variables and the aerodynamic characteristics of the body as vehicle variables. These variables are discussed, with particular emphasis on the wide range of energy conversion programs which are made available by choice of the vehicle design. The possible types of re-entry vehicles are analyzed by a description of the aerodynamic characteristics of the various principal types. The aerodynamic features of re-entry vehicles may be classified into the two broad subdivisions of lift and drag flight. Lift flight vehicles are represented primarily by the glide aircraft and lifting capsule families, and drag flight vehicles by drag capsules, satellites bodies, and nose cones. The primary distinction between bodies that rely on aerodynamic lifts, with the associated drag for gradual deceleration from orbital to subsonic velocity and bodies that under go a shocklike deceleration to terminal fall velocity. (Author)

3,954

Pendleton, M. E., & R. S. Paine 1961 VESTIBULAR NYSTAGMUS IN NEWBORN INFANTS. Neurology 2:450-458

3,955

Penny, A.R. 1956 JUMPERS DOWN AND UP
Med. Technicians Bull. 7(4):139-141, July-Aug. 1956

ABSTRACT: The personnel of a naval parachute unit conduct tests in connection with the design, use, improvement and adaptation to naval aircraft operations of parachute and ejection seat systems; pilot's personal safety equipment and flight gear; and aerial delivery of supplies and cargo. A medical corpsman equipped with medical kit is in attendance during all jumps to treat any injuries that may occur. Injuries sustained during test jumps are usually minor, consisting of bruises about the face and neck sustained from parachute lines and risers and due to opening shock forces. More serious injuries consist of leg sprains and fractures usually caused by ground impact.

3,956

Penrod, K.E. 1942 BAILING OUT ABOVE 30,000 FEET. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) Memo Rept. EXP-M-49-696-6A, 27 Nov. 1942.

3,957

Penrod, K.E., G.L. Maison, & F.G. Hall 1945 COMPARISON OF SHOCK FORCE OF OPENING OF SILK AND NYLON PARACHUTES AT VARIOUS ALTITUDES. (AAF, Aero Med. Lab) Rept. Serial TSEAL 3-696-66C, 5 May 1945.

3,958

Penrod, Maison and Hall 1945 COMPARISON OF SHOCK FORCE OF OPENING OF 24 and 28 FOOT NYLON PARACHUTES AT VARIOUS ALTITUDES. (War Dept., Air Forces) TSELA-3-696-66G, 22 May 1945

3,959

Perdriel, G. & R. Creton 1958 REGARDING MACULAR HEMORRHAGES AMONG FIGHTER PILOTS FLYING FREQUENTLY AT HIGH ALTITUDES. (Apropos d'hemorragies maculaires apparues chez les pilotes de chasse frequentant la haute altitude.)
Medecine Aeronautique (Paris), 13(4):353-358, 1958.

ABSTRACT: The authors cite five cases of permanent, chorioretinal perifoveal hemorrhage which appeared in fighter pilots after high-altitude flight. Except for a deficiency of prothrombin in the blood, there was no evidence of any other somatic or humoral change. Anoxemia, hyperoxia, and acceleration are discounted as direct causes of the macular hemorrhages, but a comparison with some aspects of general ocular pathology leads to the hypothesis of some kind of chorioretinal vascular injury which occurs during quick changes of partial oxygen pressure. (Author)

3,960

Perey, Olof, trans. by C. A. Grant 1957 FRACTURE OF THE VERTEBRAL END-PLATE IN THE LUMBAR SPINE. An Experimental Biomechanical Investigation. Acta Orthopaedica Scandinavica, Supplementum No. XXV.

3,961

Perilhou, P. & H. Pieron 1942 QUELQUES CARACTERISTIQUES DES SENSATIONS VIBRATOIRES (Some Characteristics of the Vibratory Sensations)
C.R. Soc. Biol. (Paris) 136: 448-449.

3,962

Perlman, H.B. 1945 REACTION OF THE HUMAN CONDUCTION MECHANISM TO BLAST Laryngoscope 55:427-444

3,963

Perry, D. R. and Lidie C. Dyer 1956 INCIDENCE, NATURE, AND EXTENT OF INJURY IN CRASH LANDINGS AND BAILOUTS
(Arctic Aeromedical Lab., Ladd Air Force Base, Alaska) Nov. 1956
Proj. no. 8-7956 Rept. no. 1 ASTIA AD 116 239

ABSTRACT: Data were analyzed to establish the effects of terrain, weather, and type of aircraft upon the number and extent of injuries in crash landings and bailouts. Based on data obtained from a worldwide survey of major airplane accidents, the rate of fatal or major injury in swampy terrain is 3.4% for a bailout and zero for a crash landing. For flat farmland, the probability of a fatal or major injury for either a bailout or a crash landing is about 2 out of 10 persons. For desert terrain the probability of fatal or major injuries in a bailout is 2 out of 10 as compared to 1 out of 10 in a crash landing. For terrain consisting of small hills, the probability of a fatal or major injury is 1 in 10 for bailouts and 3 in 10 for a crash landing. For a crash landing in wooded areas, the probability of fatal or major injury is 9 out of 10. In mountainous terrain, the indicated probability of fatal or major injuries is 2 out of 10 for a bailout and 6 out of 10 as compared to 3 out of 10 for a bailout. Major accidents occurring in Arctic regions are studied with reference to bomber- and jet-type aircraft, jet fighters, trainer aircraft, and all other aircraft. A total of 33 persons were involved in bomber crash landings, of which 6.1% were fatalities. For cargo aircraft, 21.7% of bailouts were fatal, and 17.4% of the crash landings were fatal. Bailouts from jets resulted in 23.1% fatalities. Crash landings involved 28.6% fatalities. No fatalities were reported from trainer aircraft. All other types of aircraft involved 4 fatal injuries. (ASTIA)

3,964

Perrin, R.A., Jr. 1962 THE DEVELOPMENT OF AN ELECTRICAL STRAIN GAGE DYNAMOMETER FOR MUSCLE USE
(Department of Mechanical Engineering of the Graduate School of Tulane U.)
A Thesis for the degree of Master of Science. ASTIA AD 290 142

ABSTRACT: This paper reviews the theory of torsion in a circular tube, then presents a method of its use in the development of an electrical strain gage dynamometer which can be used universally to measure the performance of a muscle or muscle group. Results of the tests indicate that muscle strength can

be quantitatively evaluated by an electrical strain gage dynamometer. These results can be averaged and used as a basis of comparison. Isometric muscular contraction has been used successfully in the strengthening and training of the muscle groups. It is recommended that the dynamometer be adopted for such muscular training purposes. It is also recommended that the use of the dynamometer be expanded to include measurement of muscle groups in the lower limbs.

3,965

Pertzoff, V. A. & S. W. Britton 1945 EFFECTS OF HIGH ACCELERATORY FORCES. Fed. Proc. 4(1):55-56, March 1945.

ABSTRACT: Responses of monkeys, dogs, cats, rats and other animals to high acceleration (centrifugation) have been studied over the past four years. In most cases forces up to 6 gram have been considered; in some instances, however, tests at 50 gram were also observed in a few experiments.

Respiration, pulse, blood pressure and flow, E.C.G. and E.E.G. changes have been specially studied. Other circulatory conditions, bloodglucose and electolytes, and skin resistance were also noted under acceleratory stresses.

The effects of protective devices, belts and bandages, various gases, vasopressors, etc., have also been determined.

3,966

Pertzoff, V. A., S. W. Britton, & R. F. Kline 1946 FURTHER OBSERVATIONS ON EFFECTS OF G FORCES. (Physiological Lab., University of Virginia Medical School, Charlottesville)
Federation Proceeding 5(1):80, 1946.

ABSTRACT: Determinations of blood pressure and blood flow on exposure to high accelerations have been made on monkeys, dogs and other animals. Both head and foot ends of animals (carotid, brachial, femoral arteries) were studied under various forces. Comparison of pressure changes was made with a hydrodynamic model on the centrifuge under similar experimental conditions.
The protective influence of various devices, injected materials, etc., was studied Extended observations were also made on E.E.G. changes under different conditions.

3,967

Pertzoff, V.A., & S.W. Britton 1948 FORCE AND TIME ELEMENTS IN CIRCULATORY CHANGES UNDER ACCELERATION: CAROTID ARTERIAL PRESSURE DEFICIENCY AREAS. Am. J. Physiol., 152:492-8

3,968

Pescador, L. 1943 STUDY OF DISTRUBANCES IN AVIATORS DURING ACROBATIC FLIGHT: CEREBRAL FACTOR. J. Am. M. Ass., 121:378

3,969

Pesek, R. 1961 [MAN IN SPACE]
Ceskoslovenska akademie ved. Vestnik 1961(4):447-457

ABSTRACT: This is a review of the Soviet space program starting with the launching of an improved, multistage rocket towards a Pacific ocean target area on Jan. 20, 1960, until the first manned space flight. It further briefly compares the Soviet manned space flight with A.B. Shephard's flight and also deals with controversy whether space ships for space exploration should be manned or just equipped with automatic instruments. Gagarin's flight proved that acceleration and deceleration of about 10 G caused less difficulties than expected. The noise and heat did not significantly affect the organism. The flight has shown that man cannot only endure the space flight conditions but also perform the entrusted tasks and functions. (CARI)

3,970

Pesman, G. J. 1953 APPRAISAL OF HAZARDS TO HUMAN SURVIVAL IN AIRPLANE CRASH FIRES.
(Lewis Flight Propulsion Lab., Cleveland, Ohio; issued by National Advisory Committee for Aeronautics, Washington, D.C.) Tech. Note no. 2996, Sept. 1953. ASTIA AD 16 305.

ABSTRACT: The factors which affect the survival of human beings in airplane accidents followed by fire were studied by conducting full-scale crashes of transport- and cargo-type airplanes. STudies of burning airplane hulks supplemented the information obtained from the crash fires. The time interval during which occupants could escape from a burning airplane was determined by using the time histories of cabin temperatures and toxic gas concentrations in conjunction with data that define the environmental conditions which can be tolerated by human beings. Other hazardous factors, such as flying detached airplane parts, explosiions, and crushing of the airplane structure, were also studied.

3,971

Pesman, G. J., & A. M. Eiband 1956 CRASH INJURY
(National Advisory Committee for Aeronautics, Washington, D. C.)
Technical Note TN 3775; ASTIA AD-112 617; Nov. 1956

ABSTRACT: "Data from full-scale experimental airplane crashes were studied to determine how impact injuries occur and how the chance of such injuries may be reduced. The following hazards were considered: (1) being crushed, (2) being struck by missiles, (3) striking objects by tearing loose or flailing about, and (4) being injured by the crash decelerations. Transport, cargo, fighter, and light airplane crashes were studies." (NACA)

3,972

Pesman, G. J. 1961 TERMINOLOGY FOR ACCELERATION FORCES AS APPLIED TO APOLLO ASTRONAUTS. (National Aeronautics & Space Administration, Washington, D. C.) 17 March 1961

3,973

Pesman, G. J., & H. F. Scherer, Jr. 1963 EXTENSION OF THE MEASURED EXPERIENCE OF HUMAN IMPACT LOADS. (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 29-May 2, 1963)

SUMMARY: The limits described in the previous paragraph will suffice if the spacecraft does not tumble during the landing. If the vehicle does tumble, data upon which to base the acceptable limits for impact forces having backward acting (EBO or -Gx) components must be obtained. Phase III of the impact program has been initiated to provide such data. This phase of the program, however, will encounter all of the problems associated with producing optimum restraint systems. Past experience has shown that restraint harness problems are usually complex and a particular magnitude of impact force may be quite acceptable with one harness design and completely unacceptable with a design that appears to be only slightly different. The reasons for such differences must be determined. It will then be possible to specify harness arrangements to satisfy specific problems and to select impact limits for the direction not studied in Phases I and II. (AUTHOR)

3,974

Peters, G.A and H.F. Glassner 1960 BIO-ELECTRONIC ANALYSIS OF PERFORMANCE. (Douglas Aircraft Co., El Segundo, Calif.) Engineering paper no. 897, ASTIA AD-235 969, March 1960

ABSTRACT: Recent conceptual and experimental work is described which deals with the methods of recording, analyzing, and interpreting multiple physiologic responses. Emphasis is placed on the possible use of bio-electronically monitored phenomena as a criteria of human performance and physical well being. Data is presented on the physiological changes which were obtained during the performance of complex psychological tasks. Interesting developments from this research are presented which relate to response variability, performance criteria, bio-electronic indices, and the calibration of human experimental plug-in units. Special emphasis is placed on the implications which relate to the analysis and interpretation of bio-electronic data obtained from experimental air and space vehicles. (Author)

3,975

Peterson, N. V., ed. 1958 PROCEEDINGS, FOURTH ANNUAL MEETING, AMERICAN ASTRONAUTICAL SOCIETY, 29-31 JAN. 1958, NEW YORK

CONTENTS:
Riddell, F. R., & R. W. Detra, "Returning Alive from Space,"
Strughold, H. O., "Advances in Astrobiology,"
Conover, D. W., E. C. Aiken, & C. M. Whitlock, "The Selection and Training of a Bio-Satellite Crew "

3,976

Peterson, N.V. & H. Jacobs, Eds. 1958 AMERICAN ASTRONAUTICAL SOCIETY (Proceedings of the Western Regional Meeting, Aug. 18-19, 1958, Palo Alto, Calif.)
(American Astronautical Society, New York, 1958)

ABSTRACT: Contents include:
Ward, J.E., "Considerations of Weightlessness", Special lecture, 5 pp. 6 refs.
Hoover, C.W., "Man's Operational Environment in Space", Paper no. 4, 12 pp., 13 figs.
Kornhauser, M., "Impact Protection for the Human Structure", Paper no. 38, 9 pp. 8 figs., 8 refs.

3,977

Peterson, N.V. & R.S. Swanson c.1960 RENDEZVOUS IN SPACE - EFFECTS OF LAUNCH CONDITIONS. (Proceedings, Manned Space Stations Symposium, Inst. Aero. Sci., c. 1960)

3,978

Peterson, R.L. 1962 AN INVESTIGATION OF THE SUSTAINED ACCELERATION PROPERTIES OF THE NET SEAT (Flight Dynamics Lab., Aeronautical Systems Div., Wright-Patterson AFB, Ohio) ASRMDD-TM-62-58 Aug. 1962.
NASA N 62-17259

ABSTRACT: This report presents the results of an in-house net seat sustained acceleration test program to evaluate the acceleration capability of the net seat concept during simulated launch and reentry profiles. Results of these human centrifuge experiments indicate that the prototype net seat provides the space crew member with an excellent support-restraint system with which to withstand application of transverse (chest to back) accelerations up to 16.5G's

3,979

Potter, C. E. [illegible] D. C. [illegible]

3,980

Pettitt, J. A., S. I. Cohen, et al 1958 MULTIPLF PSYCHOPHYSIOLOGIC MEASURES DURING GRADUAL ONSET ACCELERATION.
(Wright Air Development Ctr., Wright-Patterson AFB, Ohio)
WADC TN 57-234, Feb. 1958. ASTIA AD 130 796.

ABSTRACT: To investigate psychophysiological factors associated with the response of subjects to gradual onset of acceleration (G), 15 subjects were tested. Prior to the experiment blood was drawn for blood sugar determination, then the subject was exposed to four "stress" periods during which time skin resistance, blood pressure, tracking performance, and pulse were measured. The periods were (1) tracking for 90 seconds with centrifuge at rest, (2) 2G, (3) 4G, and (4) blackout level or 7 G. Prior to each G exposure there was a one-minute control period. Subjective symptoms and post-run performance estimates were obtained after each run. The relation between level of central nervous system arousal and vascular changes to blackout and performance decrement were analyzed.

3,981

Petty, C.M. 1960 INTERPLANETARY MANEUVERS USING RADIAL THRUST.
(Lockheed Aircraft Corp., Sunnyvale, Calif.) Rept. No. LMSD-703036;
ASTIA AD-341 277; Aug. 1960

ABSTRACT: Basic interplanetary maneuvers are considered, with emphasis placed on simplicity in instrumentation. First, a general theory of radial thrust is deve[illegible]ometrically, since it reveals a prope[illegible]spective of the opportunities and limitations of the theory. The special case of constant radial thrust acceleration is treated in detail. Finally, an example of a Martian capture maneuver is given where the initial portion of the maneuver has constant radial thrust acceleration and in the terminal portion the thrust acceleration varies to maintain constant radial speed. The associated characteristic velocity and other parameters are computed. (Author)

3,982

Pfingstag, C J. 1953 PRELIMINARY INVESTIGATION INTO THE STUDY OF THE FUNDUS OCULI OF HUMAN SUBJECT UNDER POSITIVE ACCELERATION (U.S. Naval Air Development Center, Johnsville, Penna.) Rept. No. NADC MA 5303, Bureau of Medicine and Surgery Rept. No. NM 001 060.12.01, TED NADC AE 1402.00 and TED ADC AE-6303

3,983

Pfingstag, C. J. 1953 PILOT'S ABILITY TO SIMULATE AN EMERGENCY ESCAPE WITH VARIOUS TYPES OF EJECTION SEATS WHILE SUBJECTED TO A FLUCTUATING ACCELERATION (Naval Air Development Ctr., Johnsville, Pa.) Proj. TED No. ADC AE-6303; ASTIA AD-54 281; 3 Nov. 1953

ABSTRACT: To determine some of the difficulties a pilot experiences in operating an ejection seat under emergency conditions, three types of seats (Air Force "arm rest" upward, Air Force "D-Ring" downward, and Navy "face curtain" upward) were tested by Air Force and/or Navy pilots in full flight gear while subjected to a fluctuating acceleration on the Aviation Medical Acceleration Laboratory Human Centrifuge. The advantages and disadvantages of each type are enumerated. It is concluded that performance may be improved on all seats by training and practice. The following modifications on the seats are suggested: (1) that the catapult strokes be shortened to 52 in. and ejection force increased for 60 ft./sec. ejection velocity, and (2) that they have the "D-ring" on the leading edge of the seat bucket as a pre-ejection and firing mechanism.

3,984

Phillips, D. G. 1945 INVESTIGATION OF VESTIBULAR FUNCTION AFTER HEAD INJURY. J. Neurol, Neurosurg., Psychiat. N.S. 8(2):79-100.

ABSTRACT: Experimental and clinical investigations of vestibular function and its relation to the symptom of post-traumatic giddiness have been carried out. It is concluded that focal injury to the vestibular pathway is the major factor, and that vasomotor disorder is the most important secondary factor in causation of the symptom.

3,985

Phillips, J. N., Jr. 1961 BIOLOGICAL SYSTEMS IN SPACE VEHICLES. Lectures in Aerospace Medicine, 16-20 January 1961. (School of Aviation Medicine, Brooks AFB, Texas)

3,986

Phillips, P. B. and G. M. Neville 1958 "EMOTIONAL G" IN AIRSICKNESS J. of Aviation Medicine 29(8):590-592, August 1958

ABSTRACT: Sixty-nine of 2,893 primary flight students developed moderate or severe airsickness in the primary phase of their flight training. Fifty-eight per cent of these students completed their primary phase of flight training after interview and reassurance by the flight surgeon. No medications were used. A past history of motion sickness was common to both those who did and those who did not complete primary. Anxiety toward flying was

marked in the majority of those who failed and motivation for flying was poor. A careful interview of an airsick flight student by a trained flight surgeon permits a reliable estimate of a student's motivation and his anixiety level. When anxiety is marked and motivation is poor his airsickness may be a manifestation of "emotional G." A new formation is offered to relate the direct proportion of the degree of anxiety and inverse proportion of the motivation.

3,987

Phillips, P.B. & J. Zarriello 1959 BRAIN INJURY FROM HIGH-G PULLOUT? (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: A young flight student experienced a stuck trim tab in a dive bombing run and had to exert exceptional force to stop the dive and save his life. He experienced a 9 G force which apparently resulted in a cerebellar injury with ataxia, dyssynergia, past pointing dysarthria, and dysgraphia. After medical and neurological examination he was grounded, and followed carefully for approximately six months during which all symptoms gradually cleared. He was checked by EEG, the human centrifuge, psychological tests, and by several actual test flights, and finally approved for full flight duty and has been an instructor for several months. No similar case could be found in the literature. This is reported because of the clinical interest it should be to flight surgeons. (J. Aviation Med. 30(3):198, Mar. 1959)

3,988

Phillips, P.B., and J.J. Zarriello 19[illegible] CENTRAL NERVOUS SYSTEM INJURY FROM HIGH RADIAL G FORCE. Aerospace Medicine 30(11):847-851

ABSTRACT: This is the case of a young flight student who apparently suffered a central nervous system injury, possibly an alteration in blood flow and subsequent edema, while under a positive 9 G stress in an airplane during an emergency. The clinical findings cleared without specific treatment. Clinically, and from a laboratory standpoint as well as from practical testing in flight, the patient was considered physically fit and aeronautically adapted for resuming his career in Naval aviation. He was returned to flight status by the Permanent Board of Medical Examiners. For the past nine months, this young officer has been serving as a primary flight instructor at his own request in the Naval Air Training Command at Pensacola, and his superiors report his efficiency and ability to be above average. Upon reviewing the literature, no previous case report was found of similar central nervous system trauma resulting from exposure to positive radial acceleratory force occurring during actual flight.

3,989

Phillips, P. B. & J. J. Zarriello 1959 EPILEPTIFORM SEIZURE AND LOW G TOLERANCE. A Case Report.
J. Aviation Med. 30(1):35-37.

SUMMARY: This is a case report of a twenty-three year-old aviation officer candidate who was referred for a complete medical evaluation after having experienced "black-out" during unusually low G forces while flying. This report contains the history and physical examination of the young man. I also reports on his mental status, centrifuge tests, and the electroencephalography results. After a thorough investigation, the physicians agreed that his reaction was a classical epileptiform tonic-clonic seizure.

3,990

Phillips, R. B. & C. Sheard 1939 AMAUROSIS FUGAX: EFFECT OF CENTRIFUGAL FORCE IN FLYING.
Proc. Mayo Clinic 14:612-618, 27 Sept. 1939.

ABSTRACT: The transitory or fleeting blindness in amaurosis fugax lasts from 1 to 20 seconds, being occasioned by sudden change of direction at high speed. Transverse accelerations up to 16 g. gause no untoward effects on experimental animals and, up to 10 g. do not produce disturbances of vision. Armstrong and Heim found that, flying in the vertical (positive) direction, in man, vision was lost after 5 g. was attained; coma ro fainting developed between 6 g and 9 g. Tears were thrown off in a stream at -4 g, and at -4 g and -4.5 g there were hemorrhages into the conjunctival membranes and a feeling that the eyes were protruding from their sockets. The return of vision occurs suddenly and dramatically.

Generally the loss of sight is attributed to the compression exerted by the intra-ocular pressure on the central retinal artery and its branches, but various facts point to the conclusion that the local conditions in the eyes form only part of a chain of factors affecting the lower visual centers and the corticovisual areas concerned with conscious mental processes.

3,991

Phillips, R. L. 1958 DESCENT TRAJECTORIES FOR MANNED SPACE VEHICLES.
(Space Technology Labs., Inc., Ramo-Wooldridge Corp., Los Angeles, Calif.)
GM-TR-0165-00416, 29 June 1958.

3,992

Phillips, R.L. and C.B. Cohen 1958 THE USE OF DRAG MODULATION TO REDUCE DECELERATION LOADS DURING ATMOSPHERIC RE-ENTRY
(Space Technology Laboratories, Ramo-Wooldridge Corp., Los Angeles, Calif.)
GM-TR-0165-00352 April 9, 1958

ABSTRACT: The design of a space vehicle capable of entering the earth's

atmosphere involves among other things, consideration of the accuracy with which its landing point can be predicted, the maximum deceleration loads which the vehicle will experience, and the aerodynamic heating to which the vehicle is exposed. Since minimization of the landing-point dispersion may require the use of entry angles sufficiently large to cause subsequent excessive deceleration loads to the vehicle and its occupants, a scheme is examined whereby these loads may be reduced to a tolerable level. This is accomplished by variation of the drag of the vehicle (either discretely or continuously) in a properly programmed fashion. It is found that the use of continuous drag modulation can reduce the deceleration loads by as much as 50% without significantly affecting the total aerodynamic heating of the vehicle. Particular numerical solutions of the complete equations of motion are also included. These substantiate the results of the approximate analysis. In addition, several specific applications of drag modulation have been considered, such as application to a vehicle returning from the moon.

3,993

Phillips, W. H. & D. C. Cheatham 1950 ABILITY OF PILOTS TO CONTROL SIMULATED SHORT-PERIOD YAWING OSCILLATIONS.
(National Advisory Committee for Aeronautics, Washington, D. C.) NACA RM-L50D06, 13 Nov. 1950.

3,994

Phoebus, C.P. 1958 ACCOMMODATING THE SPACE MAN.
Research Reviews pp. 6-12, June 1958

ABSTRACT: This article discusses problems which must be solved before space ships can be built which accommodate man's needs sufficiently to permit weeks or months of flight. These problems arise primarily because of the continuously closed environment, hence are discussed in the light of experience with submarine design. Problem areas include: respiratory mechanisms, food and waste, radiation, psychological factors, information from human engineering studies, the crew, acceleration and deceleration, environmental temperature, waste disposal and weightlessness.

3,995

Pickard, D. 1959 MEASURING BIOPHYSICAL CHANGES ON A CENTRIFUGE.
Automatic Control 11(4):13-16, Oct. 1959

3,996

Pickering, J.E., W.L. Brown, H.D. Stallings, R.E. Benson et al 1959 PRIMATES IN SPACE: REPORT NO. 2, BIOASTRONAUTICS ADVANCES IN RESEARCH (Air Force School of Aviation Medicine, Randolph AFB, Texas) March 1959

3,997

Pickering, J. E. 1960 RESEARCH PROGRAMS - III. FUTURE PROBLEMS. Lectures in Aerospace Medicine, 11-15 January 1960. (School of Aviation Medicine, USAF Aerospace Medical Center, Brooks AFB, Texas)

3,998

Pickering, J. E. 1961 ANIMAL AND MAN IN THE SPACE ENVIRONMENT. In Bergeret, P., ed., Escape and Survival: Clinical & Biological Problems in Aero Space Medicine. (London, New York, Paris: Pergamon Press, 1961) AGARDograph 52. Pp. 104-107.
ASTIA AD 261 881

ABSTRACT: Bioscientists and engineers have enthusiastically met the challenge for the conquest of space. Tremendous strides are being made in the biophysics of the space environment, particularly in defining: (1) physiological effects, (2) the creation of an intra-cabin environment that meets the human requirements, (3) proper nutrition, and (4) normal respiratory exchange. Additionally, unique approached to the biodynamics of space vehicles programmed through launch and re-entry profiles with compensation for man's limitations is receiving research emphasis. If man is to travel far and for extended periods of time, a very careful definition of the problem and man's responses to the stresses of weightlessness and radiation will heavily influence judgment for such ventures. Although much has already been presented on these two areas, one must realistically admit that of all of the biological hazards involved in space operations, the exposure of living tissue to ionizing radiation is perhaps still the most important and certainly the one with the most far-reaching consequences. This paper deals with various categories of radiation and their possible effects on man.

3,999

Pickering, W. H. 1959 MAN IN SPACE
In Alperin, M., & H. F. Gregory, eds., Vistas in Astronautics, II (New York, N. Y.: Pergamon Press, 1959)

4,000

Pierce, T.F. 1952 CLOSED LOOP CONTROLS HUMAN CENTRIFUGE. Electronics 25(10): 132-134

ABSTRACT: A human centrifuge developed at the Naval Air Development Center, Johnsville, Pennsylvania, is described. In developing acceleration forces up to 40 g, it simulates stresses encountered in high-speed flight and will be used to test physiological effects of acceleration and anti-g devices (protective clothing It consists of basically of a 50-foot tubular-steel arm attached to the shaft of a 4000-hp motor, carrying at its end an oblate spheroidal gimbal-suspended gondola for the test subject. The centrifuge can be accelerated to a gondola speed of approximately 173 mph. in less than 7 seconds and decelerated at the same rate. The main accelerating motor and the two gimbal control motors are electronically controlled. Observation of the test subject is achieved with television, motion picture cameras, high-speed X-ray equipment, and special physiological sensing and measuring equipment.

4,001

Piercy, M. 1957 EXPERIMENTAL DISORIENTATION IN THE HORIZONTAL PLANE Quart. J. Exp. Psychol. 9:65-77

4,002

Pieron, H. 1953 THE SENSATIONS.
(Cambridge: Yale University Press, 1953)

4,003

Pigg, L.D., & W.N. Kama 1961 THE EFFECT OF TRANSIENT WEIGHTLESSNESS ON VISUAL ACUITY. (Behavioral Science Lab., Aerospace Medical Division, Wright-Patterson AFB, Ohio) WADD TR 61-184, March 1961. ASTIA AD 261 906

ABSTRACT: Visual acuity was measured on subjects while they were exposed to short periods of weightlessness aboard an aircraft flown through zero-g trajectories involving transition from 1 g to 2-1/2 g to zero g. Monocular and binocular acuity of near and far vision were measured on both Snellen and checkerboard targets. Control measurements were made on the ground and inflight at 1 g in counter-balanced sequence with the zero-g measurements. Results show that the weightless environment produced from this study has a detrimental effect on visual acuity as measured. The decrement is not considered to have practical significance (Author)

4,004

Pigg, L.D. 1962 VISUAL ACUITY IN RELATION TO BODY ORIENTATION AND G-VECTOR. (Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio) Final Report. MRL-TDR-62-74. July 1962. ASTIA AD 285 552

ABSTRACT: The Armed Forces Vision Tester, fitted with checker-board targets was used in tests of visual acuity under viewing conditions involving various combinations of gravity effects. Twenty-four subjects were tested for left, right, and binocular acuity of near and far vision in each of four body positions: standing upright, prone, supine, and inverted upright. The latter condition effectively produced- 1 G acceleration. Intercomparisons of scores from these positions from the basis for useful generalizations concerning the effects on visual acuity of various acceleration environments, including 0 G. By comparison with their acuity at 1 G, subjects experience a decrement at 1 G of approximately 15 percent. This is comparable to the decrement found by other investigators at 3 G's. Since both 1 G and 3 G's are 2 G-units removed from 1 G, it appears that equal changes in either direction from the normal acceleration environment produce equal losses in visual acuity as a function of the amount of change. This conclusion is supported by results of a previous study of acuity at 0 G, in which a small but statistically significant decrement comparable to that at 2 G's was found.

4,005

Pilizzi di Sorrentino, A. 1951 UNA RAPA FRATURA CRANICA DA INCIDENTE DI VOLO (Unusual Cranial Fracture Caused By An Airplane Accident) Rivista di Medicina Aeronautica, Rome, 14:538-545, July-Sept. 1951

4,006

Pilz, G.F., 1926 ON THE RELATION OF THE AFTER-NYSTAGMUS TO ROTATION NYSTAGMUS. Amer. J. Physiol. 77: 428-442

4,007

Pinc, B.W. & B.L Ettelson 1961 DEVELOPMENT OF AN INTERNALIZED ANIMAL TELEMETRY SYSTEM.
(Paper, 32nd Annual Meeting of the Aerospace Medical Association, Chicago, April 24-27, 1961)

ABSTRACT: This paper describes a program which successfully developed a surgically implanted single channel biological telemetry system. The limitations of conventional approaches to instrumentation of experimental animals in rigorous environments is described. The practical advantages to be derived from advanced bioinstrumentation techniques is discussed. The background, rationale, design objectives and technical approach employed are outlined. The program results are summarized and some conclusions are presented. A film illustrating the program is shown. (Aerospace Medicine 32(3):244. March 1961)

4,008

Pinc, B. W., M. Brian, M. D. Ross, & N. L. Barr 1962 SMALL PRIMATE RESPONSES TO SIMULATED RE-ENTRY ACCELERATION PROFILES. (Paper, 33rd Annual Meeting of the Aerospace Medical Assoc., 9-12 April 1962, Atlantic City, N. J.)

ABSTRACT: A re-entry acceleration profile simulator, capable of producing very high accelerative loads over broadly variable periods of onset, duration, and decay, was used to expose small squirrel monkeys in miniaturized versions of current restraint and support devices to various +Gx loads. Biological and physical data were directly and indirectly collected during the exposures. The response of the animals to "conventional" accelerative stresses is presented, as well as data on small primate response to unconventionally high accelerative environments with special attention to reversible tissue damage as an endpoint. Modifications to the restraint and support devices to improve tolerance to acceleration stresses are described. Some preliminary and tentative conclusions are drawn and future work is outlined. (Aerospace Medicine 33(3):367, March 1962).

4,009

Pine, N.W. ed. 1961 THE BIOLOGY OF SPACE TRAVEL.
(London: The Institute of Biology, 1961)

(A collection of space Biology papers)

4,010

Ping, B. W. & B. L. Ettelson 1961 DEVELOPMENT OF AN INTERNALIZED ANIMAL TELEMETRY SYSTEM.
(Paper 1961 Meeting of Aerospace Medical Association, Chicago, April 24-27).

ABSTRACT: This paper descirbes a program which successfully developed a surgically implanted single channel biological telemetry system. The limitations of conventional approaches to instrumentation of experimental animals in rigorous environments is described. The practical advantages to be derived from advanced bioinstrumentation techniques is discussed. The background, rationale, design objectives and technical approach employed are outlined. The program results are summarized and some conclusions are presented. A film illustrating the program is shown. (Aerospace Med. 32(3):244, March 1961)

4,011

Pinkel, I. I. & E. G. Rosenberg 1956 SEAT DESIGN FOR CRASH WORTHINESS.
(National Advisory Committee for Aeronautics, Washington, D. C.) Tech. Note TN 3777; Oct. 1956. ASTIA AD 109 316.

ABSTRACT: Data are presented from full-scale laboratory and crash studies on the

deceleration loads measured on dummy passengers in seats of standard and novel design. Included are charts for obtaining the maximum deceleration loads experienced by the seat and passenger in response to the crash deceleration pulses. In addition, a method is described for determining the seat strength, spring stiffness, and deformation beyond the elastic limit required to serve in a crash deceleration pulse of a given type.

4,012

Pinkel, I. I. and E. G. Rosenberg. 1957 SEAT DESIGN FOR CRASH WORTHINESS. NACA Rep. 1332, 1957 (Supersedes NACA TN 3777.) ASTIA AD 109 316

ABSTRACT: On the basis of deceleration data obtained in full-scale crashes, a description of crash deceleration pulses is presented which is suitable for seat design. Charts are presented for obtaining the maximum deceleration loads experienced by the seat and passenger in response to their crash deceleration pulses. Finally, a method is presented for determining the seat strength, spring stiffness, and deformation beyond the elastic limit required to serve in a crash deceleration pulse of given description. Measurement of passenger decelerations in full-scale laboratory and crash studies shows that the general principles presented in the report apply.

4,013

Pinneo, L.R. and M.L. Kesselman 1959 TAPPING THE ELECTRIC POWER OF THE NERVOUS SYSTEM FOR BIOLOGICAL TELEMETERING (Rome Air Development Center, Griffiss AFB, N.Y.) RADC-TN-59-15

ABSTRACT: Two experiments are reported in this document wherein electric power is measured from the central nervous system (CNS) of a living mammal, and an FM radio transmitter is operated on voltages supplied largely by the organism. Also discussed are the neurophysiological basis of th CNS currents, the physical characteristics of minumum voltages necessary to operate transistors; and a description of methods of combining the two techniques for biological telemetering.

4,014

Pinson, E. A. 1940 AIRSICKNESS, ITS CAUSE AND PREVENTION. (Wright Air Development Ctr., Wright-Patterson AFB. Ohio) Memo Rept. EXP-M-54-653-21; 31 July 1940

4,015

Pinson, E. A. 1941 DARK ADAPTATION APPARATUS (ROTATING HEXAGON) (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) Memo Rept. EXP-M-54-653-69A; 29 November 1941

4,016

Piollet, L. 1960 LE VOYAGE TERRE LUNE - SERA-T-IL UN JOR UN VOYAGE D'AGREMENT? (The Earth-Moon Trip - Will It One Day Be a Pleasure Trip?) L'air, pp. 16-18, May 1960, (in French).

ABSTRACT: Discussion of the environmental conditons against which an astronaut will have to be protected. These are (1) the accelerations of launching and landing, (2) extreme temperature variations, (3) the noise and vibration of the rocket, (4) the state of weightlessness, (5) ionizing and nonionizing radiation, and (6) meteoritic impact. It is suggested that when these problems have been solved, man will have a 98% chance of surviving a journey in space.

4,017

Piorry, P.A. 1826 RÉCHERCHES SUR L'INFLUENCE DE LA PESANTEUR SUR LE COURS DU SANG; DIAGNOSTIC DE LA SYNCOPE ET DE L'APOPLEXIE; CAUSE ET TRAITEMENT DE LA SYNCOPE (Research Upon the Influence of the Gravity on the Blood Circulation; Diagnosis of the Syncope and the Apoplexy; Cause and Treatment of the Syncope.)
Archives générales de médecine (Paris) 12: 527-544

4,018

Piquet, J. & J. J. Piquet 1958 CENTRAL SEQUELAE OF CLOSED CRANIAL INJURIES: POST-CONCUSSION VERTIGO AND THEIR OBJECTIVE MANIFESTATIONS. Rev. Otoneuroophthal. 30:29-47.

4,019

Pisarev, D. I. 1957 NEUROLOGICAL EXPERIENCES OF AVIATION MEDICINE Trans. of mono. Neurologische Erfahrungen der Luftfahrtmedizin, Berlin, 1957, trans. from mono. Opyt Raboty v Oblasti Aviatsionnoy Nevrologii i Voprosy Profilaktiki (Experimental Work in the Field of Aviation Neurology and Problems of Prevention) ed. by Rudolf Mitzscherling. (Office of Technical Services, Washington, D.C.) 1959 60-13091

4,020

Pisarev, D. I. 1959 NEUROLOGICAL EXPERIENCES OF AVIATION MEDICINE (Trans. from mono. Opyt Raboty v Oblasti Aviatsionnoy Nevrologii i Voprosy Profilaktiki (Experimental Work in the Field of Aviation Neurology and Problems of Prevention) ed. by Rudolf Mitzscherling. (Office of Technical Services, Washington, D.C.) 60-13091

4,021

Pivotti, G. 1957 EXPERIMENTS ON LATERAL NYSTAGMUS EVOKED BY SIMULTANEOUS BILATERAL THERMAL STIMULATION OF THE VESTIBULAR APPARATUS.
(Esperienze sul nistagmo laterale evocata da bilaterale, contemporanea stimolazione termica del apparato vestibolare.)
Archivio di fisiologia,(Firenze), 57(2-3):117-135. Nov 12, 1957

ABSTRACT: No lateral nystagmus was observed in normal subjects in a supine position (corresponding to a horizontal situation in relation to the force of gravity of the plane connecting the ampullae of the horizontal semicircular canals) exposed to bilateral, simultaneous, equal thermal stimulation of the vestibular apparatus. This is termed the position of indifference. In this position, if the head was turned either right or left, nystagmus developed directed towards the side contrary to rotation. The duration and frequency of the nystagmus attains maximal values after a 90° lateral rotation of the head. In this position, after a certain period of time, even if thermal stimulation persists, lateral nystagmus terminates. This may be due to exhaustion of the endolymphatic current with return of the cupula to its original position. By bringing the head back in the medical position (rotatation of 90° in the direction contrary to the preceding one) nystagmus reappears. This is an expression of the endolymphatic current of balance that reinstates the original equilibrium. (Author)

4,022

Platonov, K. K. 1957 MAN IN FLIGHT 2D. ED. REV. 1958
(Trans. of Chelovek v Polete, 2d ed. rev., Moscow, 1957.
(Office of Technical Services, Washington, D.C.) 59-11879

4,023

Platonov, K.K. 1957 MAN IN FLIGHT (SECOND REVISED AND EXPANDED EDITION)
Technical Documents Liaison Office, MCLTD, Wright-Patterson Air Force Base, Ohio
F-TS-9381/V; ASTIA AD 162 876
(Original Source: Military Publishing House, Ministry of Defense, USSR, Moscow)

ABSTRACT: This book discussed the principal questions of aviation medicine, with which the pilot must in practice be acquainted. The book is intended for students of aeroclubs and flying schools, for the flight personnel of the regular military units of the Soviet Army Air Force, and for the wide circle of youth interested in aviation. It will also be useful to physicians serving aviation units, schools, and aeroclubs.

4,024

Platonov, K.K. 1959 PSIKHOLOGICHESKIE PROBLEMY KOSMICHESKOGO POLETA (Psychological Problems of Space Flight) Vosprosy Psikhologii (Moskva), 5(3):56-65
German Translation: Psycholgische Probleme des Raumfluges, in Sowjetwissenschaft: Naturwissenschaftliche Beitrage (Berlin), 1959(12):1213-1222, 1960

ABSTRACT: The psychologic effects of the conditions of space flight are reviewed with reference to published reports on the reactions of experimental subjects to these conditions. It is concluded that the adverse effects of acceleration, weightlessness, confinement, isolation, and exposure to danger may satisfactorily be counteracted by the proper conditioning and motivation of space pilots.

4,025

Platonov, K. K. 1959 PSYCHOLOGICAL PROBLEMS OF OUTER-SPACE FLIGHT (Psikhologicheskiye Problemy Kosmicheskogo Poleta)
Trans. of Voprosy Psikhologii (USSR) 5(3):56-65, 1959.
(Office of Technical Services, Washington, D.C.)
Dec. 16, 1959 60-13520

4,026

Pletcher, K. E. 1959 THE HUMAN ELEMENT IN AIRCRAFT ACCIDENTS (Conference, U. S. Air Force Flight Safety, 14-18 Sept. 1959, Riverside, Calif.)

4,027

Poe, A. C., & V. W Lyon 1952 THE EFFECTIVENESS OF THE CYCLORAMIC LINK TRAINER IN THE U. S. NAVAL SCHOOL, PRE-FLIGHT. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 058.07.01., 17 March 1952

4,028

Pogrund, R. S., S. W. Ames and C. F. Lombard 1949 BIOCHEMICAL AND BLOOD PRESSURE CHANGES IN GOATS UNDER NEGATIVE G (ACCELERATION TAILWARD) (Office of Naval Research, Washington, D. C.)
December 1949 Contract N6ori77
See also J. Avia. Medicine, 22(1), February 1951

SUMMARY: Blood pressure and biochemical changes of blood have been determined in goats repeatedly exposed to negative radial acceleration on the human centrifuge at the University of Southern California.

These effects have been ascertained by the determinations of oxygen tension, carbon dioxide tension , glucose, lactic acid, pyruvic acid, hematocrit, and plasma protein concentrations, all of which not only indicate the state of tissue metabolism, but also present a sensitive method for assessing tolerable and intolerable exposures.

Blood pressurevalues present evidence of a progressive stagnation of blood under repeated negative 5 G as indicated by steady decreases in arteriovenous pressure differences. These decreases in A-V difference during progressive negative 5 G runs occur concomitantly with certain alterations in carbohydrate metabolism and generally reflect the anaerobic state of metabolism during the stress of negative acceleration.

The chemical changes which show this anaerobic character of metabolism are (a) an initially elevated blood glucose followed by a greatly reduced concentration as the stress is prolonged; (b) increase in A-V oxygen content difference due to the decrease in venous oxygen tension and the relatively constant tension of arterial oxygen; (c) reduction in both arterial and venous carbon dioxide content; (d) increase in both lactic and pyruvic acid, the former accumulating to a more marked extent than the latter and giving rise to a lactate-pyruvate (L/P) ratio of increasing numerical value. The significance of these changes is discussed. Hematocrit and plasma protein determination give variable results of doubtful significance.

4,029

Pogrund, R. S., S. W. Ames, & C. F. Lombard 1951 BIOCHEMICAL AND BLOOD PRESSURE CHANGES IN GOATS UNDER NEGATIVE G (ACCELERATION TAILWARD)
J. Avia. Med. 22(1):50-59A, Feb. 1951
See also (Dept. of Avia. Med., School of Med., University of Southern Calif., Los Angeles 7, Calif.) Contract N6ori77, Task 1, Dec. 1949

SUMMARY: 1) Blood pressure and biochemical changes of blood have been determined in goats repeatedly exposed to negative radial acceleration on the human centrifuge at the University of Southern California. 2) These effects have been ascertained by the determinations of oxygen tension, carbon dioxide tension, glucose, lactic acid, pyruvic acid, hematocrit, and plasma protein concentrations, all of which not only indicate the state of tissue metabolism but also present a sensitive method for assessing tolerable and intolerable exposures. 3) Blood pressure values present evidence of a progressive stagnation of blood under repeated negative 5 g as indicated by steady decreases in arteriovenous pressure differences. These decreases in A-V difference during progressive negative 5 g runs occur concomitantly with certain alterations in carbohydrate metabolism and generally reflect the anaerobic state of metabolism during the stress of negative acceleration. 4) The chemical changes which show this anaerobic character of metabolism are (a) an initially elevated blood glucose followed by a greatly reduced concentration as the stress is prolonged; (b) increase in A-V oxygen content difference due to the decrease in venous oxygen tension and the relatively constant tension of arterial oxygen; (c) reduction in both arterial and venous carbon dioxide content; ; (d) increase in both lactic and pyruvic acid, the former accumulating to a more marked extent than the latter and giving rise to a lactate-pyruvate (L/F) ratio of increasing numerical value. The significance of these changes is discussed. Hematocrit and plasma protein determination give variable results of doubtful significance. (DACO)

4,030

Pogrund, R.S. 1962 PHYSIOLOGICAL ASPECTS OF THE SPACEMAN
In: Brown, K., and L.D. Ely, eds., Space Logistics Engineering
(New York: John Wiley and Sons, 1962) pp. 55-135

ABSTRACT: The complexity of space logistics engineering for the comfort of the astronaut in a space vehicle is described as a function of mission duration and of the operational requirements and performance capabilities expected. The following physiological parameters are reviewed: (1) vehicle-induced stresses (propulsion, noise, vibration, accelerations, zero gravity, re-entry, emergency escape); (2) internal environment of the space capsule (sources of oxygen supply, handling food, biological photosynthesis systems, methods of carbon dioxide elimination, water and waste control, toxicological considerations, temperature and humidity regulation); (3) radiation hazard shielding requirements, low-level chronic exposure hazard; and (4) psychological stress (isolation, confinement, and sensory deprivation).

4,031

Pokorovski, A.V. 1956 STUDY OF THE VITAL ACTIVITY OF ANIMALS DURING ROCKET FLIGHTS INTO THE UPPER ATMOSPHERE. (Report presented at the Congres Internationale des fusees et engins guides, Paris, Dec. 3-8, 1956)
In Etudes Sovietiques (Paris) 106:65-70, Jan. 1957.
R.A.E. Translation No. 625, ASTIA AD 124191
Alsoin Krieger, F. J., ed. Behind the Sputnik (Washington: Public Affairs Press, 1958)

ABSTRACT: In the first stage of this work, vital activity of the body at high altitudes has been observed in dogs, carried in a hermetically sealed compartment in the nose of a rocket. Equipment carried in the compartment allowed observations to be made on conditions, and on the behaviour of the animals during flight, and during the free fall of the cabin from the rocket.

The second stage involved the placing of the dogs, in space suits, in a compartment not hermetically sealed. In one case the animal was ejected at about 75 to 85 km, its parachute opened, and it was subjected to all the external influences of the upper atmospheric layers during 50-65 min.

4,032

Pokrovskiy, B. 1961 MAN'S SPACE FLIGHT
Vestnik vozdoshnogo flota 4: 59-62

4,033

Pokrovskiy, G. 1961 MAN GOES OUT INTO SPACE
Kryl'ya rodiny 6: 17-18

ABSTRACT: The article deals with the first cosmic flight of Major Yu. A. Gagarin in the spaceship "Vostok", which proved that man can exist and function normally in space. K.E. Tsiolkovskiy was amongst the first scientists to point out that man in a cosmic fl ght would experience two distinctly different states, i.e. overloads which would be felt during the acceleration and deceleration in the atmosphere before landing, and a state of weightlessness while the spaceship is in orbit. Insignificant "g" loads would be possible during change-over from one orbit into another or before landing. "g" loads have been known to high-speed pilots, and momentary weightlessness to aerobatic pilots. Checking of a prolonged state of weightlessness had to be carried out under conditions of a real cosmic flight. Three aspects of the phenomena were observed: (1) weightlessness reduces the load on blood vessels and facilitates the heart functions. It lowers the strain of the human body, and could be used as a treatment for heart diseases; (2) it affects the intake of food, which becomes weightless; further investigation as to the food's progress in the digestive system was required; (3) the force of gravity must play an important part in man's orientation in space as it acts on the body as a whole, and on the vestibular apparatus, which governs the sensation of "Top" and "Bottom". After Major Yu. A. Gagarin's flight in space it was found that the human body withstands all unexpected and unusual conditions quite well. (CARI)

4,034

Pokrovskiy, G. 1961 DECELERATION OF SPACE VEHICLES
Tekhnika-molodezhi (Meteor-rocket) No. 1, 1961, 37. Air Information Division Report 61-51, ASTIA AD 255 793

ABSTRACT: The electric charge on the nose of a rapidly flying body considerably changes the intensity of the body's deceleration. Professor G. Pokrovskiy discusses the use of this effect in the development of a deceleration engine for space vehicles. The method of decelerating a space body would thus be based on the use of the kinetic energy of that body.

4,035

Pokrovskiy, G. 1961 MAN, TECHNOLOGY, AND SPACE
Ekonomicheskaya Gazeta 102(774):3-4, Sept. 27, 1960
(Aerospace Technical Intelligence Ctr., Wright-Patterson AFB, Ohio, Trans. No. MCL-851/1; ASTIA AD-258 837; March 27, 1961)

4,036

Pokrovskiy, G. 1961 METEOR-ROCKET
(Tekhnika Molodezhi, No. 1, 1961, pp. 37) Foreign Technology Division, WP-AFB, Ohio. FTD-TT-61-190/1+2 ASTIA AD 268070

ABSTRACT: Description of the study of meteors in relation to the problem of slowing down spaceships and re-entering the earth's atmosphere.

4,037

Pokrovskiy, I. 1961 MIRACLE OF THE TWENTIETH CENTURY.
Ekonomicheskaya Gazeta 88(941):4
(Aerospace Technical Intelligence Center, Wright-Patterson AFB, Ohio)
Transl. No. MCL-1150, 13 April 1961. ASTIA AD 261 824

ABSTRACT: This report is an evaluation on the individual and technical achievements of Soviet scientists, designers, and workers in the field of cosmic flights and other fields. It emphasizes the importance of sending a man into space to make it possible for him to work in this medium.

4,038

Polis, B. D., L. Jedeikin, and E. Polis 1952 EFFECTS OF ACCELERATION UPON THE CEREBRAL METABOLISM AND CEREBRAL BLOOD FLOW. PHASE III: The Activation of Aerobic Phosphorylation by the Addition of Xanthines and Analogous Compounds to the Inhibited Enzyme Systems. (Avia. Med. Acceleration Lab., U.S.Naval Air Development Center, Johnsville, Pa.) Rept. No. NADC-MA-5205; Rept. No. NM 001 060.03.04, 9 Dec. 1952; ASTIA AD-1031

ABSTRACT: This investigation was concerned with the increase in the efficiency of aerobic phosphorylation obtained by the addition of xanthines and analogous structural compounds to enzyme systems with the phosphorylation efficiency decreased by the addition of a Mg-ATPase, or by the use of suboptimal concentrations of ATP in the reaction mixture. Compounds such as caffeine, xanthine, and theophylline may function as a substitute for ATP with an in vitro enzyme system for aerobic phosphorylation. The opposing actions of pentothal and caffeine on aerobic phosphorylation may be due to a competitive action for the same enzyme site. Experimental results demonstrating the release or bypass of phosphorylation inhibition produced by dinitrophenol, pentothal, or Mg-ATPase by the addition of xanthines indicated that these compounds may function as a bypass to ATP in the coupling reaction of aerobic phosphorylation.

4,039

Polis, B. D., et al. 1955 MISCELLANEOUS TESTS AND MINOR INVESTIGATIONS. PHASE VI. AN INVESTIGATION INTO THE EFFECT OF ACCELERATION AND CERTAIN STRESSOR AGENTS ON THE INTERMEDIARY METABOLISM OF THE BRAIN. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 103 300; TED ADC AE-1402; 31 Dec. 1955

ABSTRACT: Cerebral blood flow, cerebral oxygen consumption, and glucose metabolism were determined in groups of monkeys under the influence of the hallucinatory drug mescaline and under control conditions. Although the mescaline caused a considerable increase in blood flow, there were no changes in the total oxygen used relative to glucose. The experimental results did indicate the metabolism of an unknown reducing substance by the brain under stress. Mescaline apparently increased the brain utilization of this substance.

4,040

Polis B.D. 1959 HORMONAL FACTORS IN THE RESISTANCE OF THE MAMMAL TO ACCELERATION STRESS. (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: The reactions of the mammalian organism to acceleration stress involves circulatory, central nervous and respiratory responses to such an extent that the importance of the endocrine system in adjustment to this adverse environment is self evident. These studies were designed to reveal possible hormonal factors operative in the utilization of biological energy at a cellular level that would contribute to the survival of the animal under high acceleration forces. The heart rate obtained by a transistor amplified ECG adapted for use on an eight-foot animal centrifuge defined a physiologic end point of tolerance to 20 G as the time for the heart rate to fall from an initial rate of 7 beats to a final rate of 2 beats per second. With this criterion normal Sprague-Dawley rats survived 20 G for 10 minutes (50 per cent lethal level). Hypophysectomy provided an appreciable measure of protection against G stress in that the mean survival time was increased to 30 minutes. Injection of ACTH decreased the protective action of hypophysectomy. Adrenalectomy decreased the tolerance of the animal to G stress as indicated by a mean survival time of 4 minutes under 20 G. Adrenalectomy and hypophysectomy reversed the decreased tolerance to G stress obtained with adrenalectomy alone. The data were interpreted to indicate that the protective action of hypophysectomy was due to the elimination of adrenocortical hormones and pituitary hormones which are important for the resistance to other forms of stress.
(J. Aviation Med. 30(3):198, March 1959)

4,041

Polis, B. D. 1960 HORMONAL DETERMINANTS OF MAMMALIAN TOLERANCE TO ACCELERATION STRESS.
(Naval Air Dev. Ctr., Johnsville, Pa.) Rept. NADC-MA-6025; 12 Aug. 1960; ASTIA AD 242 447.
See also J. Appl. Physiol. 16(2):211-214, March 1961.

ABSTRACT: The pituitary-adrenal hormonal axis has been implicated as a critical factor in the survival of the rat to acceleration stress. The physiological endpoint for the tolerance of animals to high positive acceleration stress was obtained by determining the time to reduce the heart rate from eight to two beats per second at 20 G. With this technique a significant increase (300 percent) in the survival time of rats to 20 G was found following hypophy-sectomy. A significant loss (60 percent) of tolerance to high acceleration stress was found in adrenalectomized rats. The procedures of hypophysectomy and adrenalectomy essentially cancelled the effect of each operation alone in the rat to yield an animal approximately similar to the normal rat in its ability to tolerate acceleration. Possible mechanisms for these effects are offered. (Author)

4,042

Polis, B. D. 1961 HORMONAL DETERMINANTS OF MAMMALIAN TOLERANCE TO ACCELERATION STRESS.
J. Appl. Physiol. 16(2):211-214, March 1961.
See also (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-6025, 12 Aug. 1960. ASTIA AD 242 447.

ABSTRACT: The pituitary-adrenal hormonal axis has been implicated as a critical factor in the survival of the rat to acceleration stress. The physiological endpoint for the tolerance of animals to high positive acceleration stress was obtained by determining the time to reduce the heart rate from eight to two beats per second at 20 G. With this technique a significant increase (300 percent) in the survival time of rats to 20 G was found following hypophysectomy. A significant loss (60 percent) of tolerance to high acceleration stress was found in adrenalectomized rats. The procedures of hypophysectomy and adrenalectomy essentially cancelled the effect of each operation alone in the rat to yield an animal approximately similar to the normal rat in its ability to tolerate acceleration. Possible mechanisms for these effects are offered. (Author)

4,043

Polis, B. D. 1961 INCREASE IN ACCELERATION TOLERANCE OF THE RAT BY 2-DIMETHYLAMINOETHYL P-CHLOROPHENOXY-ACETATE (LUCIDRIL) (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-6136, 27 Nov. 1961
See also Aerospace Medicine 33(8):930-934, Aug. 1962

ABSTRACT: A simple chemical molecule, the dimethyl-aminoethyl ester of para-chlorophenoxyacetic acid has been found to enhance significantly the tolerance of rats to acceleration at 20 G. The median survival time of treated animals

increased to 33.3 minutes, almost a three-fold increment over the control survival time of 12.5 minutes. The effectiveness of the drug persisted only for a period of four hours after injection. A latent period of 3 to 4 days treatment with the drug seemed necessary before the enhanced tolerance to acceleration become apparent. The activity of the drug was dose dependent in that no significant changes in acceleration tolerance were found with a total injection of 50 mg; significant increments in tolerance were obtained with 75 mg of the drug; much larger increases in the tolerance to acceleration followed administration of 100 mg of Lucidril. The nature of the parmacologic effect suggests that the drug action per se is mediated via the hypothalamic area of the brain, possibly by interplay with the biogenic amines. Its structural relationship to acetylcholine suggests additional areas for investigation of the mechanism of its action and also for the investigation of the role of this hormone in acceleration stress tolerance. The low toxicity of the drug and the fact that it has already been used in humans in high doses with no deleterious and some presumptive beneficial effects leads to the proposal that the compound might be effective in increasing human tolerance to accele ation stress. (AUTHOR)

4,044

Polis, B. D. 1961 INCREASE IN THE TOLERANCE OF ACCELERATION STRESS WITH THE DIMETHYLAMINETHYL ESTER OF P-CHLOROPHENOXYACETIC ACID. (Paper, 32nd Annual Meeting of the Aerospace Medical Association, 24-27 April 1961, Chicago, Ill.

ABSTRACT: Previous studies from this laboratory have demonstrated a pronounced enhancement of the tolerance to acceleration stress in the rat following hypophysectomy. The studies implicated the pituitary adrenal axis as a critical factor in the survival of the rat and pointed to possible involvement of the hypothalamic area of the brain. Attempts were then made to attain a similar enhancement of the resistance to acceleration stress without some of the deleterious effects of hypophysectomy. The new drug lucidril (dimethylaminoethyl ester of p-chlorophenoxyacetic acid) has been shown to enhance the vasopressor effects of adrenalin applied topically to the brain. Administration of lucidril to rats increased the tolerance of a rat population from a median survival time of 10 minutes at 20 G to a median survival time of 24 minutes at 20 G. The low toxicity of the drug and striking effects in animals suggests its possible use to increase the tolerance of humans to high G. (Aerospace Medicine 32(3):244, Mar. 1961)

4,045

Polis, B. D. 1962 INCREASE IN ACCELERATION TOLERANCE OF THE RAT BY 2-DIMETHYLAMINOETHYL P-CHLOROPHENOXY-ACETATE (LUCIDRIL) Aerospace Medicine 33(8):930-934, Aug. 1962
See also (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-6136, 27 Nov. 1961

ABSTRACT: A simple chemical molecule, the dimethyl-aminoethyl ester of parachloro phenoxyacetic acid has been found to enhance significantly the tolerance of rats

to acceleration at 20 G. The median survival time of treated animals increased to 33.3 minutes, almost a three-fold increment over the control survival time of 12.5 minutes. The effectiveness of the drug persisted only for a period of four hours after injection. A latent period of 3 to 4 days treatment with the drug seemed necessary before the enhanced tolerance to acceleration become apparent. The activity of the drug was dose dependent in that no significant changes in acceleration tolerance were found with a total injection of 50 mg; significant increments in tolerance were obtained with 75 mg of the drug; much larger increases in the tolerance to acceleration followed administration of 100 mg of Lucidril. The nature of the parmacologic effect suggests that the drug action per se is mediated via the hypothalamic area of the brain, possibly by interplay with the biogenic amines. Its structural relationship to acetylcholine suggests additional areas for investigation of the mechanism of its action and also for the investigation of the role of this hormone in acceleration stress tolerance. The low toxicity of the drug and the fact that it has already been used in humans in high doses with no deleterious and some presumptive beneficial effects leads to the proposal that the compound might be effective in increasing human tolerance to acceleration stress. (AUTHOR)

4,046

Polis, B. D., H. W. Schumukler, & M. Chianti 1962 CHANGES IN THE AMINO ACID COMPOSITION OF RAT BRAIN CAUSED BY ACCELERATION STRESS. (Paper, 33rd Annual Meeting of the Aerospace Medical Assoc., 9-12 April 1962, Atlantic City, N. J.)

ABSTRACT: Previous work from this laboratory showing the importance of hormonal and other cellular factors in the tolerance to acceleration stress suggested the possibility of a reversible "metabolic lesion" that results from acceleration stress. The following study was undertaken in an effort to reveal the metabolic defects in cerebral metabolism induced by acceleration. Rat brains were rapidly excised from normal and centrifugal animals, frozen, weighed, deprotenized with picric acid and analysed for the complete free amino acid pool composition by ion exchange chromatography. Large decreases (>50%) were found for the new amino acid β-hydroxyaspartic acid, as well as for serine, urea, and glutathione. A large increase in the concentration of free ammonia was also found. The interrelationships of the changes in amino acid composition suggest a block in the energy yielding mechanisms from the respiratory enzyme systems in mitochondria. (Aerospace Medicine 33(3):349, March 1962)

4,047

Polis, B. D., & H. W. Shmukler 1963 BIOCHEMICAL PHARMACOLOGY IN THE TOLERANCE TO ACCELERATION STRESS. (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 28 - May 2, 1963)

ABSTRACT: Experimental work from this laboratory defined the tolerance of the rat to acceleration stress in terms of a heart-brain interaction mediated by

hormones of the pituitary-adrenal axis and demonstrated a 300 per cent increase in acceleration tolerance by the rat after hypophysectomy. Efforts to reproduce by pharmacological means this high tolerance to acceleration were realized in part with the drug Lucidril. Since pharmacological studies in animals suggested involvement of the hypothalamic area of the brain as a mode of action for this drug, some basic studies of biochemical changes in the brain during acceleration were carried out with the hope that a logical chemical approach to acceleration tolerance might be attained. These revealed a striking decrease in the brain concentration of a component identified as B-hydroxyaspartic acid by its position in ion exchange chromatography. This component also was increased significantly in the brain of hypophysectomized animals; it therefore appeared to be a critical metabolite of brain under anoxic stress. The parenteral administration of synthetic B-hydroxyaspartic acid to rats resulted in a significant increase in the median survival time from 7 minutes at 20 G for the litter mate controls to 14 minutes for the treated animals.

4,048

Pollitzer, Robert 1961 SELECTED ABSTRACTS FROM SOVIET BIOMEDICAL JOURNALS, No. 6
(The Institute of Contemporary Russian Studies, Fordham University, New York 58, New York) Contract No. DA18-108-405-CML-867, June, 1961, ASTIA AD 262007

ABSTRACT: A selected group of abstracts on biomedical journals by Russian authors.

4,049

Pollitzer, Robert 1961 SELECTED ABSTRACTS FROM SOVIET BIOMEDICAL JOURNALS No. 8
(The Institute of Contemporary Russian Studies, Fordham University, New York 58, New York) Contract No. DA 18-108-405-CML-867, December 1961, ASTIA AD 271 923

ABSTRACT: A selected group of abstracts on biomedical journals by Russian authors.

4,050

Pollock, L. J. 1943 BLAST INJURIES OF THE CENTRAL NERVOUS SYSTEM. Illinois Med. J. 83:196-168, 1943.
ASTIA AD 74 028

4,051

Popov, A. P. 1938 THE EFFECT OF THE FORCES OF CORIOLIS ON THE BLOOD PRESSURE IN HUMAN BEINGS.
Vestnik Oto-rhinolaryngology (5):510-516.
Collected Transactions Inst. Av. Med. Voyengiz 1 (1939).

4,052

Popov, A. P. 1956 ZAME CHANIYA K STAT'YAM D. YE. ROZEMBLYUMA "OB OSNOVNYKH VOPROSAKH V FISIOLOGII USKORENIY" I G. L. KOMENDANTOV "O SPORNYKH VOPROSAKH V OBLASTI FIZIOLOGII USKORENIY". (NOTES TO PAPERS BY D. YE. ROZENBLYUMS "FUNDAMENTAL PROBLEMS IN PHYSIOLOGY OF ACCELERATION" AND BY G. L. KOMENDANTOV "CONTROVERSIAL PROBLEMS IN THE FIELD OF PHYSIOLOGY OF ACCELERATION.").
Voyenno-meditsinskiy Zhurnal (Military Medical Journal). 6:85-91, 1956.
(Translation in USAF Air Intelligence Information Report "Physiology of Acceleration: A Controversy Between D. Ye. Rozenblyum and G. L. Komendantov" IR-1407-57. 21 May 1957.)

4,053

Poppen, J. C. & E. L. Hendler 1950 PROTECTIVE HELMETS — THEIR INTEGRATION WITH OTHER EQUIPMENT.
J. Aviation Med. 21(5):414-418.

SUMMARY: 1. The impetus to the development of protective helmets is outlined.
2. Methods of construction and general configuration of the more commonly worn protective helmets are briefly described.
3. The need for better integration between the helmet and contiguous equipment is defined.
4. The need for better integration of all personal equipment is emphasized.

4,054

Poppen, J. R. 1932 REPORT ON THE PHYSIOLOGICAL EFFECTS OF SUDDEN CHANGES IN THE SPEED AND DIRECTION OF AIRPLANE FLIGHT. (Dept. of Physiol., Harvard School of Pub. Health, Boston, Mass.) April 1932.

4,055

Poppen, J. R. 1934 REPORT ON POSSIBLE METHODS OF REDUCING THE SYMPTOMS PRODUCED BY RAPID CHANGE IN THE SPEED AND DIRECTION OF AIRPLANES. (Dept. of Physiology, Harvard School of Public Health, Boston, Mass.) Feb. 1934.

4,056

Poppen, J. R. 1934 AERIAL EQUILIBRATION.
J. Aviation Med. 5(1):96-106.

ABSTRACT: Three mechanisms are involved in the function of equilibration: the vestibular apparatus, the somatic senses with their one fairly homogeneous function, and vision, the purely telesceptive sense. This article details the functions of each of the three mechanisms.

4,057

Poppen, J.R. 1938 EFFECTIVENESS OF PNEUMATIC BELT IN COUNTERACTING ACCELERATION. (Discussion.) J. Aviation Med. 9:214-215, 233

4,058

Poppen, J. R. 1941 THE CARDIOVASCULAR ASPECTS OF AVIATION MEDICINE.
New England J. of Medicine 225(23):892-896.

ABSTRACT: Aviation medicine is peculiarly subclinical in its field of interest and application. In this respect, it is the acme of preventive medicine.

The selection of flying personnel requires, first of all, freedom from organic disease. Flying requires adjustment to a new and unusual set of circumstances in its three-dimensional fields. With rapid changes in altitude come the problems of anoxia and high accelerations. The profound changes in blood distribution incident to the centrifugal forces encountered in certain maneuvers place a peculiar burden on the circulation, in which the heart has its share. The responsibility of repeatedly and suddenly requiring an effort to preserve the circulation against profound reduction and inadequate filling of the right heart is peculiar to flying.

For the determination of actual or incipient organic heart disease, doctors must depend on the diagnostic methods commonly used in physical examination. C reful history, keen inspection, accurate percuss'on and clear auscultation continue bot be the most reliable diagnostic tools. Adjunctive aids in the form of electrocardiograms and x-ray plates must remain supplementary for those cases in which commoner methods of examination do not suffice to make the diagnosis clear.

In discussing the cardiovascular aspects ot flying in its application to the maintenance of flying fitness, emphasis is placed on two major considerations: the cardiovascular demands peculiar to flying, and tests for determining cardiovascular efficiency.

4,059

Poppen, J. R. 1941 INFLUENCE OF AIRCRAFT PERFORMANCE ON SELECTION AND CARE OF MILITARY AVIATORS.
War Med. 1:180-187.

4,060

Poppen, J.R. 1941 PHYSIOLOGICAL EFFECTS OF SUDDEN CHANGES IN SPEED AND DIRECTION OF AIRPLANE FLIGHT.
(RAF, Institute of Aviation Medicine, Farnborough)
FPRC Report 263(a), March 1941.

4,061

Poppen, J.R. 1941 POSSIBLE METHODS OF REDUCING THE SYMPTOMS PRODUCED BY RAPID CHANGE IN THE SPEED AND DIRECTION OF AIRPLANES.
(RAF, Institute of Aviation Medicine, Farnborough) FPRC Report 263(b), March 1941.

4,062

Poppen, J. R. 1942 THE EFFECTS OF COLD AND HIGH SPEED ON THE FLYER
Int. Clin., N. ser. 5, 1:60-67, 1942.

4,063

Poppen, J.R. 1946 PILOTS ESCAPE FROM HIGH PERFORMANCE AIRCRAFT.
INTERIM REPORT ON LIVE EJECTION FROM AIRCRAFT IN FLIGHT AT LAKEHURST, N.J. ON 30 Oct '46. (Naval Air Experimental Station, Philadelphia, Pa.) Dec. 1946. ASTIA ATI 48167

ABSTRACT: The first live ejection from high performance aircraft was made from a JD-1 bomber at 5000 ft with airspeed of 250 mph. Prior to the live ejection from the bomber, 42 live ejections were made in the test tower using powder charges and catapults to approximately duplicate the acceleration expected, and 5 dummy ejections at 200-350 mph were made from the bomber. The 28-ft chute attached to the seat failed on the live ejection and at approximately 2000 ft the subject left the seat, fell 500 ft. and opened his seat chute and made an uneventful descent. The subjective reaction of the subject are described and the cause of the failure of the 28-ft parachute is explained.

4,064

Poppen, J.R., & D.T. Watt 1947 HUMAN TOLERANCE TO HIGH POSITIVE ACCELERATION OF SHORT DURATION. Fed. Proc., 6:181

4,065

Poppen, J. R. 1948 HIGH ACCELERATION OF SHORT DURATION.
Mil. Surg. 103(1):30-32, July 1948.

ABSTRACT: A brief outline of the historical background of acceleration studies is given, starting with the early work of the Germans in 1939 and discussing the advances of the British during World Warr II and the postwar work continued here in the United States.

4,066

Poppen, J. R. & C. K. Drinker 1950 PHYSIOLOGIC EFFECTS AND POSSIBLE METHODS OF REDUCING SYMPTOMS PRODUCED BY RAPID CHANGES IN SPEED AND DIRECTION OF AIRPLANES AS MEASURED IN ACTUAL FLIGHT.
J. Appl. Physiol. 3:204-215.

ABSTRACT: Dogs anesthetized with Nembutal were mounted in an airplane in a position similar to that occupied by the aviator and subjected to rapid horizontal turns and to dives. Direct records of arterial pressure were made during these maneuvers. A drop in arterial pressure occurs which is directly proportional to the severity and time of application of the abnormal forces. This causes a severe cerebral anoxemia which accounts for the symptom of going black. Other dogs were mounted in an airplane in a similar manner and direct records taken from the carotid artery, the jugular vein and the femoral artery and vein. They were flown through horizontal turns and dives.

A belt embracing the entire abdomen and containing an inflatable bag was strapped about the dog. Inflation of this bag produced an increase in intra-abdominal pressure. This was done at different times in relation to the maneuvers. Raising the intra-abdominal pressure by inflation of the belt at least one-half minute before the high accelerations produced a marked improvement in the physiological changes. The improvement was a preservation of carotid cerebral circulation at a level above that resulting in severe anoxemia and consistent with freedom from subjective symptoms.

4,067

Poppen, J.R. 1956 MAN'S ADAPTATION TO INCREASING ALTITUDE.
In Society of Automotive Engineers. (Paper, presented at meeting April 9-12, 1956) Paper no. 749

ABSTRACT: Barriers to man's ascent to higher altitudes listed; atmospheric barriers can be met by pressurized and conditioned compartments with equable artificial environment; adaptation to velocity accomplished by designing protective equipment; barrier of vision surmounted by providing realistic data presentation, direct electronic control and appropriate illumination. Protective means available to obviate harmful effects of unusual radiations.

4,068

Poppen, John R. 1957 INTRODUCTION AND HISTORY OF THE AIRCRAFT ESCAPE PROBLEM
The Journal of Aviation Medicine 28: 57-59, Feb., 1957

ABSTRACT: The history of escape from aircraft starts with the parachute which was followed by the Martin-Baker upward ejection seat. There are four physiologic aspects of the gravitational forces involved in ejection just as there are for all gravitational forces in flying. Research on the ejection seat has been performed by all branches of the military services to determine the best design criteria and to define the human tolerance factors.

4,069

Poppen, J. R. 1958 SUPPORT OF UPPER BODY AGAINST ACCELERATIVE FORCES IN AIRCRAFT.
J. Aviation Med. 29(1):76-84, Jan. 1958.

ABSTRACT: A prototype harness intended to provide support against vertical forces was designed on the basis of an analysis of the support structure and mass distribution characteristics of the upper part of the body. The harness provides support under the axillae, crosses over the manubrium, extends along lines consonant with the resultant of anticipated forces, and ends in two points for attachment to an aircraft seat structure. Comparison of data from tower drop tests conducted with the prototype and standard military harnesses indicated that support of the upper body mass eliminates compressive loads on the lumbar spine by reduction of the dynamic response between the upper and lower masses.

4,070

Posner, D.L. 1953 CRASH SURVIVAL AND CRASH FIRES. (Daniel and Florence Guggenheim Aviation Safety Center, Cornell University, Presented to Wash. Sect. Institute of Aeronautical Sciences, 7 April 1953)

4,071

Powell, T. J. 1954 ACUTE MOTION SICKNESS INDUCED BY ANGULAR ACCELERATIONS. (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. No. 865; ASTIA AD-39 215; Feb. 1954

ABSTRACT: Acute motion sickness was produced in susceptible subjects seated in a Bárány chair by rotating the chair at 16 rpm in a counterclockwise position and flexing the subjects' heads in a controlled manner. Records were made of the revolutions of the turntable, sweating on the forehead, diving-climbing sensations, lateral tilting sensation, head movements, and onset of nausea. Significant positive associations were found (1) between test reaction and motion-sickness

susceptibility, as determined by the subjects' replies to a questionnaire, and (2) between the onset of sweating and the onset of nausea. More nonpilots were susceptible to motion sickness than pilots. In the severely motion-sick subject, there was a falling systolic blood pressure, a slowing of the pulse, and vasodilatation. All subjects who were severely nauseated on the test procedure had a secondary nausea lasting from 2 to 12 hours. (ASTIA)

4,072

Powell, T. J. 1956 EPISODIC UNCONSCIOUSNESS IN PILOTS DURING FLIGHT. J. Aviation Med. 27(4):301-316.

SUMMARY: Nine cases of unconsciousness of ten seconds to six minutes, occurring in pilots while flying, have been observed and the patients investigated. Apart from hypoxia, and a few other external causes, the reason for unconsciousness is considered to be a summation of physiological factors.

The factors noted in these cases are: (1) anger or anxiety; (2) probable hypoglycemia; (3) increased prolonged G; (4) probably hyperventilation; and (5) paroxysmal type of EEG. The condition could not be reproduced under laboratory conditions.

4,073

Powell, T. J., T. M. Carey, H. P. Brent & W. J. R. Taylor 1957 EPISODES OF UNCONSCIOUSNESS IN PILOTS DURING FLIGHT IN 1956. J. Aviation Med. 28(4):374-386.

SUMMARY: Eight cases of unconsciousness or diminished consciousness while flying were investigated at the Institute of Aviation Medicine in Toronto during 1956. Five of these cases satisfied the criteria for the diagnosis of "physiologic unconsciousness in medically fit aircrew." The factors seem to be: (1) Previous or concomittant G; (2) hypoglycemia occurring a few hours after a light carbohydrate meal; and (3) hyperventilation. Anxiety or anger, and early slow electroencephalogram activity with hyperventilation seem to be associated factors.

All these findings contribute to diminished cerebral activity and can summate. It is considered that this summation is the cause of the unconscious episodes, and therefore these episodes may be prevented by removing one or more of the factors.

4,074

Powers, E.E. 1945 VELOCITY AND ACCELERATION MEASUREMENTS OF PILOT SEAT EJECTION CATAPULT. (Army Air Forces Materiel Command) 27 Nov. 1945. ASTIA ATI 52658

ABSTRACT: Ultra high-speed motion pictures were made of four tests of the

firing of the pilot-seat ejection catapult in order to study the velocities and accelerations involved when the ejection gun is fired. A pneumatic brake was used to preload the system, thus increasing the initial load, and the catapult under initial braking loads of 1.2g, 1.6g and 1.9g. The motion pictures were assessed for space-time-evaluation, and the values of velocities and accelerations were plotted. Acceleration curves show a fluctuation of acceleration prior to reaching maximum acceleration. It is recommended that further tests be conducted to determine whether the fluctuation in acceleration is consistent.

4,075

Pozhariski, P. 1937 PARACHUTE JUMPING FROM THE MEDICAL STANDPOINT
Vasduhopl. Glasn. (10):127-143. 1937

4,076

Preece, C.D. 1960 BANG! ARE YOU ALIVE?
Air Clues, 14(6):176-180 March 1960

ABSTRACT: Between January 1, 1953, and August 31, 1959, 168 RAF personnel ejected, and of these 130 were successful.
The main purpose of this letter is not to analyse the unsuccessful cases, but to pose a question. Are aircrew given, and do they give themselves, a fair chance when the occasion demands that they reach for the handle?

4,077

Preem, R. 1959 KOSMILISTE LENDUDE BIOLOOGILISED PROBLEEMID (BIOLOGICAL PROBLEMS OF COSMIC FLIGHTS. Eesti loodus, Tallinn, Estonia 6:330-338
Abstract: Aerospace Medicine 31(11):959-960, Nov. 1960

ABSTRACT: A review is presented of Russian achievements in the penetration of space, and of U. S. research on the Medical aspects of acceleration and survival of supersonic bailout at low altitudes.

4,078

Presnyakov, A. 1961 THE SECRET OF THE FORCES OF GRAVITY.
(Aerospace Technical Intelligence Center, Wright-Patterson AFB, Ohio) Translation No. MCL-1057, 14 July 1961. ASTIA AD 261 810.

ABSTRACT: The author gives a brief review of work done in the field of

gravitation. He states that the interest in the problems of gravitation is due to the study of the nature of time and space, investigations of the cosmos and progress in learning of the elementary particles of matter. For research work carried out by Professor Dmitri Dmitriyevich Ivanenko is reviewed. Considerable interest was prompted by reports of this scientist concerning the so-called field quantization, new hypothesis of cosmology, a unified theory of matter and gravitation, and antigravitation.

4,079

Preston, G. Merritt and A Martin Eiband 1955 CRASH IMPACT SURVIVAL IN LIGHT AIRPLANES
(NACA Tech. Film No. 25, 1955)

4,080

Preston, G. Merritt and Jacob C. Moser 1956 CRASH LOADS
(Paper, National Advisory Committee for Aeronautics, April 17, 1956, Cleveland, Ohio)

ABSTRACT: This paper discusses the deceleration data measured on the floor of the fuselage during the NACA crash tests. During this investigation, impact decelerations were measured in fighter, cargo, transport, and light airplanes. Accelerometers were located at several stations on the floor of these airplanes. Accelerations were measured in the longitudinal, vertical, and lateral directions.

4,081

Preston, G. M., & G. J. Pesman 1958 ACCELERATIONS IN TRANSPORT-AIRPLANE CRASHES. (National Advisory Committee for Aeronautics, Wash., D. C.) NACA TN 4158, Feb. 1958. ASTIA AD 152 829.

ABSTRACT: Full-scale aircraft crashes were made with low-wing pressurized and high- and low-wing unpressurized transport airplanes to determine the crash loads that result from a variety of crash events. The crashes simulated take-off and landing accidents involving fuselage damage ranging from moderate to severe. Accelerations were measured by accelerometers installed on the cabin floor. The data (peak magnitude of acceleration, time required to attain peak magnitude, and the time duration and the direction of the acceleration) were analyzed in terms of impact survival possibilities for the various airplane configurations and crash circumstances.

4,082

Preston, G. M. and J. J. Williams 1962 SPACECRAFT PREPARATION AND CHECKOUT (In Results of the First U. S. Manned Orbital Space Flight, February 20, 1962). (NASA Manned Spacecraft Ctr.) Pp.53-67.

4,083

Preston-Thomas, H., R. Edelberg, J. P. Henry, et al 1955 HUMAN TOLERANCE TO MULTISTAGE ROCKET ACCELERATION CURVES. J. Aviation Med. 26(5):390-398.

SUMMARY: Hyperbolic acceleration curves are derived for three or four stage rockets which could attain the 10 to 11 km./sec velocity necessary for establishment in a practical orbit around the earth.

A preliminary study has evaluated the capacity of nine subjects to perform a dual pursuit task while undergoing a typical series of curves.

Evidence is presented to indicate that select crewmen can be expected to assist in the control of such a vehicle during the critical acceleration phases of the flight.

4,084

Pribil, R. F. 1956 HIGH-SPEED TRACK TESTS OF EJECTION SEAT AND PILOT'S EQUIPMENT, F-100 AIRPLANES. TEST NO. 2. (North American Aviation, Inc.) Report No. NA-56-750-2. 30 August 1956.

4,085

Price, H. W. 1941 ACCELERATOR PROJECT PROGRESS REPORT 1 JANUARY TO 31 MARCH. (National Research Council, Canada) C-2091.

ABSTRACT: A progress statement is made on the construction of the human centrifuge at No. 1 I.T.S. Toronto.

4,086

Price, J. F. 1962 PHYSIOLOGICAL AND PSYCHOLOGICAL EFFECTS OF SPACE FLIGHT: A BIBLIOGRAPHY: VOL. I. ACCELERATION, DECELERATION, AND IMPACT. (Space Technology Labs., Inc. Redondo Beach, Calif.) Research Bibliography No. 43, Oct. 1962. ASTIA AD 286 930.

ABSTRACT: This bibliography, consisting of 1020 references (mostly annotated) on acceleration, deceleration and impact studies, is the first of a series of

volumes pertaining to the physiological and psychological effects of space flight. Whenever possible the references listed in the bibliography have been reviewed in order to include the maximum amount of retrieval data. Author, agency, periodical, subject and ASTIA indices are included.

4,087

Price, R.S. 1961 UNDERWATER EXPLOSION TESTS IN A PRELIMINARY HIGH-GRAVITY TANK ACCELERATED BY A CENTRIFUGE. (Naval Ordnance Lab., White Oak, Md.) NAVWEPS rept. no. 7365; DASA-1241, ASTIA AD- 264 760 August 1961

ABSTRACT: NOL is developing a high-gravity tank for simulating large under water explosions at a very small scale. To determine if a centrifuge, rather than the previously proposed linear accelerator, could be used to provide the acceleration, six explosion tests using 50-milligram charges were made. Radial accelerations up to 60 gravities prevailed in a 7-inch square test tank mounted on a 10- foot centrifuge arm. Since the explosion phenomena were not objectionably distorted by the rotation effects, it was concluded that a centrifuge is suitable for providing the acceleration forces required for the proposed NOL High-Gravity Tank. (Author)

4,088

Prince, J. E. 1962 INTRODUCTION: SCOPE - BIOPACK - SATELLITES, LAUNCH TO RECOVERY.
In Biologic Systems of Discoverer Satellites XXIX and XXX. (School of Aerospace Medicine, Aerospace Medical Div., Brooks AFB, Tex.) April 1962.

ABSTRACT: The design of biopacks used to study radiation and weightlessness are based on the following avaiable space in the satelite; weight allotment; internal volume and configuration of the typical canister; center of gravity; time between specimen preparation and return to the laboratory; and environmental temperature.

4,089

Prince, J.E. & J.R. Mabry 1962 ORGAN AND TISSUE CULTURES. 2. CILIARY ACTIVITY OF EMBRYONIC CHICK CHOROID PLEXUS. In BIOLOGIC SYSTEMS OF DISCOVERER SATELLITES XXIX AND XXX (School of Aerospace Medicine, Aerospace Medical Div., Brooks AFB, Tex.) April 1962

ABSTRACT: Ciliary activity was assessed on the basis of percentage of total border with vibrating cilia and the total numbers of active and inactive explants. Satellite cultures are compared to cultures from the same donors retained under ideal conditions. It was found that the ciliary activity of the ependymal cells of the choroid plexus from the 15-day-old chick embryo was not

adversely affected by the launch, orbit, and recovery of Discoverer satellite XXIX. Similar tissue cultures aboard Discoverer XXX were reduced in ciliary vitality, and further laboratory studies are being conducted to elucidate the factors responsible.

4,090

Proell, W. & N. J. Bowman 1958 A HANDBOOK OF SPACE FLIGHT. (Chicago: Perastadion Press, 1958.)

ABSTRACT: This is a reference book bringing together data and ideas from divergent disciplines which are pertinent to space flight.

In addition to many tables, formulas, equations and diagrams, there are listed job opportunities; companies which build rockets, notable space flight research men; known societies devoted to rockets and space flight; glossary of words; and a bibliography.

4,091

Pryor, W. W., H. O. Sieker & R. L. McWhorter 1952 SPATIAL VECTOR ANALYSIS OF THE ELECTROCARDIOGRAM DURING EXPOSURE TO POSITIVE ACCELERATION. J. Aviation Med. 23(6):550-559, Dec. 1952.

ABSTRACT: (1) Standard limb and unipolar precordial lead EKG's have been recorded simultaneously on seven healthy male subjects during positive acceleration. (2) The records were analyzed by the method of spatial vector analysis in an effort to separate changes caused by rotation of the heart from alterations caused by a change in the electrical activity of the myocardium. (3) At levels of acceleration insufficient to cause visual symptoms only one subject demonstrated alterations in the EKG described by earlier investigators. This subject was also the only one showing changes after being tilted to 90 degrees. The relationship between these Tw changes and the autonomic instability observed in this individual have been discussed in the light of Wendkos' observations on patients with neurocirculatory asthenia demonstrating such EKG changes during tilt. (4) Among the remaining subjects only two showed any Tw changes, even when the acceleration was sufficient to cause "blackout." In these two instances the alterations in the Tw waves are less marked, but also are most likely secondary to changes in autonomic tone and filling of the heart. (5) There was no S-T segment shift to suggest coronary insufficiency in any subject. (6) It is planned to carry out further investigation using the same techniques in the study of the effects of autonomic blocking drugs and/or g-suits on the EKG response of subjects to positive acceleration.

4,092

Public Health Service 1958 BIBLIOGRAPHY OF SPACE MEDICINE
(Public Health Service, Washington, D. C.) Publication no. 617
(Bibliography series 21)

ABSTRACT: Contents include references on acceleration, deceleration, partial and zero gravity.

4,093

Puga, C. R. 1950 ACELERACIONES EN AERONAUTICA (FISIOPATOLOGIA).
(ACCELERATION: PHYSIOPATHOLOGY) San Aeronaut 1:251-284, Aug. 1950.

4,094

Puxeddu, P. & D. Tarsitani 1962 INDAGINI SULLA SOGLIA DEL RIFLESSO NISTAGMICO DA STIMOLI ACCELERATORI (RESEARCH ON THE THRESHOLD OF THE NYSTAGMIC REFLEX AFTER ACCELERATORY STIMULI)
Bolletino delle malattie dell'orecchio della gola del naso (Firenze), 80 (1): 73-91. Jan.-Feb. 1962. In Italian, with English summary (p. 88)

ABSTRACT: Test subjects were exposed to rotatory accelerations and decelerations of progressively increasing value from 0.2° - $0.6^{\circ}/sec.^2$. Each run consisted of accelerations of the same physical value applied for 60 seconds. The first and third runs were associated with mental activity such as the answering of simple questions, performing a calculation, etc. When no nystagmic reaction was observed after a rest period of not less than thirty seconds, a successive run was carried out and the stimulus intensity increased by $0.1^{\circ}/sec.^2$ but reversing the direction of acceleration in order to avoid habituation phenomena. Results showed that mental activity was effective in lowering the threshold of the nystagmic response. An average threshold value of about $0.4^{\circ}/sec.^2$ was established for these subjects in comparison to previously reported values of 0.7° - $0.8^{\circ}/sec.^2$. Since results were based on evident reactions observed by electronystagmographic recordings, it was assumed that the threshold of excitability of the ampullar receptor was even lower.

4,095

Puxeddu, P. and D. Tarsitani 1962 INVESTIGATIONS OF THE THRESHOLD OF THE NYSTAGMIC REFLEX CAUSED BY ACCELERATION STIMULI.
In Boll. Mal. Orecch. 80:73-91, Jan.-Feb. 1962 (Italy)

ACCELERATION

Q

4,096

Queijo, M.J. and G.K. Miller, Jr. 1962 ANALYSIS OF TWO THRUSTING TECHNIQUES FOR SOFT LUNAR LANDINGS STARTING FROM A 50-MILE ALTITUDE CIRCULAR ORBIT. (National Aeronautics and Space Administration, Washington, D.C.) NASA Technical note D-1230, ASTIA AD-272 877, March 1962

ABSTRACT: An analytical study was made of 2 modes of thrusting to perform soft lunar landings starting from a circular orbit around the moon. One method made use of constant-thrust, restartable engines. In this landing mode a short thrust period is used to initiate the landing. The second landing mode presupposes the use of engines having 2 levels of thrust. The low thrust level is used to initiate the landing maneuver and is applied until conditions are attained which permit use of the higher thrust level for landing the vehicle. In all instances the thrust vector is directed against the velocity vector. The study showed that either landing mode could be made quite economical by proper choice of maximum thrust available and the range covered in the landing maneuver. Use of a maximum ratio of thrust to initial earth weight of 0.45 combined with a surface travel of about 30 degrees requires a characteristic velocity of about 6,000 fps, which is about 6.5% greater than the value of 5,630 fps required for a 2-impulse Hohmann transfer (Author)

4,097

Quimby, F. H. 1955 SUMMARY OF PROCEEDINGS. (Second Meeting of Aviation Crash Injury Research Steering Committee, Navy Dept. Office of Naval Research, Washington, D.C., 25 October 1955)

4,098

Quimby, F. H. & A. H. Hasbrook 1956 PREVENTION OF INJURIES IN "UNPREVENTABLE" AIRCRAFT ACCIDENTS. Research Reviews, August 1956.

ABSTRACT: Safety activities in aviation, until recent years, have been devoted solely to accident prevention. This was a particularly constructive approach because most accidents in the past followed definite patterns.

4,099

Quinnel, R.K. 1956 THE HUMAN COMPONENT IN EXTRATERRESTRIAL FLIGHT
TAC Surgeon's Bulletin (Langley AFB, Va.) 6(11): 1-24, Nov. 1956
See also: Medical Newsletter 29(4): 27-40 Feb. 15, 1957

ABSTRACT: A general discussion is presented on the physiological stresses to be encountered in extraterrestrial flight such as accelerations, vibrations, cosmic radiations, and weightlessness. Within the cabin, control of pressurization, temperature, oxygen, carbon dioxide, and body odors is required, as well as adequate illumination and presentation of the instrument panel. Vision outside the cockpit may be important only for psychological reason .

4,100

Quinnel, R. K. 1957 THE HUMAN COMPONENT IN EXTRATERRESTRIAL FLIGHT
Canadian Service Med. J. 13(4):245-258, April 1957.

4,101

Quix, F.H. 1922 LE MAL DE MER ET LE MAL DES AVIATEUR. Monogr L'Oto-Rhino-Laryng Internat. 8:829, Paris: A. Legrand

4,102

Quix, F. H. 1925 THE FUNCTION OF THE VESTIBULAR ORGAN AND THE CLINICAL EXAMINATION OF THE OTOLITHIC APPARATUS.
J. Laryng. 40:425-443; 493-511.

4,103

Quix, F.H. 1928 UN NOUVEL APPAREIL POUR L'EXAMEN DU NYSTAGMUS DE POSITION
(A New Device for the Examination of the Position Nystagmus)
J. de neurol. et de psychiat. (Brussels) 28: 160

4,104

Quix, F. H. 1931 LE ROLE DE L'ORGANE VESTIBULAIRE DANS L'AVIATION (The Role of the Vestibular Organ in Aviation)
5 Congr. internat. Nav. aer. La Haye. Tome 2, p. 1290-1326.

NOTE: Reviewed in Ber. Physiol. 64:551.

4,105

Quix, F.H. 1941 LE LABYRINTHE ET LE MAL DE MER (The Labyrinth and Seasickness)
Folha medica (Rio de Janeiro) 22: 97-100

ACCELERATION

R

4,106

RAAF Flying Personnel Research Committee 1941 LETTER FROM RAAF FLYING PERSONNEL RESEARCH COMMITTEE TO AIR LIAISON OFFICER, AUSTRALIA HOUSE, 3 OCT. 1941 WAM-101-1; FPRC No. 358(b)

ABSTRACT: Reports that Cotton suit gives protection up to 9 to 10 "g".

4,107

RAAF 1944 MINUTES OF THE 1st MEETING OF THE ACCELERATION SECTION OF NO. 2 FLYING PERSONNEL RESEARCH UNIT HELD AT THE OLD MEDICAL SHCOOL, SYDNEY UNIVERSITY.
(Royal Australian Air Force, Flying Personnel Research Committee, Sydney) F.R. No. 78; 29 March 1944.

4,108

RAAF Flying Personnel Research Committee 1944 PLANS FOR A NEW TYPE OF CENTRIFUGE WITH WHICH TO STUDY THE PHYSIOLOGICAL EFFECTS OF ACCELERATION. (Conference held at Department of Physiology, Sidney University, 2 p.m. on 28 October 1944, Min. Acceleration Section, No. 2 Flying Personnel Research Unit) FPRC, RAAF-FR 102, Appendix B. 15 January 1945

4,109

Rabideau, G. F. & D. L. Schloredt 1960 SPACE SYSTEMS TRAINING DEVICES. (Paper SAE National Aeronautic Meeting, Los Angeles, Calif., Oct. 10-14, 1960)
(Society of Automotive Engineers, Inc., New York, N. Y.) Rept. 245D, Oct. 1960.

ABSTRACT: The high priority given to the development of manned space systems and the difficulties inherent in the development of programs and devices for space crew training have created a need for a review of associated training requirements. This paper presents a number of hypotheses concerning the desirable characteristics of such programs and devices for further verifications. Several guide lines or principles are introduced to facilitate design and development of useful training curricula and equipment for manned space systems. (Tufts)

4,110

Radio Corporation of America 1960 STUDY OF INSTRUMENTATION AND TECHNIQUES FOR MONITORING VEHICLE AND EQUIPMENT ENVIRONMENTS AT HIGH ALTITUDE. INSTRUMENTATION AND MONITORING TECHNIQUES. (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TN 59-307 June 1960 ASTIA AD 268 090

ABSTRACT: Instrumentation techniques are presented which are available within the state-of-the-art; an instrumentation system is proposed for the monitoring of high-altitude environments encountered by typical vehicles. The high altitude environmental effects on ptyical vehicles and equipment are summarized. The present airborne-instrumentation state-of-the-art is presented for measuring temperature, pressure, strain, vibration, acceleration, radiation, meteorite detection, and acoustic noise. A feasible instrumentation system is discussed for monitoring these deleterious environments. (Author)

4,111

Raehn, R. V. 1961 THE PROCUREMENT AND SELECTION OF CANDIDATES FOR FLIGHT TRAINING. (Research Paper: U. S. Naval Postgraduate School, 1961) Rept. VF3844

4,112

Raeke, J. W. 1959 IMPACT PROTECTION CHARACTERISTICS OF FLIGHT HELMETS. (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: This study represents an attempt to determine the impact protection characteristics of three types of flight helmets. Tests were conducted at a constant impact velocity of 17.6 ft/sec. and at three impact energy levels: 60,107.5 and 136.5 ft lbs. Peak resultant acceleration, rate of onset of acceleration, energy absorption efficiency and in several cases impact stress, were determined either directly or indirectly. High speed motion pictures of helmet shell deformation augment the aforementioned quantitative data. Results show that even under the relatively mild test conditions each helmet type displayed at least one undesirable characteristic. The impact response of each helmet type could be significantly improved by relatively minor design or fabrication changes; however, the test as a whole points up the need for a set of minimum acceptable performance standards. (J. Aviation Med. 30(3):199, Mar. 1959)

4,113

RAF, Institute of Aviation Medicine 1944 MINUTES OF THE 13TH MEETING OF FLYING PERSONNEL MEDICAL OFFICERS, FARNBOROUGH. 6 Feb. 1944

4,114

RAF, Institute of Aviation Medicine 1952 MEDICAL ASPECTS OF NAVAL AVIATION WITH SPECIAL REFERENCE TO DECK LANDINGS.
(RAF, Institute of Aviation Medicine, Farnborough) July 1952.

4,115

RAF, Institute of Aviation Medicine 1956-1960 UNCLASSIFIED JOURNALS AND REPORTS. PUBLICATIONS ON ACCELERATION AND ALLIED SUBJECTS.
(A mimeographed list of titles, unnumbered, undated)

4,116

RAF Physiological Lab. 1942 DEVICES FOR PROTECTING PILOTS FROM THE EFFECTS OF HIGH ACCELERATION WITH PARTICULAR REFERENCE TO TRIALS OF THE FRANK'S SUIT.
(RAF, Institute of Aviation Medicine, Farnborough) FPRC No. 498, 20 Nov. 1942.

ABSTRACT: At 8 "g", 250 mm Hg aortic blood pressure is needed for clear vision at 20 "g", 625 mm. The heart has difficulty in contracting against even 200 mm Hg. Service trials of FFS in planes show one to two "g" increase in tolerance. Farnborough experimental trials always show 2 "g" increase, often 4.5 to 8 "g" increase with experienced subjects when 3/4 to 1 3/4 gallons of water are used in the suit. Pilots complain of loss of "feel" when wearing suit. The danger of pilot's exceeding "g" load of plane is evident. It is recommended that pilots not be protected beyond 6 "g" and that FFS never be used in planes not cleared for 9 "g". Advantages of FFS is that pressure gradient is produced automatically and independently of any external control.

4,117

RAF Physiological Laboratory 1944 PROGRESS REPORT OF THE RAF PHYSIOLOGICAL LABORATORY, JANUARY 1943 TO JANUARY 1944 (RAF, Institute of Aviation Medicine, Farnborough) FPRC No. 563; 21 Jan. 1944

4,118

Raffone, J. J. 1955 ACCELERATION FORCE AND SPACE FLIGHT.
J. Astronautics 2(3):100-104, Fall 1955.

ABSTRACT: Results of tests on a human centrifuge on the effects of acceleration force measured in positive and negative G units, with an evaluation of the relative merits of the supine position during acceleration periods.

4,119

Raike, J.W. 1958 PHYSIOLOGIC CONSIDERATIONS IN DESIGN FOR HIGH-SPEED HIGH-ALTITUDE FLIGHT SAE J. p. 52-55, Aug. 1958

ABSTRACT: Evaluation of human limitations of importance for the design of high-altitude vehicles -- including oxygen, and pressure requirements, acceleration and cosmic radiation.

4,120

Raines, M.A. 1919 ROTARY VERTIGO IN THE TAIL-SPIN.
Science, 49:266-267

4,121

RAND Corporation 1958 AN ANNOTATED BIBLIOGRAPHY OF RAND SPACE FLIGHT PUBLICATIONS.
(RAND Corporation, Santa Monica, Calif.) AFR 190 16; RM 2113, Feb. 1958. ASTIA AD 150 655.

ABSTRACT: This annotated bibliography lists all The RAND Corporation Research Memoranda, Papers, and Translations related to space flight that are currently available to industrial contractors and commercial organizations with the required need-to-know. The reports that are deposited with the Armed Services Technical Information Agency (ASTIA) have the ASTIA number below the RAND number.

4,122

RAND Corporation 1959 AN ANNOTATED BIBLIOGRAPHY OF RAND SPACE FLIGHT PUBLICATIONS
(The RAND Corporation, Santa Monica, Calif.)
USAF Project RAND, RM-2113-1, March 1, 1959
ASTIA AD 216108

ABSTRACT: This annotated bibliography is a list of RAND Reports, Research Memoranda, Papers (both classified and unclassified), Translations, and Books related to astronautics and space exploration which are currently available to the military and to industrial contractors and commercial organizations with the required need-to-know. (Supersedes RM-2113, Feb. 1958 [AD 150 655]).

4,123

Randall, F.E. 1944 PRONE POSITION.
(U.S. AAF Materiel Center, Engineering Div., Aeromedical Laboratory)
Memo. Rept. ENG-49-695-32P, 25 Feb. 1944.

ABSTRACT: Beginning with a base platform a series of tests was run on the best positions. It was found that a variable adjustment for the chest offered the best concession to individual likes and dislikes. Comfort was a function of liking the position plus time spent in the given position. Periods up to one hour were spent without undue fatigue, providing a head sling was provided. Thus, an adjustable head sling was rigged to aid the individual in holding the head in such a position as to look forward without undue strain on the dorsal neck muscles. It was clearly demonstrated that pads or wells should be provided. Thus, an adjustable head sling was rigged to aid the individual in holding the head in such a position as to look forward without undue strain on the dorsal neck muscles. It was clearly demonstrated that pads or wells should be provided to take weight off the patellae. The variable adjustments of the chest allowed sharp rises of the upper chest region of 1, 2, 3 and 4 inches. A 10° rise in the long axis of the trunk was provided. The legs lay in the plane of flight.

4,124

Randall, F. E. 1945 ATTENDANCE AT THE FOURTH CRASH INJURY CONFERENCE, WASHINGTON, D. C. ON 21 AND 22 FEBRUARY 1945. (Aero Medical Laboratory, AAF Hq, Air Technical Service Command) Memorandum Report Serial No. TSEAL-3-695-32PP, 9 March 1945.

4,125

Randen, T. 1934 ON THE EFFECT OF ACCELERATION ON THE ORGANS OF THE BODY. Abstr: Arch. Med. belges 87:525

4,126

Randt, C. T. 1960 INPACT OF SPACE EXPLORATION ON BIOLOGY AND MEDICINE J. Am. Med. Assoc. 172(7):663-665, 13 Feb. 1960.

ABSTRACT: The interest in space exploration has stimulated biologic and medical research on the tolerance and adaptability of the human organism to the stresses of acceleration, vibration, temperature, weightlessness, and isolation. It is expected that study of animals and man in actural or simulated space environments will also contribute to understanding of basic processes of consciousness, orientation, thinking, emotion, and motor coordination. The complexity andinter-dependence of problems anticipated in manned space flight call for an integrated approach by both the physical and biologic sciences.

4,127

Randt, C. T. (Dir.) 1960 FIRST PLANNING CONFERENCE ON BIOMEDICAL EXPERIMENTS IN EXTRATERRESTRIAL ENVIRONMENTS. WASHINGTON, D.C., JUNE 20, 1960.
(National Aeronautics and Space Administration, Washington, D. C.)
NASA TN D 781, Feb. 1961.

ABSTRACT: Thirty of the nation's leading experimental biologists conferred with the NASA Office of Life Science Programs staff to establish objectives, important areas of inquiry, and program priorities for space environment biomedical studies. Emphasis on the following were recommended: detection and study of extraterrestrial life, effects of simulated extreme environments, cellular and biological system studies in space conditions, ways and means of decontaminating space probes and vehicles, effects of space on biological rhythms and animals orientation, and photosynthesis in ecosystems. Space related work was recommended for earth-bound laboratories as well as for simulated environments and for upper atmospheric balloons. (Tufts)

4,128

Randt, C. T. 1961 THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION LIFE SCIENCE PROGRAMS. In Space Medical Symposium Held in Conjunction with the XIth International Astronautical Congress, Stockholm, Sweden, August 15-20, 1960. Astronautik (Stockholm) 2(4):295-299

ABSTRACT: The objectives of the National Aeronautics and Space Administration (NASA) Life Science Programs are to implement manned space flight to assure man's contribution to the success of space flight missions and to utilize his unique capabilities as a scientific observer in space exploration; and to conduct biological investigations to determine the effects of remote environments on living organisms including the search for extraterrestrial life. Research, development, training, and operations required to implement manned space exploration and to conduct significant biological investigations utilizing extraterrestrial environments for observation of biological phenomena are considered in three broad categories: flight medicine and biology, space medicine and behavioral sciences, and space biology. (Aerospace Medicine 33(8):1030, Aug. 1962)

4,129

Ranke, O. F. 1937 DIE BEDEUTUNG DER LAGE FÜR DIE VERTRÄGLICHKEIT VON BESCHLEUNIGUNGSEINWIRKUNGEN. (The Significance of Body Position to the Tolerance of Acceleration)
Ber. ges. Physiol. (Berlin) 96:671.

4,130

Ranke, O.F. 1937 DER ÜBERLASTUNGSKOLLAPS (The Overloading Collapse)
Deutsche Militärarzt (Berlin) 2: 461-463

4,131

Ranke, O. F. 1937 EFFECT OF CENTRIFUGAL FORCES ON THE CIRCULATORY SYSTEM. Part 4 of 10 Parts. (Kreislauf unter Beschleunigung. Versuche ueber die Wirkung ker Beschleunigung. . . .Tier) March 1937. ASTIA ATI-60741.

ABSTRACT: The effect of centrifugal force on the circulatory system of humans and animals was investigated. The maximum tolerable centrifugal force depends

on its direction and duration, on the constitution of the individual tested, and the pilot's posture which affects the hydrostatic condition of the blood circulation and is largely responsible for a sufficient blood supply to the brain and eyes. The vasomotor control of the blood vessels is limited in its adaptability and can be affected by centrifugal forces which increase faster than the adaptability. The results of experiments on 22 persons are discussed in detail, and conclusions are outlined.

4,132

Ranke, O. F. 1938 BESCHLEUNIGUNGSWIRKUNG (EFFECTS OF ACCELERATION). Luftfahrtmedizin 2:242-258

4,133

Rapp, R., & P. Yudkofsky 1957 MICROCIRCULATORY EFFECTS OF TILTING AND ACCELERATION. Federation Proceedings 16:140, March 1957

4,134

Rappe, G. 1960 SURVIVAL IN SPACE
Cornell Engineer 25(7):27-29, April 1960.

ABSTRACT: This paper points out the problems of survival in space due to man's biological limitations.

4,135

Rashbass, C. & G.F.M. Russell 1961 ACTION OF A BARBITURATE DRUG (AMYLOBARBITONE SODIUM) ON THE VESTIBULO-OCULAR REFLEX
Brain, 84:329, 1961.

4,136

Ratcliffe, H. L. 1955 A POST MORTEM STUDY OF RHESUS MONKEYS (MACACA MULATTA) AT INTERVALS AFTER SINGLE OR REPEATED EXPOSURE TO NEGATIVE ACCELERATION. (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-5004, 26 May 1955.

4,137

Raulston, B.O. 1950 PHYSIOLOGICAL, BIOCHEMICAL AND ANATOMICAL EFFECT OF ACCELERATION ON THE BODY RELATIVE TO PILOT POSITION IN HIGH-SPEED AIR CRAFT. (University of Southern Calif., School of Medicine, Los Angeles) USN Contract N6ori77, Project no. 161-014, Task order 1, March 1950

4,138

Raulston, B. O. and C. F. Lombard 1951 FINAL REPORT: PHYSIOLOGICAL, BIOCHEMICAL AND ANATOMICAL EFFECTS OF ACCELERATION ON THE BODY RELATIVE TO PILOT POSITION IN HIGH-SPEED AIRCRAFT.
(Office of Naval Research, U. S. Department of the Navy, Washington, D.C.)
Contract N6ori77 Project NR-161-014 April 9, 1946 - Aug. 31, 1950.
ASTIA ATI 163 566

SUMMARY: Many of the original objectives have been accomplished. Much progress has been made on the primary objectives as evidenced by the technical reports and published articles abstracted in this report. All of the other objectives have been accomplished.

It is worthy of note that considerable accomplishment has been made in the field on the effects of Negative Accleration; a new field of productive research opened on the effects of acceleration on the extremities of man while controlling aircraft; a new field of productive research opened in the study of the tolerance of the human to impace acceleration of the head; a new field of productive research opened in the study of the effects of acceleration upon respiration and circulation of blood through the lungs and other organs of the body; a new field of productive research opened on the effects of acceleration upon biochemical systems in the body; a new field of productive research opened in the use of the Epicyclic centrifuge in studying methods of restraint of the body and the study of transient dynamic pressure responses to fluctuating accelerational forces, and the establishment of the centrifuge as a primary instrument for psychological investigation of stresses of flight upon the human.

It is recommended that the above-mentioned new productive fields of research be further continued.

4,139

Ray, J. T. 1956 A STUDY OF ADAPTATION TO TILT
(Ann Arbor: Univ. Microfilms, 1956) Publication No. 17,018

ABSTRACT: By means of a lateral tilt chair, subjects were inclined from the gravitational vertical under varying conditions and required to return to that position which "felt upright". It was observed that the constant error of adjustments

increased with the magnitude of inclination, and that the direction of initial inclination has no significant effect upon the adjustment error. Within each experimental session the constant error of adjustment was found to decrease with repeated trials (termed the intraseries decrement). It was further found that introduction of a sufficient rest period tended to restore the constant error of adjustment in the direction of its unpracticed level. Positive transfer of habituation of the response did not take place from one quadrant to the other and apparently the transfer of this effect approximates 100% since none of the differences were statistically significant.

4,140

Ray, J. T. 1959 ARTIFICIAL "G" FIELDS - PERCEPTION OF THE VERTICAL. (Paper, ASME Aviation Conference, 9-12 March 1959, Los Angeles, Calif.) ASME Paper No. 59-AV-8

4,141

Rayevskiy, N.P. and M.I. Subbotin 1963 MEASUREMENT OF LINEAR ACCELERATIONS. (Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio) ASTIA AD-400 524, 7 March 1963 Trans. No. FTD-TT-62-860; from Izdatel'stvo Akademii Nauk SSR, Moskva, p. 1-62, 1961

ABSTRACT: The characteristic nature of acceleration measurements consists in the fact that accelerations are extremely varied and that accelerometers have a comparatively small range of measurement magnitudes. In addition, the most important characteristic of an acceleration is not its magnitude, but its rise time. Accelerometers are divided into two groups. The large number of maximum-range accelerometers belong to the first group. Accelerometers for recording a process in time must be included in the second group. Descriptions of accelerometers based on the use of various methods of measurement may be found in the literature relating to measurement techniques. There are mechanical, optical, hydraulic, electrical, and other accelerometers which measure accelerations over various frequency and acceleration ranges. Among the electrical accelerometers are slide-wire, inductive, semi-conductive, electrodynamic, and other accelerometers. In operation, electrical linear acceleration sensors with wire-wound strain-gage pickups and piezoceramic sensors made of barium titante are considered the most highly perfected and simplest accelerometers with respect to design. Sections 1.6 to 8 were written by N.P. Rayevskiy and sections 2 to 5 and 9 by M.I. Subbotin.

4,142

Raymond, G.B. 1960 FORCE-BALANCE, DOUBLE INTEGRATING ACCELEROMETER (Raymond Engineering Lab., Inc., Middletown, Conn.) Rept. no. 553, Contract DA 49-186-502-ORD-874; 29 April 1960; ASTIA AD-254 631

ABSTRACT: A force-balance double-integrating accelerometer was developed which offered improved accuracy for safing and arming systems. The system was in the use of stored energy and had no moving mass, the device provided a savings in weight and size. Evaluation indicated that ball bearings for the flywheel were unacceptable because of high lubricant drag during low-temperature, high-speed operation. The effect of flywheel and windage errors were reduced by the feedback nature of the device. The major dynamic effect was that produced by vibration. Vibration caused the device to see false velocities near the start of the integration. Several methods for damping the accelerometer were studied. Damping of the pendulum offered the greatest promise.

4,143

RCA Service Co., Camden, N. J. 1962 TECHNIQUES OF PHYSIOLOGICAL MONITORING. VOL. I. FUNDAMENTALS. (Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio) AMRL-TDR-62-98 (I), Sept. 1962

ABSTRACT: This volume is the first of a three-volume handbook covering the applications of electronics in monitoring bioelectric physiological responses. The fundamental concepts and methods presented in this volume form a foundation for the detailed technical discussions in the succeeding volumes and, it is hoped, provide a common language and basis of understanding between the physiologist and electronic engineer engaged in this field. The data obtained by monitoring physiological responses in varied environments can be used to improve the efficiency and increase the safety of a human subject in aircraft and spacecraft. (AUTHOR) (Aerospace Medicine 34(3):282, March 1963)

4,144

RCAF 1941 AIRSICKNESS.
(RCAF Investigations) (RAF Institute of Aviation Medicine, Farnborough) F.P.R.C. Report # 335, May 1941.

4,145

RCAF Institute of Aviation Medicine 1946 THE R.C.A.F. HUMAN CENTRIFUGE AND ACCELERATION LABORATORY, R.C.A.F. INSTITUTE OF AVIATION MEDICINE, TORONTO. J. Canadian Medical Services 4:95, Nov. 1946

4,146

Reals, W. J. and R. E. Danielson 1962 PRACTICAL METHODS IN THE AUTOPSY INVESTIGATION OF MAJOR AIRCRAFT ACCIDENTS. (Paper, 33rd annual meeting of the Aerospace Medical Assn., Atlantic City, N. J. 9-12 April 1962)

ABSTRACT: Investigations into the human factors in major aircraft accidents have contributed greatly co air safety. Autopsy studies have been utilized in this effort as well as biochemical and histologic techniques. The Federal Aviation Agency has a consulting staff of pathologists who are sent to the scene of disasters to study wreckage, environment and other factors. These consultant pathologists join in the human factors team upon arrival working closely with the F.A.A., C.A.B. officials, Federal Bureau of Investigation and local police officers, Armed Forces Institute of Pathology teams and the local coroners or medical examiners, airline flight surgeons and rescue parties. A number of practical points will be emphasized using the experience gained in two recent major air accidents (Denver, Colorado and Chicago, Illinois). Since efforts are now underway to utilize F.A.A. designated Aviation Medical Examiners as investigators in the general aviation field this paper will help in the understanding of the problem encountered. The availability of proper equipment to be carried to the scene as well as the organization of the autopsy procedure will be detailed. The practice methods of liason, utilization of facilities and means of investigations will be presented. (Aerospace Med. 33(3):350, Mar. 1962)

4,147

Reed, J. C. 1949 FACTORS INFLUENCING ROTARY PERFORMANCE J. Psychol. 28:65-92.

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Reed, J. H., B. F. Burgess, & H. Sandler 1963 EFFECTS ON ARTERIAL OXYGEN SATURATION OF POSITIVE PRESSURE BREATHING DURING ACCELERATION. (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 29-May 2, 1963)

SUMMARY: Twenty-two centrifuge runs were performed on eight subjects in whom arterial oxygen saturation was continually monitored by means of a Waters cuvette while the subjects were exposed to various transverse accelerations +Gx at a seat angle of 6 degrees head up. These runs were made during conditions of breathing air (control), air positive pressure, pure oxygen (control), and pure oxygen positive pressure. The positive pressure was metered automatically to provide 3 mm Hg per G above ambient pressure.

The results of this experiment show that the slope of the curve of oxygen saturation plotted against time for air and air positive pressure decreased approximately 3 percent every 10 seconds, beginning 10 to 20 seconds after the onset of the acceleration.
During the oxygen breathing studies, a lowering in arterial oxygen saturation was observed approximately 100 seconds after the onset of acceleration.
A method is suggested as a means of estimating physiological limits for theoretical profiles of acceleration G plotted against time. (AUTHOR)

4,149

Reeves, E. 1961 THE EFFECT OF AGEING ON THE G-TOLERANCE OF RATS. (Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.) Rept. No. NADC-MA-6116, Task MR00t.15-0002.3; rept. no. 5; 6 July 1961. ASTIA AD-259 075

ABSTRACT: The erfect of age on the G tolerance of rats was studied in five different age groups - one, three, four, six, nine and twelve months. Each group consisted of 24 male Sprague-Dawley rats. All of the rats were subjected to 20 positive G and their survival times were measured using an EKG end point. The results show that there was a gradual decline in acceleration tolerance with increase of age in this group of 98 rats. (Author)

4,150

Reeves, E. 1961 THE EFFECT OF ACCLIMATIZATION TO COLD ON THE G TOLERANCE OF RATS. (Aviation Medical Acceleration Lab., Johnsville, Pa.) Rept. no. NADC-MA 6117, ASTIA AD- 259 072, 9 June 1961

ABSTRACT: Two groups of rats were acclimatized to cold (4 to 6 C) for 37 days and then exposed to acceleration of 20 positive G until the heart rate decreased to 2 beats per second. No statistically significant difference in tolerance to acceleration was found between the cold-acclimatized animals and their controls. Exposure to cold caused loss of weight and increase in adrenal gland size.

4,151

Reeves, W. and L.E. Morehouse 1948 THE INFLUENCE OF POSITIVE G UPON THE CENTRAL NERVOUS SYSTEM OF MAN. (University of Southern Calif., School of Medicine, Los Angeles) Contract N6ori77, Task order 1, Project Nr 161-014, 19 October 1948

ABSTRACT:
1. The rates of tremor of six college atheletes were determined during the second, fifth and ninth seconds of observation during rest and under

the influence of the stress of positive G, to assess the influence of G upon the activity of the central nervous system.

2. Subjects with high resting tremor rates showed the greatest variability and their rates of tremor tended to increase under G. Subjects with low rates of tremor lowered or did not change their tremor rates under G and the rates were less variable under all conditions.

3. A regular effect of G to stimulate or depress the rate of tremor was not observed.

4. Irregularities in tremor rates repeated during constant exposure to G indicated that the influence of G alone did rot enhance or diminish the activity of the central nervous system.

5. These findings do not support the possibility that the diminished performances under G is due to any depression of the activity of the central nervous system and indicate that decreased motor performance is probably due to mechanical effects of increased gravitational forces upon the musculo-skeletal mass.

4,152

Reeves, W., and L.E. Morehouse 1951 THE INFLUENCE OF POSITIVE G UPON THE CENTRAL NERVOUS SYSTEM OF MAN. (University of Southern Calif., School of Medicine, Los Angeles, Calif.) Contract N 6ori77, Task 1 31 March 1951

ABSTRACT: The rates of tremor of six college athletes were determined during the second, fifth and ninth seconds of observation during rest and under the influence of the stress of positive G, to assess the influence of G upon the activity of the central nervous system.

Subjects with high resting tremor rates showed the greatest variability and their rates of tremor tended to increase under G. Subjects with low rates of tremor lowered did not change their tremor rates under G and the rates were loss variable under all conditions.

A regular effect of G to stimulator depress the rate of tremor was not observed.

Irregularities in tremor rates repeated during constant exposure to G indicated that the influence of G alone did not enhance or diminish the

activity of the central nervous system.

These findings do not support the possibility that the diminished performances under G are due to any depression of the activity of the central nervous system and indicate that decreased motor performance is probably due to mechanical effects of increased gravitational forces upon the musculo-skeletal mass.

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Reid, D.D. 1942 SOME FACTORS IN THE CAUSATION OF FLYING STRESS. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 450, June 1942.

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Reid, H. J. E. 1922 A STUDY OF AIRPLANE MANEUVERS WITH SPECIAL REFERENCE TO ANGULAR VELOCITIES. (National Advisory Committee for Aeronautics, Washington, D.C.) NACA Rept. No. 155.

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Reid, H. J. E. 1922 THE NACA THREE COMPONENT ACCELEROMETER. (National Advisory Committee for Aeronautics, Washington, D.C.) NACA Tech. Note 112.

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Reighard, H. L., C. E. Wilbur, J. C. Cherry, & M. Y. McCormick 1962 A STUDY OF GENERAL AVIATION ACCIDENTS. (Paper 33rd Annual Meeting of the Aerospace Medical Assoc. Meeting, Atlantic City, N. J., 9-12 April 1962).

ABSTRACT: General aviation accident notification, investigation, and reporting procedures are examined briefly and the lac k of privileged status for accident reports is emphasized. In an attempt to elicit human factors data, a questionnaire, with privileged status, was sent to 1,570 civilian pilots involved in general aviation accidents during the period June 1960 to May 1961. Completed questionnaires were received in 949 cases —a response rate of 60 per cent. The questionnaires were matched with the corresponding accident reports and studied. The results are presented, along with recommendations. (Aerospace Med. 33(3): 350, March 1962).

4.157

Reihm, H. D. Jr., 1962 HELMET IMPACT TESTS.
(Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio) MRL-TDR-62-19. April 1962. ASTIA AD 283950.

ABSTRACT: Several helmets, designed and tested to determine which shell thickness and which type of suspension afford maximum protection during high-energy collisions and provide comfort during normal use, are discussed. There are many factors which influence the design of a satisfactory crash helmet; however, a combined analysis of three of its basic properties-reduction of acceleration, reduction of the rate of onset of acceleration, and the absorption of kinetic energy-is sufficient to reveal the relative performance of each helmet design. Tests which determine these basic properties are discussed. An analysis of the data correlated in graphical form shows an optimum helmet thickness and most satisfactory suspension system of those studied.

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Reihm, H.D. 1962 HELMET IMPACT TESTS
(International Latex Corp., Dover, Del.) Contract AF 33(600)-39536, Report No. MRL-TDR-62-19; Project No. 6301, Task No. 630104, April 1962.

ABSTRACT: Several helmets, designed and tested to determine which shell thickness and which type of suspension afford maximum protection during high-energy collisions and provide comfort during normal use, are discussed. There are many factors which influence the design of a satisfactory crash helmet; however, a combined analysis of three of its basic properties--reduction of acceleration, reduction of the rate of onset of acceleration, and the absorption of kinetic energy--is sufficient to reveal the relative performance of each helmet design. Tests which determine these basic properties are discussed. An analysis of the data correlated in graphical form shows an optimum helmet thickness and the most satisfactory suspension system of those studied. (Author)

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Rein, F. H., O. Aulhorn, H. Autrum et al 1947 PHYSIOLOGY - PART III. ANIMAL PHYSIOLOGY AND PHYSIOLOGY OF PERCEPTION (WITH TWO APPENDIXES TO GENERAL PHYSIOLOGY) (Animalische Physiologie und Sinnesphysiologie [Mit Zwei Anhangen Zur Allgemeinen Physiologie]). FIAT Review of German Science 1939-1946. ASTIA ATI 68 556.

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Reinhardt, R. F. 1959 MOTION SICKNESS: A PSYCHOPHYSIOLOGIC GASTROINTESTINAL REACTION?
J. Aviation Med. 30(11):802-805.

ABSTRACT: There is much to suggest that motion sickness is a psychophysiologic gastrointestinal reaction in which part of the anxiety is experienced consciously and part is kept from consciousness by visceral expression. Longitudinal studies have been of value in establishing the incidence of motion sickness, analyzing the motions and external conditions which produce it, and understanding its relation to flight failures and successes. Now needed are studies, in depth, of the psychologic make-up of persons subject to motion sickness. Only by an intensive examination of the personality and developmental factors and the psychodynamics involved in such individuals can the presumption that the basic disorder is emotional be validated.

Further research into the relationship between psychologic test results and motion sickness is needed. The psychologic test batteries in use eliminate many applicats for flight training who are subject to motion sickness. Perhaps projective tests can be devised which will measure one's affective response to unclear and confusing spatial situations. Some persons are so insecure in the face of positional uncertainty that they respond with anxiety and nausea symbolic of not being able to "stomach" the situation. It is hoped that such individuals, prone to motion sickness, can be singled out with appropriate tests.

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Reiniger, C.W. 1958 HUMAN SYSTEM IN SPACE. Missiles and Rockets pp. 4, 33-34

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(REM, Inc., Portland, Oregon) Letter #311. 23 July 1959.

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Remky, H. 1960 THE REGULATION OF THE CEREBRAL CIRCULATION. A CONTRIBUTION TO THE DIAGNOSTIC UNDERSTANDING OF HEADACHE AND VERTIGO BY MEASUREMENT OF THE PRESSURE OF THE RETINAL VESSELS.
Muenchen Med Wschr 102:969-73, 6 May 1960

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Renzi, A. A., & L. J. Milch 1956 EFFECTIVENESS OF PAGITANE (CYCRIMINE HYDROCHLORIDE) AND KEMADRIN (PROCYCLIDINE HYDROCHLORIDE) IN PREVENTION OF AIRSICKNESS. Federation Proceedings 15(1, part I):473 March 1956

ABSTRACT: Results based on groups of airmen subjected to a 60-minute flight consisting of motion patterns to produce emesis indicated that the incidence of sickness was highest in the placebo group (38.1%), and that the incidence in the Kemadrin (procyclidine hydrochloride)-treated subjects (17.5%) was far less than in the Pagitane (cycrimine hydrochloride) group (28.5%). In terms of protection, 5 mg. of Kemadrin was 54% effective, while 5 mg. of Pagitane was only 25% effective. Kemadrin compared very favorably with Benadryl which itself showed 50% protection against airsickness. The preparations demonstrated no untoward side effects at the dose level employed. (AUTHOR)

4,165

Renzi, A.A. and L.J. Milch 1957 EFFECTIVENESS OF PROCYCLIDINE HYDROCHLORIDE AND CYCRIMINE HYDROCHLORIDE IN THE PREVENTION OF AIRSICKNESS (School of Aviation Medicine, USAF Randolph AFB, Texas) Rept. No. 58-20, November 1957

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Renzi, A.A. and L.J. Milch 1958 EFFECTIVENESS OF PROCYCLIDINE HYDROCHLORIDE (KEMADRIN) AND CYCRIMINE HYDROCHLORIDE (PAGITANE) IN THE PREVENTION OF AIRSICKNESS Jour. Aviation Med., 29(8):587-589 Aug. 1958

ABSTRACT: The incidence of vomiting during one hour of simulated turbulence in a C-54 type aircraft was determined in subjects treated one hour before flight with the anti-Parkinson drugs procyclidine hydorchloride, cycrimine hydrochloride, or diphenhydramine hydrochlorifed. Administration of 5 mg. of either procyclidine hydrochloride or cycrimine hydrochloride resulted in a decrease in incidence of vomiting similar to that produced by 50 mg. of diphenhydramine hydorchloride. No side effects of the drugs were observed.

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Resch, J. A. 1942 HUMAN CENTRIFUGE. MAYO AERO MEDICAL UNIT. (War Dept., Air Corps, Materiel Div.) EXP-M-49-698-5A, 24 Aug. 1942

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Reviglio, G.M. 1934 CONTRIBUTO ALLA CONOSCENZA DELLE MODIFICAZIONI DEI DIAMETRI CARDIACI E DEL VOLUME DEL CUORE RISCON TRATA ALL INDAGINE ROENTGENOLOGICA NEI PILOTI. (Changes in the cardiac diameter and volume of the heart as shown in the roentgenogram of pilots.)
Rassegna di med. appl. al lavoro indust, 5:154-159, March - April 1934

ABSTRACT: The heart measurements were taken of eighteen military pilots in service from one to three years. Of these, sixteen showed variations in the principal cardiac diameter and less frequently in the longitudinal diameter. The median diameter showed the most conspicuous variation, with a predominant increase in the left segment. The volume of the heart was increased in ten, especially in those pilots who had made frequent very high or speedy flights.
(J. Aviation Medicine, 7 (1): 51, March 1936)

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Reynolds, H. H., M. E. Grunzke, & F. H. Rohles, Jr. 1963 THE EFFECTS OF EXPOSURE TO SIMULATED LAUNCH AND REENTRY PROFILES ON CHIMPANZEE PERFORMANCE.
Aerospace Medicine 34(3):196-200, Mar. 1963

ABSTRACT: One of the most critical factors associated with space flight, insofar as its effects behavior, is the acceleration experienced during launch and reentry. This was demonstrated by the performance of HAM, the first chimpanzee to participate in the Project Mercury Program. With the advent of this ballistic flight, and the acknowledgement by scientists as to its value in the subsequent manned ballistic flights, a research and training program was begun immediately to prepare a chimpanzee for an orbital flight (Mercury-Atlas 5) to precede that of man. In preparing for this flight it became essential to simulate, insofar as possible, the conditions of launch and reentry which exist at the time a capsule is placed into orbit, particularly with regard to the effects of accelerative forces on a key performance task. Thus, the purpose of this study was to determine the effects upon performance of exposure to accelerative forces likely to occur during launch and reentry, which could further serve as a basis for selecting subjects for an orbital flight. (AUTHOR)

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Reznikov, S. and G. Graifer 1935 MEDICAL CONTROL OF PARACHUTE JUMPS FROM TRAINING TOWERS
Vo.-sanit. Dyelo (7):26-31. 1935

4,171

Reynolds, H. H., M. E. Grunske & F. H. Rohles 1962 THE EFFECTS OF EXPOSURE TO SIMULATED LAUNCH AND RE-ENTRY PROFILES ON CHIMPANZEE PERFORMANCE. (Aeronautical Systems Division, Air Force Systems Command, Andrews AFB, Washington, D.C.) ARL-TDR-62-1, March 1962. ASTIA AD 280 029.

ABSTRACT: Five chimpanzees trained to perform a continuous avoidance task were exposed to the acceleration profiles simulating the conditions of launch and re-entry which exist when a capsule is placed into orbit. Performance during launch and re-entry differed from the base-line period which immediately preceded each of the three launches. However, performance immediately following launch and re-entry indicated that the animals recovered rapidly and tolerated the insults well.

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Reynolds, W.C. 1959 BEHAVIOR OF LIQUIDS IN FREE FALL. J. Aerospace Science 26:847

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Reynolds, W. C. 1960 FREE FALL OBSERVATIONS OF ZERO G HYDRODYNAMICS. (Zero G Research Symposium, Hawthorne, Calif., July 1960)

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Rhein, L.W. & E.R. Taylor 1962 INCREASED SKELETAL MUSCLE ACTIVITY FOLLOWING IMPACT. (Aeronautical Research Lab., Holloman AFB, New Mex.) Report No. ARL-TDR-62-26, Dec. 1962.

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Rhein, L. W., & E. R. Taylor 1962 INCREASED SKELETAL MUSCLE ACTIVITY FOLLOWING IMPACT. (6571st Aeromedical Research Laboratory, Holloman AFB, New Mexico) ARL-TDR-62-26; December 1962

ABSTRACT: Seven male human subjects were exposed to impacts of -10 seat Gx, -20 seat Gx (400 G/second), and -20 Gx (800 G/second). An increase in skeletal muscle activity was seen following the 20 G exposures, with involuntary movements of the trunk and extremities. The activity was greater at the higher rate of onset. Possible explanations are discussed in this preliminary report, and the hypothesis of transient alteration of the central nervous system is advanced. (AUTHOR)

4,176

Rhein, L. W., & E. R. Taylor 1962 RELATIVE BRADYCARDIA AFTER IMPACT (6571st Aeromedical Research Lab., Holloman AFB, N. Mex.) Rept. No. ARL-TDR-62-12; Proj. 7850; ASTIA AD-282 688; August 1962

ABSTRACT: Experimental subjects underwent a 15 G abrupt deceleration in both the forward- and backward- facing positions. A continuous electrocardiogram was made on all subjects. As compared with control subjects, a relative bradycardia of clinical and statistical significance occurred in the backward-facing position immediately after impact for at least five beats. This effect was virtually nonexistent in the forward-facing position. The possible mechanisms are discussed and the hypothesis is advanced that the relative bradycardia was due to a vagal reflex. (AUTHOR)

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Rhode, R. V. 1929 THE PRESSURE DISTRIBUTION OVER THE HORIZONTAL AND VERTICAL TAIL SURFACES OF THE F6C-4 PURSUIT AIRPLANE IN VIOLENT MANEUVERS. (National Advisory Committee for Aeronautics) NACA Rept. No. 307.

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Riccabona, A., and A. Jezek 1960 THE DIFFERENTIAL DIAGNOSIS BETWEEN VASCULAR-CAUSED CENTRAL AND LABYRINTH VERTIGO. Wien Klin Wschr 72:68-9, 29 January 1960

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Richardson, H. C. 1926 FLIGHT ACCELERATIONS AND EQUILIBRIUM. U. S. Navy Med. Bull. 24:874-880, Oct. 1926

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Richmond, D. R., M. B. Wetherbe, R. V. Taborelli, T. L. Chiffelle & C. S. White 1957 THE BIOLOGIC RESPONSE TO OVERPRESSURE. I. EFFECTS ON DOGS OF FIVE TO TEN-SECOND DURATION OVERPRESSURES HAVING VARIOUS TIMES OF PRESSURE RISE.
J. Aviation Med. 28(5):447-460. Oct. 1957.

ABSTRACT: An apparatus producing variable environmental pressure conditions is described. Dogs were exposed to overpressures of up to 170 p.s.i. for durations of 5-20 seconds, and baffles were used as protection against high velocity

winds. Fatalities were limited to animals subjected to dynamic decelerative loading when no wind baffles were used. Gross pathology in nondisplaced but restrained animals, even though exposed to overpressures from 60 to 170 p.s.i. was limited to ear drum failure, sinus and middle ear hemorrhage, larygeal petechiae and characteristic marginal, wedge-shaped hemorrhagic lesions of the costophrenic portions of the lung bases. (Author)

4,181

Richmond, D.R. and R.V. Taborelli n.d. SOME RESULTS OF A SHOCK TUBE FOR BIOMEDICAL INVESTIGATION in PROCEEDINGS OF SECOND SHOCK TUBE SYMPOSIUM (Air Force Special Weapons Center, Air Research and Development Command, Kirtland Air Force Base, New Mexico) 5-6 March 1958, ASTIA AD211239

ABSTRACT: This shock tube was designed to investigate the biological effects of long duration overpressure phenomena as recorded inside protective shelters subjected to nuclear blast. It had to be capable of modifying the different parameters of the blast wave such as maximum overpressure, time to maimum pressure and duration and, in addition, produce single, and multiple reflections as recorded in shelters of different geometric configurations. Also, it had to be of sufficien size to test the larger species of experimental animals.

Although the aerodynamic characteristics have not been studied in detail, its general performance as determined empirically shows this to be a versatile apparatus capable of producing a wide range of pressure-time phenomena. In addition, this device permits a broad basic study of the biological significance of overpressure.

4,182

Richmond, D.R., R.V. Taborelli, I.G. Bowen, T.L. Chiffelle, et al 1959 BLAST BIOLOGY - A STUDY OF THE PRIMARY AND TERTIARY EFFECTS OF BLAST IN OPEN UNDERGROUND PROTECTIVE SHELTERS
(Lovelace Foundation for Medical Education and Research, Albuquerque, New Mexico, February 1959) WT-1467 Project 33.1 Operation Plumbbob

ABSTRACT: Dogs, pigs, rabbits, guinea pigs, and mice were exposed to nuclear detonations in two open underground partitioned shelters. The shelters were of similar construction, and each was exposed to separate detonations. Each inner

chamber filled through its own "orifice"; thus four separate pressure environments were obtained. An aerodynamic mound was placed over the escape hatch of each structure to determine its effect on the pressure-curve shape inside the chamber. In one test a sieve plate bolted across the top of the mound was evaluated. Wind protective baffles of solid plate and of heavy wire screen were installed in the shelters to compare primary and tertiary blast effects on dogs. The shelters also contained static and dynamic pressure gauges, radiation detectors, telemetering devices, and, in one test, air-temperature measuring instruments, dust-collecting trays, and eight pigs for the biological assessment of thermal effects.

One dog was severely injured from tertiary blast effects associated with a maximal dynamic pressure (Q) of 10.5 psi, and one was undamaged with a maximal Q of 2 psi. Primary blast effects resulting from peak overpressures of 30.3, 25.5, 9.5, and 4.1 psi were minimal. The mortality was 19 per cent of the mice exposed to a peak pressure of 30.3 psi and 5 and 3 per cent of the guinea pigs and mice exposed to a peak pressure of 25.5 psi. Many of the rabbits, guinea pigs, and mice sustained slight lung hemorrhages at maximum pressures of 25.5 and 30.3 psi. Eardrum perforation data for all species, except mice, were recorded.

Following shot 2, thermal effects were noted. Animals of the groups saved for observation have died from ionizing-radiation effects.

4,183

Richmond, D.R., R.V. Taborelli, F. Sherping, M.B. Wetherbe, R.T. Sanchez, V.C. Goldizen, and C.S. White 1959 SHOCK TUBES STUDIES OF THE EFFECTS OF SHARP-RISING, LONG-DURATION OVERPRESSURES ON BIOLOGICAL SYSTEMS. In Proceedings of Third Shock Tube Symposium 10-12 March 1959 pp. 171-194

ABSTRACT: A closed-end shock tube was used to study the effects of single and stepwise, fast-rising overpressures of long duration on four species of experimental animals.

For animals exposed side on against the end-plate to single, sharp-rising pressure pulses, the reflected pressures necessary to kill 50 per cent (LD_{50}) were as follows: for the mouse- 29.8 + 1.1 : rabbit -3314 + 1.2 guinea pig - 36.7 $\pm$ 0.7; and the rat - 38.7 $\pm$ 0.6 psi.

Animals located at short distances away from the end-plate were loaded in a two-step manner. The steps corresponded to the incident and reflected shock fronts. With stepwise increases in pressure, animals tolerated much higher reflected overpressures than when the pressure load consisted of a single-sharp-rising pulse.

The importance of the time interval between step loads was pointed out and briefly discussed.

4,184

Richmond, D.R. R.V. Taborelli, F. Sherping, M.B. Wetherbe, et al 1959 SHOCK TUBE STUDIES OF THE EFFECTS OF SHARP-RISING, LONG-DURATION OVERPRESSURES ON BIOLOGICAL SYSTEMS
(The Lovelace Foundation for Medical Education and Research, Alburquerque, New Mexico) Atomic Energy Commission Project Report TID-6056 AEC Contract No. AT(29-1)-1242 March 10, 1959

ABSTRACT: A closed-end shock tube was used to study the effects of single and step-wise, fast-rising overpressures of long duration on four species of experimental animals.

For animals exposed side-on against the end-plate to single, sharp-rising pressure pulses, the reflected pressures necessary to kill 50 per cent (LD_{50}) were as follows: for the mouse - 29.8 + 1.1; rabbit - 33.4 + 1.2; guinea pig - 36.7 + 0.7; and the rat - 38.7 + 0.6 psi.

Animals located at short distances away from the end-plate were loaded in a two-step manner. The steps corresponded to the incident and reflected shock fronts. With stepwise increases in pressure, animals tolerated much higher reflected overpressures than when the pressure load consisted of a single, sharp-rising pulse.

The importance of the time interval between step loads was pointed out and briefly discussed.

4,185

Richmond, D. R., I. Gerald Bowen and C. S. White 1961 TERTIARY BLAST EFFECTS: Effects of Impact on Mice, Rats, Guinea Pigs and Rabbits. Aerospace Med. 32(9):789-805.

ABSTRACT: The present report deals with the results of exposure of four species of animals to impact. Extrapolation of the mortality data to the 70 kg animal and a comparison of the results with relevant information in the literature dealing with human response to dynamic accelerative or decelerative loading is presented.

4,186

Richmond, D. R., I. G. Bowen and C. S. White 1961 TERTIARY BLAST EFFECTS: THE EFFECTS OF IMPACT ON MICE, RATS, GUINEA PIGS AND RABBITS (Lovelace Foundation for Medical Education and Research Albuquerque, New Mexico) Contract No. DA-49-146-XZ-055, 28 Feb. 1961, ASTIA AD-279677.

ABSTRACT: A total of 455 mice, rats, guinea pigs and rabbits were subjected to impact at velocities ranging between 25 ft/sec. and 51 ft/sec. The desired velocities were generated by allowing the animals to free-fall from various heights to a flat concrete pad. The ventral surface of each animal was the area of impact. Probit analyses of the

24-hr mortality data yielded LD_{50} impact velocities with 95 per cent confidence limits as follows: mouse, 39.4 (37.4 - 42.0) ft/sec; rat, 43.5(42.0-44.8) ft/sec; guinea pig, 31.0(30.0 - 31.9) ft/sec; and rabbit, 31.7 (30.2-33.3) ft/sec. The LD_{50} figures for the mouse and rat were significantly higher, statistically, than those for the guinea pig and rabbit. The small spread in the LD_{50} values suggested little variation in the tolerance of biological systems to impact. Further, the steepness of the mortality curves indicated a narrow survival range to impact. Extrapolation of the experimental data to the 70 kg animal yielded a predicted LD_{50} impact velocity of 26 ft/sec (18 mp). Literature relevant to the human case was reviewed and the tentative applicability of the predicted figures to adult man was discussed.

4,187

Richmond, D. R., V. R. Clare, V. C. Goldizen, D. E. Pratt, R. T. Sanchez, & C. S. White 1962 A SHOCK TUBE UTILIZED TO PRODUCE SHARP-RISING OVERPRESSURES OF 400 MILLISECONDS DURATION AND ITS EMPLOYMENT IN BIOMEDICAL EXPERIMENTATION (Ballistic Research Laboratories, Aberdeen Proving Ground, Md.) BRL Rept. No. 1160; Feb. 1962
See also In Proc. of Fourth Shock Tube Symposium, April 18-20, 1961, pp. 36-59, 1961

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Richmond, D. R., V. R. Clare, V. C. Goldizen, D. E. Pratt, R. T. Sanchez, & C. S. White 1961 A SHOCK TUBE UTILIZED TO PRODUCE SHARP-RISING OVERPRESSURES OF 400 MILLISECONDS DURATION AND ITS EMPLOYMENT IN BIOMEDICAL EXPERIMENTATION. In Proc. of Fourth Shock Tube Symposium, April 18-20, 1961, pp. 36-59
See also (Ballistic Research Laboratories, Aberdeen Proving Ground, Md.) BRL Rept. No. 1160; Feb. 1962

4,189

Richmond, D. R., V. C. Goldizen, V. R. Clare, D. E. Pratt, et al 1962 THE BIOLOGIC RESPONSE TO OVERPRESSURE III. MORTALITY IN SMALL ANIMALS EXPOSED IN A SHOCK TUBE TO SHARP-RISING OVERPRESSURES OF 3 to 4 MSEC DURATION
Aerospace Medicine, 3:1-27, January 1962.

ABSTRACT: The experiments to be reported here are a part of a broad study primarily conceived to establish an interspecies correlation

between the weight of animals and their tolerance to "sharp"-rising overpressures as a function of pulse duration. However, the limited objective of the present report is to set forth the empirically determined relationship between lethality and magnitude of single, "sharp"-rising overpressures of 3 to 4 msec duration for mice, rats, guinea pigs and rabbits, and to record selected, but significant, gross pathological lesions caused by air blast generated in a shock tube specially designed to produce pressure pulses similar to "small", high-explosive charges.
See also: (Defense Atomic Support Agency, Wash., D. C.)
Technical Progress Report on Contract DA-49-146-XZ-055,DASA 1242, June 15, 1961.

4,190

Richmond, D. R. et al. 1961 BIOLOGICAL EFFECTS OF OVERPRESSURE. II. A SHOCK TUBE UTILIZED TO PRODUCE SHARP-RISING OVER-PRESSURES OF 400 MILLISECONDS DURATION AND ITS EMPLOYMENT IN BIOMEDICAL EXPERIMENTS. Aerospace Medicine 32(11):997-1008, Nov. 1961.

ABSTRACT: A shock tube employed for blast biology studies is described. By appropriate modifications a wide variety of wave forms some of which closely resemble those produced by nuclear detonations under certain circumstances can be produced. Mortality data are presented on six species of animals all exposed in a similar geometry to similar pressure-time phenomena that varied among the species mostly with respect to the magnitude of the over-pressure. (Tufts)

4,191

Richmond, D.R., D.E. Pratt, & Clayton S. White 1962 ORBITAL "BLOW-OUT" FRACTURES IN DOGS PRODUCED BY AIR BLAST
(Lovelace Foundation for Medical Education and Research, Alburquerque, New Mexico) Defense Atomic Support Agency of the Department of Defense Contract No. DA-49-146-XZ-005 April 10, 1962 , ASTIA AD-287 636

ABSTRACT: Reported here are 11 cases of orbital "blow-out" fractures involving 9 of 115 dogs that were subjected to shock tube-produced air blast.
Usually, there was failure of the frontal, palatine, sphenoid and lacrimal bones - fragments of which were displaced medially and anteriorly into the nasal fossa with extension into the frontal and maxillary paranasal sinuses. In one instance there was extension into the cranial vault. Eye signs, in the form of proptosis of the globe, subconjunctival hemorrhage, ecchymotic areas of the globe and hemorrhage into the intra-orbital soft tissues, were found associated with all cases of orbital fracture.

The pressure-time histories in which animals did or did not sustain orbital fractures are illustrated along with a tabulation of the corresponding pressure-time parameters. The data indicate that orbital fractures (caused by the eyeball and other intra-orbital tissues hydraulically transmitting the pressure-load to the walls of the orbit more rapidly than counter pressure developed in the air-containing areas bordering the orbit) occurred at maximal pressures above 140 psi provided they reached a peak in less than 30 msec.

The incidence of "blow-out" fractures is discussed along with the significance of this lesion in relation to other blast-produced injuries.

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Richou, M.J. 1936 LA RÉSISTANCE HUMAINE Á LA VITESSE (Human Resistance to Speed)
Ailes (Paris) 16(760): 7

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Richter, H. 1940 PHYSIOLOGISCHE BETRACHTUNGEN UEBER DAS SITZKATAPULTIEREN (Physiological Analysis of the Effects of Catapulting by an Ejection Seat) July 1940. ASTIA ATI 60910

ABSTRACT: The physiological effects of catapulting flying personnel by means of an ejection seat from the He-280 jet fighter were investigated. The seats were released at accelerations of 10 and 12 g. Possible injuries are compression of the spinal column, brain concussion, hemostatic effects and injuries to the inner ear. Cardiograms were taken before the seat was catapulted, during ejection and after the seat was stabilized. In order to avoid possible bodily injuries, it is recommended that the catapult of the ejection seat be made with the pilot in a prone position, in which accelerations up to 16 g can be endured without ill effects.

4,194

Richter, H. 1940 SCHUSSVERSUCHE MIT DEM KATAPULTSITZ (Ejection Seat Test) Oct. 1940. ASTIA ATI 51210

ABSTRACT: An avaluation was made of ejection tests with a German Heinkel catapultseat, and the method is given for determining the piston pressure,

friction, acceleration and velocity. Graphical data represent ejection altitudes dependent on the piston pressure and the maximum accelerations acting on the catapult seat. At a known weight of the occupied catapult seat and the minimum ejection height expected, the minimum piston pressure and the acceleration acting on the body can be determined.

4,195

Richter, H., tr. J.B. Bateman 1945 EJECTION EXPERIMENTS WITH THE CATAPULT SEAT (Ernst Heinkel Flugzeugwerke (Seestadt Rostock) Research Division) V.B. 3009, Appendix 2, Pages A-17138 to A-17155, 7 Nov. 1940. Translated as Appendix 9 to Lovelace, W.R., E.J. Baldes, & V.J. Wulff, The Ejection Seat for Emergency Escape from High-Speed Aircraft ASTIA ATI 7245

ABSTRACT: Following upon the ejection experiments with sandbags, ejections of human subjects were undertaken with the cooperation of Professor Wacholder of the Physiological Institute, University of Rostock, and his assistant, Doctor Aeffner. We made two experiments with Mr. Voss(VSA) and Mr Wegner (Statik); both subjects were ejected, the first at 12 and the second at 10 g. In each case electrocardiograms were recorded with electrodes on the right and left wrists. The procedure was first to record the heart beat before ejection, then during ejection, and finally once again some time after the completion of the ejection. The electro-cardiograms obtained are recorded in Figure 5. Here, having discussed the matter with Professor Macholder, I wish to bring together a statement of all the processes which might cause injuries of any kind to experimental subjects in this work: 1) Compression fractures of the spinal column; 2) Conc ussion of the central nervous system, especially with contrecoup symptoms of the type seen in concussion of the brain, 3) Hemostatic effects; 4) Disturbances in the inner ear (labyrinth)

4,196

Richter, H., tr. J.B. Bateman 1945 CATAPULT SEAT He 280 (Ernst Heinkel Flugzeugwerke G.m.b.H., Seestadt Rostock, Research Division) V.B. 3009, Pages A-17156 to A-17186, 21 Oct. 1940. Translated as Appendix 8 to Lovelace, W.R., E.J. Baldes, & V.J. Wulff, The Ejection Seat for Emergency Escape from High-Speed Aircraft ASTIA ATI No. 7245

ABSTRACT: The investigation dealt with the following subjects: 1) Testing of the catapult cylinder (drawing No. 280.101-25) 2) Tests on rapid opening

valve, drawing No. 280.101-26. 3) Tests on compressed air cylinder with reservoir attachment, Drawing No. 280.101-14. 4) Experiments on ejection of sand bags from mockup He 280 (high speed moving pictures and indicator diagrams) 5) Seat ejections with human subjects on the inclined track (high speed moving pictures and indicator diagrams) together with various types of measurement of acceleration and electrocardiograms). (Author)

4,197

Richter, H. 1949 PHYSIOLOGICAL ANALYSIS OF THE EFFECTS OF CATAPULTING BY AN EJECTION SEAT. 24 Aug. 1949. ASTIA ATI 60-910

ABSTRACT: The ejection seat of the He-280 jet fighter was used to study the effects of catapulting (acceleration) on the human body. Heart cardiograms were taken before the seat was catapulted, during its release, and after it was stabilized. The seats were released at accelerations of 10 and 12 g. The effects of these accelerations could have the following injurious results: compression of the spinal column; concussion of the central nerve system with contrecoup symptoms, as observed in the case of brain concussion; hemostatic effects and injury to the inner ear. To avoid possible injuries to the body it was recommended that catapult with an ejection seat be executed from a prone position, in which accelerations to 16 g can be endured without ill effects.

4,198

Richter, Albert P. 1960 THE RESPONSE OF A TWO-DEGREE-OF-FREEDOM UNDAMPED SYSTEM SUBJECTED TO IMPULSIVE LOADING. (Structural Mechanics Research Lab., The University of Texas)

4,199

Ricks, Luin Blunt 1961 A FEASIBILITY STUDY OF A MAGNETO-HYDRODYNAMIC CENTRIFUGE. (Master's Thesis, Air Force Inst. of Tech., Wright-Patterson AFB, Ohio) Rept. No. GE/EE/61-15; ASTIA AD-269 423; Aug. 1961

ABSTRACT: A study was made of the magneto-hydrodynamic centrifuge, a direct-current motor with a mercury armature. Centrifuging action is derived from the rotating mercury which, at sufficient speeds, assumes the shape of a hollow ring. A development prototype is designed and tested to determine the feasibility of such a centrifuge. Results were promising and indicated that the basic operational principle is sound and feasible. A paddle wheel was rotated at 2000 rpm by a rotating ring of mercury at an estimated mercury input power of 5 watts. (AUTHOR)

4,200

Riddell, F.R. and R.W. Detra 1959 RETURNING ALIVE FROM SPACE.
(Avco Mfg. Corp., Avco Research Lab., Everett, Mass.)

ABSTRACT: The paper discusses three problems of re-entry: deceleration, heat, and terminal landing conditions. Hypersonic gliders and pure drag re-entry vehicles are compared. The drag vehicle has inherent advantages over the hypersonic glider which are usually not generally observed.

4,201

Riddell, Frederick R. and Howard B. Winkler 1961 METEORITES AND RE-ENTRY OF SPACE VEHICLES AT METEOR VELOCITIES
(Paper, National ARS-ISA Joint Meeting, June 13-16, 1961)

ABSTRACT: In the exploration of the solar system, it will soon be of interest to recover instrumented probes, which, if they are not decelerated in some fashion in space, will approach Earth at velocities as high as 140,000 fps. The possibility of decelerating such a recovery vehicle by atmospheric braking is examined. Since this velocity is well into the meteor range, data on meteorites are used to orient the analysis. Meteorites are known to cover a wide range of sizes from a few microns to hundreds of feet in diameter. There is evidence, furthermore, that, in the intermediate-size range from a few inches to a foot or two in diameter, only objects in the lower meteor velocity range survive. Rational designs of recoverable deep-space probes are of this intermediate size. Analysis is performed which shows that, whereas very small and very large objects may survive throughout the meteor velocity range, there may well be an upper limit to re-entry velocity of about 50,000 to 60,000 fps for objects of intermediate size. The reason for this upper limit appears to be that, at meteor velocities the dominant mechanism of heat transmission is radiation. This provides a much more effective route for the transfer of energy than the convective heat transfer processes associated with lower entry velocities.

4,202

Riddell, Frederick R. & Howard B. Winkler 1962 METEORITES AND RE-ENTRY OF SPACE VEHICLES AT METEOR VELOCITIES
ARS Journal, 2(10): 1523-1530

ABSTRACT: In the exploration of the solar system, it will soon be of interest to recover instrumented probes, which, if they are not decelerated in some

fashion in space, will approach Earth at [illegible] as high as 140,000 fps. The possibility of decelerating such a [illegible]icle by atmospheric braking is examined. Since this velocity is well [illegible] the meteor range, data on meteorites are used to orient the analysis. Meteorites are known to cover a wide range of sizes from a few microns to hundreds of feet in diameter. There is evidence, furthermore, that, in the intermediate-size range from a few inches to a foot or two in diameter, only objects in the lower meteor velocity range survive. Rational designs of recoverable deep-space probes are of this intermediate size. Analysis is performed which shows that, whereas very small and very large objects may survive throughout the meteor velocity range, there may well be an upper limit to re-entry velocity of about 50,000 to 60,000 fps for objects of intermediate size. The reason for this upper limit appears to be that, at meteor velocities, the dominant mechanism of heat transmission is radiation. This provides a much more effective route for the transfer of energy than the convective heat transfer processes associated with lower entry velocities.

4,203

Rigal, R. D., F. W. Lovell & F. M. Townsend. 1960 PATHOLOGIC FINDINGS IN THE CARDIOVASCULAR SYSTEMS OF MILITARY FLYING PERSONNEL. The American Journal of Cardiology 6(1):19-25 July 1960.

ABSTRACT: In a group of supposedly healthy young fliers, there is a significant percentage who have moderate or marked atherosclerosis of the coronary arteries. However, in these pilots there is very little arteriosclerosis in the aorta, renal arcuate arteries, and small arteries of the periadrenal fat and the pancreas. The same observations are essentially true of a similar group of non-flying military personnel. This suggests that in young men free of clinical evidence of disease, coronary artery atherosclerosis may develop at a more rapid rate than in vessels of other organs. Fliers and non-fliers in the present study were not basically comparable because of age and other differences. However, the incidence of moderate and marked coronary artery sclerosis was found to be approximately equal in both groups, regardless of age.

In implicating marked coronary artery disease as a causative factor in an otherwise unexplained aircraft accident, extreme caution must be used. The finding of severe narrowing of the lumen of the coronary arteries must be considered in the light of information gained from the investigation of mechanical factors and from reports of the details of the accident.

4,204

Riley, M. B., and Bernardini, A. T. 1959 ANIMAL AND HUMAN STUDIES OF THE EFFECTS OF LOW-FREQUENCY OSCILLATION COMBINED WITH TRANSVERSE ACCELERATION (Wright Air Development Center, Aero Medical Lab., Wright-Patterson AFB, Ohio) WADC TN 59-92, March 1959. ASTIA AD 227 503.

ABSTRACT: Animal and human endurance is reported to low-frequency oscillation combined with acceleration having a resultant force acting in the back-to-chest direction. No significant suggestion of trauma was found in animals subjected to a maximum oscillation-g pattern of 2.8 cycles per second through a 36° arc in a 12 g field. In humans, there was no identifiable endpoint when they were subjected to a maximum oscillation-g pattern of 0.7 cycle per second through a 36° arc in an 8 g field.

4,205

Riley, M. B., and Bernardini, A. T. 1959 ANIMAL AND HUMAN STUDIES ON THE EFFECTS OF LOW-FREQUENCY OSCILLATION COMBINED WITH TRANSVERSE ACCELERATION (Wright Air Development Center, Aero Medical Lab., Wright-Patterson AFB, Ohio) WADC TN 59-92, March 1959. ASTIA AD 227 503.

ABSTRACT: Animal and human endurance is reported to low-frequency oscillation combined with acceleration having a resultant force acting in the back-to-chest direction. No significant suggestion of trauma was found in animals subjected to a maximum oscillation-g pattern of 2.8 cycles per second through a 36° arc in a 12 g field. In humans, there was no identifiable endpoint when they were subjected to a maximum oscillation-g pattern of 0.7 cycle per second through a 36° arc in an 8 g field.

4,206

Riley, R.L., S. Permutt, S. Siad, M. Godfrey, T.O. Cheng, J.B.L. Howell and R.H. Shepard 1959 EFFECT OF POSTURE ON PULMONARY DEAD SPACE IN MAN. J. Appl. Physiol. 14:339-344.

ABSTRACT: Physiologic dead space was determined in the supine and upright postures by simultaneous sampling and subsequent analysis of arterial blood and expired gas for P_{CO_2}. In seven normal men there was invariably a higher dead space in the upright than in the supine position. The difference averaged

83 ml and was statistically significant (S.E. 25 ml and $P > 0.01$). The ratio of dead space to tidal volume also invariably increased on assuming the upright posture. Evidence is presented for believing that most of the change in physiologic dead space resulted from a change in alveolar dead space. Estimated changes in the ratio of alveolar dead space to alveolar tidal volume suggest that approximately one seventh of the total number of alveoli became nonperfused on changing from the supine to the erect posture. These findings are consistent with bronchospirometric and hemodynamic evidence that the apex of the lung is virtually nonperfused in the resting human subject in the upright position.

4,207

Rind, Emanuel 1954 A PHOTOGRAPHIC METHOD FOR DETERMINING VERTICAL VELOCITIES OF AIRCRAFT IMMEDIATELY PRIOR TO LANDING. (National Advisory Committee for Aeronautics, Washington, D. C.) NACA TN 3050.

4,208

Rippon, T. S. 1935 PHYSICAL MEDICINE AND FLYING
Brit. J. Phys. Med. 10:25-26.

4,209

Rinehart, J. S. 1960 STRESSES ASSOCIATED WITH LUNAR LANDINGS
J. Brit. Interplanet. Soc. 17(12):431-436, Nov.-Dec. 1960

ABSTRACT: The probable stresses which would be developed during lunar impact landings are discussed phenomenologically and quantitatively. For landings against rocks in the velocity range from a few hundred feet per second to a few thousand feet per second, the stress is proportional to the first power of the impact velocity, with its magnitude depending upon the particular rock struck and increasing approximately linearly with shear strength and with specific acoustic resistance, but ranging roughly from 6000 lb./in.^{2} at 100 ft./sec. to 2,000,000 lb./in.^{2} at 6000 ft./sec. In landings against loose soils the stress, much lower than for rock impacts, is substantially independent of velocity at low velocities, but begins to depend strongly on the square of the velocity as the velocity is increased. The excursions of a 10,000-lb. vehicle into rock and soil surfaces are compared.

4,210

Risavi, A. 1956 CHANGES IN THE STATO-ACOUSTIC APPARATUS OF PILOTS. (Promjene na statoakustičnom apparatu kod pilota. Vojnosanitetski pregled (Beograd)). 13:(11-12):536-543. Nov. Dec. 1956. In Serbocroation, with English summary. p. 542.

4,211

Risinger, B.W. 1960 PILOT ACCELERATION PROTECTION IN THE INTEGRATED FLIGHT CAPSULE (Chance Vought Aircraft, Inc., Dallas, Texas) CVA EOR-12843, 21 March 1960.

4,212

Ritter, O. L. & S. J. Gerathewohl 1959 THE CONCEPTS OF WEIGHT AND STRESS IN HUMAN FLIGHT. (School of Aviation Medicine, Aerospace Medical Center (ATC) Brooks AFB, Texas) Rept. No. 58-154, Jan. 1959

ABSTRACT: The concepts of weight and stress in human flight are considered. The usage of terms and expressions is analyzed, their diverse meanings disentangled, and some of the physical facts are presented together with a simple and consistent set of concepts for their description.

4,213

Roaf, Robert 1961 SPINAL INJURIES
The Lancet 14 Jan. 1961, pp. 99-102.

4,214

Rob, C. G. 1944 SOME EXPERIENCES WITH A PARACHUTE SURGICAL UNIT
J. R. Army med. Cps. 82:165-167. 1944

4,215

Roberts, Kenneth A. 1961 WE CAN BUILD A CRASH-PROOF CAR
SAGA, Oct. 1961, pp. 17-21; 91 93

ABSTRACT: This article contains a detailed report and illustrations of a "Magic Bumper", seat belt, and "Ensolite" which Professor James Ryan claims

could prevent one-half of all injuries and deaths suffered in automobile accidents every year. The "Magic Bumper" absorbs collision shocks by hydraulic device and would cost less that fifty dollars a car installed. The seat-belt adjuster allows passengers complete freedom of movement but cinches tight upon any impact. Unbelievable "Ensolite" 1-inch cushioning, proposed for padding inside cars, can absorb bouncing raw eggs without cracking them.

4,216

Roberts, W. O. 1957 THE ASTRONOMER'S VIEWS.
In Campbell, P. A., K. Dannenberg, W. O. Roberts, H. Haber, A. S. Crossfield, G. W. Hoover, A. M. Mayo, J. P. Hagen, & H. Strughold, SPACE TRAVEL: A SYMPOSIUM. J. Avia. Med. 28:484-487

4,217

Robertson, A. E. and P. R. Patianow 1962 OPTIMIZING SPACE PROGRAMS (TAPCO. Div. of Thompson Ramo Wooldridge, Inc. Paper, American Rocket Society, 17-19 July 1962 American Rocket Society Preprint ARS-2468-62.

4,218

Robinette, J. C. 1957 A SELECTED BIBLIOGRAPHY CONCERNING PHYSIOLOGICAL FACTORS IN AERO-MEDICAL RESEARCH AND DEVELOPMENT. (Wright Air Development Center, Wright-Patterson AFB, Ohio) ASTIA AD-126 401; April 1957

ABSTRACT: This bibliography has been prepared to acquaint individuals, interested in physiological factors as they relate to aero-medical research and development, with the scope of project work conducted by the Physiology Branch of the Aero Medical Laboratory, Wright Air Development Center.
The principal topics include thermal physiology and protective garments; toxicity of materials and toxic chemical measurement; respiratory physiology and high altitude protective garments; aircraft visual requirements; nutrition and metabolism. (CARI)

4,219

Robinette, J. C., ed. 1959 BIBLIOGRAPHY ON AEROMEDICAL RESEARCH WITH ABSTRACTS (Wright Air Development Division, Wright-Patterson AFB, Ohio) Dec. 1959 [illegible]

ABSTRACT: This bibliography compiles abstracts of Technical Documentary Reports issued by the Aerospace Medical Laboratory, Wright Air Development Center, from 1957 through 1959.

The major areas comprising the Laboratory's mission are behavioral sciences, biomedical sciences, and engineering as related to human factors in aircraft design and survival equipment. The reports documenting the first two areas are subdivided into more specialized categories: engineering psychology, training psychology, bioacoustics, biophysics, and physiology.

4,220

Robinson, A. C., & A. J. Besonis 1958 ON THE PROBLEMS OF RE-ENTRY INTO THE EARTH'S ATMOSPHERE. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 58 408; ASTIA AD-203 790; Aug. 1958

ABSTRACT: Re-entry into the earth's atmosphere has been studied from the standpoints of deceleration, heating, and accuracy of impact. This has been done for re-entry speeds consistent with return from near satellite orbits, and for speeds consistent with re-entry from a circum-lunar orbit under several configurations of lift and constant or variable drag coefficient assumptions. Heating considerations are based only on stagnation point influences. It is shown that deceleration and peak heating rates are not larger than those occuring in ballistic missile re-entries. The total heat input, however, is much larger as the heating occupies a much longer time. It appears that simple, non-lifting re-entry will be feasible from satellite orbits. The lunar re-entry, on the other hand, presents a severe total heat problem and accuracy requirements are such that some lift or other control will probably be required.

4,221

Robinson, A. C. 1958 ON THE PROBLEMS OF RE-ENTRY INTO THE EARTH'S ATMOSPHERE. In Robinson, A. C., & A. J. Besonis, eds., Advances in Astronautical Sciences (Proceedings AAS Western Regional Meeting, August 1958) (New York: Plenum, 1958) 3:33-1 - 33-24

ABSTRACT: Re-entry into the earth's atmosphere has been studied from the standpoints of deceleration, heating, and accuracy. This has been done for re-entry

speeds ranging from those consistent with re-entry from a near satellite orbit to those consistent with a circumlunar vehicle. It is shown that deceleration and peak heating rates present no major difficulty, being no larger than those occurring in ballistic missile re-entries. The total heat input, however, is much larger than for ballistic missiles, as the heating occupies a much longer time. It appears that a simple ballistic re-entry will be feasible from satellite orbits. The lunar re-entry, however, presents a severe total heat problem, and accuracy requirements are such that some lift or other control will probably be required.

4,222

Robinson, A.C., and C.R. Poli 1961 DEVELOPMENT OF NORMALIZED SIX-DEGREE-OF FREEDOM EQUATIONS FOR ANALOG SIMULATION OF ATMOSPHERIC RE-ENTRY (Synthesis and Analysis Division, Directorate of Systems Dynamic Analysis, Aeronautical Systems Division, Wright-Patterson AFB, Ohio)Task No. 70958, ASD TR 61-448, November 1961, AD 270465

ABSTRACT: This report has developed the six-degree-of-freedom equations for a rigid body re-entering the earth's atmosphere and has normalized these equations to aid in their systematic study. Their solution by means of both analog and digital computers has been demonstrated. The results for specific re-entry conditions are shown together with an analysis of the errors in impact position due to re-entry perturbation sources. For the case of proper time scaling, the results of analog and digital computers compare quite favorably.

4,223

.n, F. R., R. L. Hamlin, W. M. Wolff, & R. R. Cermann 1962 RESPONSE OF THE RHESUS MONKEY TO LATERAL IMPACT. (Paper, 33rd Annual Meeting of the Aerospace Medical Assoc., 9-12 April 1962, Atlantic City, N. J.)

ABSTRACT: The physiological response of the Rhesus monkey to abrupt negative acceleration (deceleration) is reported. Eight animals received a series of progressively higher impact loss in the Y axis up to 75 g over a six-month period with use of the Vertical Deceleration Tower. Accelerations on the head, chest and hip of the animal were recorded simultaneously with the acceleration on the cart from which rise time, velocity and displacement were computed and recorded. Three orthogonal electrocardiograms and respiration rates were recorded. Radiographs were taken before and after the impacts. Routine hematological examinations were performed in addition to serum transaminase determinations. Changes in the EGG and respiration will be presented as well as changes of position of the heart as seen on radiographs. Hemograms and serum transaminasc results will also be discussed. (Aerospace Medicine 33(3):350, March 1962)

4,224

Robinson, F. R., R. L. Hamlin, W. M. Wolff & R. R.Coermann 1963 RESPONSE OF THE RHESUS MONKEY TO LATERAL IMPACT. Aerospace Med. 34(1):56-62, Jan. 1963.

SUMMARY: These experiments provide information regarding the physiological and mechanical response of well protected animate systems subjected to lateral impacts.

Rhesus monkeys were subjected to 11 laterally applied impacts over a 6 month period. The impacts ranged from 5 to 75 g with pulse durations of 70 to 27 milliseconds, respectively. Marked resonances of the head and hip occurred in the 30 millisecond pulse duration range. There appeared to be a resonance of the chest in the 60 millisecond range and either another resonance or the shifted resonance in the 30 millisecond range. The most important biological effect of the impacts was the response of the heart in the form of conduction abnormalities. The maximum response occurred immediately after the 55 g impacts. There were twice the number of abnormalities recorded from left lateral impacts as compared to right lateral impacts.

Radiographs showed no skeletal fractures. Movement and/or dilatation of the heart was evident on the side receiving the impact. Routine hemogram and serum glutamic-oxalacetic transaminase values showed no change due to the impacts.

Protection provided by the individually fitted body molds is discussed, particularly with reference to the heart.

4,225

Robinson, J. E., et al. 1960 FLIGHT TESTS - TOO MANY VARIABLES? (13th Annual International Air Safety Seminar, Chandler, Arizona) Nov. 1960

4,226

Roche, C.A. 1960 OF MEN, MEDICINE AND MILITARY PARACHUTING. Milit. Med. 125:615-6, September 1960

4,227

Roegner, H. F. & J. Carroll 1960 CRASH INJURY INVESTIGATION: U. S. ARMY HU-1A BELL IROQUOIS HELICOPTER ACCIDENT, FORT CARSON, COLORADO, 9 JUNE 1960. (Aviation Crash Injury Research, Phoenix, Arizona) AvCIR 12-PR-122, TREC Tech. Rept. 60-72, December 1960.

SUMMARY: This investigation revealed that the injuries experienced by the occupants resulted from vertical deceleration, failure of the troop seat, and failure of the transmission support, permitting displacement of the transmission into the cabin of the aircraft through the rear bulkhead. The side and the rear roof support members failed in this accident in a manner almost identical to failures of these parts experienced in other HU-1A helicopter accidents. The accident also revealed the excellent energy absorption characteristics of the skid landing gear and the crew seat cushion.

4,228

Roegner, H. F. 1960 CRASH INJURY EVALUATION: SUMMARY EVALUATION OF U. S. ARMY HU-1A BELL IROQUOIS HELICOPTER. (Aviation Crash Injury Research, Phoenix, Arizona) AvCIR 15-PR-126, TREC Tech. Rept. No. 60-73, December 30, 1960

ABSTRACT: This report reviews and discusses findings, conclusions, and recommendations forthcoming from the three evaluations and the five accident investigations. The purpose of the evaluations and investigations is to: (1) Evaluate the over-all crashworthiness of the basic aircraft structure; (2) Draw attention to all features which could either lead to or prevent unnecessary exposure of crew members and passengers to serious or fatal injury in accidents where crash forces are within survivable limits; (3) Make recommendations for remedial action in areas where deficiencies exist or are believed to exist in order to improve the crash safety aspects of the aircraft; and (4) Note the existence of effective crash safety features.

4,229

Roegner, H. F., G. J. Walhout & J. D. Davenport 1961 CRASH INJURY INVESTIGATION: U. S. ARMY G-91 RECONNAISSANCE JET FIGHTER ACCIDENT, FORT RUCKER, ALABAMA, 1 FEBRUARY 1961. (Aviation Crash Injury Research, Phoenix, Arizona) AvCIR 61-2, TREC Tech. Rept. 61-91, July 1961

ABSTRACT: Report is made of crash injury investigation involving a U.S. Army G-91 aircraft to determine cause of fatality. Wreckage was examined at crash

site, photographs obtained, and reconstruction of the approximate kinematics of the crash sequence made. It was concluded that the fatal injury was caused by a blow to the head and recommended that the ejection se t, since it is designed to provide safe escape at all altitudes and speeds, be utilized as an escape device in lieu of "riding the aircraft in" in a crash landing, with the exception, possibly, of crash landing on a well prepared surface or runway.

4,230

Roger, L. 1945 BLAST INJURY OF THE BRAIN Med. J. Australia 2:209-210

4,231

Rogers, T. A., & H. A. Smedal 1961 THE VENTILATORY ADVANTAGE OF BACKWARD TRANSVERSE ACCELERATION. (Paper, 32nd Annual Meeting of the Aerospace Medical Association, Palmer House, Chicago, Illinois, April 24-27, 1961) Aerospace Med. 32(3):245, March 1961.

ABSTRACT: Test pilots have reported less d[illegible] when subjected to g-stress in the eyeballs out direction than in the eyeballs in direction. Six subjects were exposed to stress [illegible], 6 and 8 g in both positions for two minutes, during which measurements of tidal volume and vital capacity were made, using a wet spirometer in a closed circuit. In the eyeballs in direction, there was virtually no expiratory reserve at only 4 g, and at higher g, the tidal volume was nearly [illegible] of the greatly diminished vital capacity. In contrast, the [illegible] had a markedly greater tidal volume and vital capacity at each g level in the eyeballs out direction. The results strongly bear out the subjective reports of the greater ease of ventilation in the eyeballs out direction.

4,232

Rogers, T. A. and H. A. Smedal 1961 THE VENTILATORY ADVANTAGE OF BACKWARD TRANSVERSE ACCELERATION
Aerospace Medicine 32(8):737-740, Aug. 1961.

ABSTRACT: To compare the effects of acceleration applied transversely to the spinal axis in the "eyeballs-in" and the "eyeballs-out" directions on

respiratory function, five Ss were tested on the human centrifuge at four, six, and eight g. With the use of special respiratory equipment data were obtained on tidal volume, inspiratory capacity and expiratory reserve separately, and vital capacity. The ventilatory advantage of the eyeballs-out or backward position was discussed. (Tufts)

4,232

Rogers, T. A. 1962 THE PHYSIOLOGICAL EFFECTS OF ACCELERATION. The Scientific American 206(2):61-70, Feb. 1962

ABSTRACT: Emboldened by the resilience of their bodies, men now submit to the extreme stress of the acceleration sufficient to hurl them free of the earth's gravitational field. In the state of weightlessness thus achieved the body may come under stresses still more extreme. Within the past generation, therefore, the physiological effects of acceleration have become the focus of urgent and elaborate research programs. One program on acceleration studies is taking place at the Naval Air Development Center in Johnsville, Pa. At the center, volunteers are subjected to extreme acceleration in the largest centrifuge in the United States. Using this centrifuge, scientists study the physiological effects of various positions during acceleration. The centrifuge has also been used a great deal for experimenting with the effects of weightlessness. Investigators are concerned that the reflexes controlling the circulation might deteriorate under weightlessness. In the first place, long periods at zero G might be expected to depress the response of the pressure receptors in the circulatory system. The second factor to be considered is that of blood-volume changes. Finally, it is possible that prolonged exposure to zero G may affect the sensitivity of the pressure-receptor cells themselves. (CARI)

4,234

Roggeveen, L. J., & P. Nijhoff 1956 THE NORMAL AND PATHOLOGICAL THRESHOLD OF THE PERCEPTION OF ANGULAR ACCELERATIONS FOR THE OPTOGYRAL ILLUSION AND THE TURNING SENSATION. Acta oto-laryngologica (Stockholm) 46(6):533-541, Nov.-Dec. 1956

ABSTRACT: Threshold determinations on the vestibular organ were made in fifteen subjects using a turning chair. Two criteria were used: (1) perception of a turning movement without further aids and (2) the optogyral illusion (caloric or rota-

tory stimulation applied with the visible surroundings reduced to a small luminous spot in a fixed position in relation to the subject and at a distance of 1 m. from his eyes). A reduction of the effect of fancied impressions was brought about by the administration of blank stimuli (no acceleration after the warning signal). A significant difference was found between sensitivity as expressed by the turning sensation and sensation expressed by the turning sensation and sensation expressed by the optogyral illusion, the latter being more sensitive. In most pathological cases a still larger difference was found. (AUTHOR)

4,235

Rohles, F. H., Jr., H. H. Reynolds, et al. 1961 A LADORATORY MODEL FOR A FOURTEEN DAY ORBITAL FLIGHT WITH A CHIMPANZEE. (AF Missile Development Center, Holloman AFB, New Mexico) Report No. AFMDC TR 61-33, October 1961. ASTIA Doc. No. AD-268 408.

ABSTRACT: A young male chimpanzee was restrained on a plastic couch and isolated from the usual laboratory distractions for 14 days. Assuming a 90 minute orbit, the subject performed a complex psychomotor task for approximately nine hours each day and received all of his food and water as rewards for his performance. Skin temperature, pulse, and respiration were monitored throughout the test and urine and feces were collected outside the isolation cubicle and measured. The subject lost no weight for the test period and recovery was rapid. (Author)

4,236

Rohles, F.H., Jr., H.H. Reynolds, & M.E. Grunzke 1962 A PERFORMANCE SCHEDULE FOR EXTENDED SPACE FLIGHT WITH THE CHIMPANZEE (Aeromedical Research Laboratory, Holloman AFB, New Mexico) ARL-TDR-62-14; Project 6893 July 1962. ASTIA AD 278 546

ABSTRACT: This report describes a schedule designed for measuring animal performance during space flight which is oriented toward sampling simple motor behavior and visual and auditory monitoring, as well as requiring performance for food and water. Employment of this schedule should facilitate the animal to human extrapolation.

4,237

Rohles, F.H., M.E. Grunzke & H.H. Reynolds 1962 A DETAILED ACCOUNT OF CHIMPANZEE PERFORMANCE DURING THE BALLISTIC AND ORBITAL PROJECT MERCURY FLIGHTS
(6571st Aeromedical Research Lab., Holloman AFB, N. Mex.) ARL TDR 62-15; Proj. 6893. ASTIA AD 282 687

ABSTRACT: The insults of prolonged periods without sleep, the suturing of the physiological sensors, and the long period of restraint before launch, did not affect performance during flight; this also appeared true of the prolonged breathing of 100 per cent oxygen under reduced atmospheric pressures for the time periods of these flights. The noise and vibration accompanying launch did not affect performance during flight. Accelerations accompanying launch and re-entry in excess of 7 G's had an immediate effect upon performance; however, recovery to a prelaunch level appeared to be rapid. Adaptation to weightlessness took place during the long exposures to the weightless state, and re-entry accelerations did not have as severe effect upon performance as during the shorter flight. Eating and drinking were accomplished during weightlessness without difficulty. The visual processes, as measured, were unaffected by the rigors of space flight; this was also true of temporal response processes as well as continuous and discrete motor behavior. The pellet and water dispensers functioned properly during weightlessness. The chimpanzee appears to be a highly reliable subject for future space flights. (Author)

4,238

Rolle, S.D. 1952 INTERPRETATION OF PRESSURE-TIME RECORDS IN TESTS OF CATAPULTIC DEVICES. (Pitman-Dunn Laboratories Department, Frankford Arsenal) Memorandum Report MR-516, ASTIA ATI-166379, 1 May 1952

ABSTRACT: Ballistic performance of catapultic devices is evaluated on the basis of separation velocity, thrust, maximum acceleration, maximum rate of change of acceleration, and ignition delay. The methods and techniques of evaluating these data from pressure-time records are described to promote uniform interpretation of such records and to insure compliance with specification requirements. Typical pressure-time traces are shown to illustrate the methods of interpretation.

4,239

Roman, A. 1959 LIST OF REFERENCES ON PACKAGES, WITH SPECIAL REFERENCE TO SHOCKS AND VIBRATIONS APPLIED TO PACKAGES WHILE IN TRANSIT
(Royal Aircraft Establishment (Gt. Brit.) Library bibliography no. 160, ASTIA AD-93761
Revised edition, June 1961, ASTIA AD 226 657L

4,240

Roman, J.A. and J.R. Prine 1958 THE SEMI-RIGID ENVELOPE AS A MEANS OF PROTECTION FROM IMPACT-PRELIMINARY TESTS ON RABBITS. (USAF Aero Med. Lab., Wright-Patterson AFB, Ohio) Techn. Report 58-123, April 1958

4,241

Roman, J., I.R. Coermann, & G. Ziengenruecker 1958 VIBRATION, BUFFETING AND IMPACT RESEARCH. (Paper, First Post-Satellite Meeting of the Aero-Medical Association, Statler Hotel, Washington, D.C. March 24-26, 1958)

ABSTRACT: A "vertical accelerator" which simulates the dynamic loads expected of future aircraft was developed in order to study the effectiveness of devices for protection against vibration, buffeting, and impact. Experimentation revealed several mechanisms productive of injury in severe vibration of buffeting, and indicated that vibration and impact protection are intimately related and possible by simple means. It was shown that by simplification of mathematical models of organ systems, present knowledge of vibration physics may be directly applied to the development of protective equipment.
(J. Aviation Med., 29(3):248, March 1958)

4,242

Roman, J.A., R. Coermann & G. Ziegenruecker 1959 VIBRATION, BUFFETING AND IMPACT RESEARCH. J. Aviation Med. 30(2):118-125
See also WADC TR 58107

SUMMARY: Prediction of the effects of mechanical forces upon the human body, and protection against these effects hinges largely upon our ability to describe body structures in terms which are susceptible to analysis. The chest-abdomen system simplified mechanical model. The behavior in vibration and impact of the chest-abdomen in some animals and humans has been found to follow closely that of the model.

Formulation of a successful model for certain conditions has proved helpful in determining the potential value for humans of protective equipment against vibration, buffeting and impact. It may permit many of the data derived from vibration study of humans under safe conditions to be extrapolated to impact situations with valid results. Testing of impact protective devices for humans may eventually be accomplished with minimal risk to the subject.

4,243

Roman, J. A. 1961 SCHOOL OF AVIATION MEDICINE PHYSIOLOGICAL STUDIES IN HIGH PERFORMANCE AIRCRAFT. (Paper, 32nd Annual Meeting of the Aerospace Medical Assoc., 24-27 April 1961, Chicago, Ill.)

ABSTRACT: Work at the School of Aviation Medicine with high performance aircraft in subgravity has yielded physiological data in statistical quantities. These show that cardiovascular reaction to subgravity may be quantitated and bears direct relation to cardiovascular behavior at positive and negative acceleration values. Representative EGG, respiration and heart rate data are presented for several conditions of flight in high performance aircraft, i. e., local VFR flights and cross-country flights, both VFR and actual HFR, with weather departures and terminal procedures. These data are discussed in the light of current air traffic control problems and pilot selection policies. Operational problems attendant to biomedical use of high performance aircraft are discussed. Figures are given for the number of flying hours per month to be expected from heavily instrumented high performance aircraft. Instrumentation problems are presented and some of the solutions utilized by the Aerospace Medical Center are discussed.
(Aerospace Medicine 32(3):244-245, March 1961)

4,244

Roman, James A. 1962 BIOMEDICAL MONITORING IN-FLIGHT
In: (School of Aerospace Medicine) Lectures in Aerospace Medicine, 1962 pp. 97-114

ABSTRACT: For the operational situation in space, biomedical monitoring implies the automatic gathering of quantitative information relative to physiological functioning in the intact human or animal in a form suitable for evaluation, recording, or storage. The justification for the use of biomedical monitoring on space missions is based on considerations of operational safety and on the need to gather data which will bear on the design of future space vehicles and mission profiles. Physiological parameters for use in biomedical monitoring must be chosen in such manners that information derived from them is unequivocally interpretable as well as being descriptive of the functioning of important organ systems. In addition, the choice of parameters must be governed by the knowledge as to whether or not reliable sensors exist with which to measure them or whether such sensors can be developed within the near future. The interpretation of data during a space flight will be affected by the environment, diet and fluid intake, and the level of alertness or stress during critical parts of the mission.

4,245

Roman, J.A. 1963 CARDIORESPIRATORY FUNCTIONING IN-FLIGHT. Aerospace Medicine, 34(4): 322-336, April 1963

ABSTRACT: Systolic and diastolic blood pressures on three pilots in-flight in high performance single engine jet aircraft in the course of cross-country flights were above clinical norms, in the absence of linear acceleration other than 1 G or Hypoxia.

The blood pressures obtained correlates with the pilot's estimate of the difficulty of the task at hand.

High blood pressures are frequently seen in the face of normal or near normal pulse and respiratory rates.

Heart rate, respiratory rate and blood pressure responses were highly reproducible in similar in-flight situations in the same individual.

Evaluation of in-flight heart rate response of a subject has meaning only when related to baseline heart rate values for that individual.

From the data available, it appears that sinus tachycardia is the most common and the only significant ECG finding seen regularly in the in-flight situation.

4,246

Roman, J. A., B. H. Warren et al. 1962 SOME OBSERVATIONS ON THE BEHAVIOR OF A VISUAL TARGET AND A VISUAL AFTER-IMAGE DURING PARABOLIC FLIGHT MANEUVERS (School of Aerospace Medicine, Brooks Air Force Base, Tex.) SAM TDR 62-66, June 1962, ASTIA AD-287 083. Same as ASTIA AD-290 353

ABSTRACT: The apparent displacement of a real target and a visual after-image were observed in the F-100F aircraft during periods of weightlessness averaging 45 seconds. A real target appears to be displaced upward from center for accelerations greater than 1 G positive, and appears to be displaced downward for accelerations less than 1 G positive. A visual after-image, when observed in the absence of a real target, appears to be displaced from center in a direction opposite to that observed for a real target. Fixating on a real target (RT) in RT and the VAi concurrently in the fashion described for a real target. Differences in interpretation of results, on the basis of the opposite direction of illusory movements using real targets and visual after-images, were resolved. (Author)

4,247

Roman, P. 1958 SEMI-RIGID ENVELOPE AS A MEANS OF PROTECTION FROM IMPACT (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TR 58-123.

4,248

Roman, J.A., B.H. Warren and A. Graybiel 1963 THE SENSITIVITY TO STIMULATION OF THE SEMICIRCULAR CANALS DURING WEIGHTLESSNESS. (U.S. Naval School of Aviation Medicine, Pensacola, Fla.) SAM/B TDR62 148, Report No. 84, 20 May 1963. ASTIA AD 410 982.

ABSTRACT: The sensitivity to stimulation of the semicircular canals during periods of weightlessness averaging 46 seconds was estimated by timing the duration of apparent rotation of a visual target and of the subjects perception of rotation after stimulation. Stimulation was accomplished by rolling the aircraft during periods of subgravity as well as during 1-G control maneuvers. Time-intensity relationships of the stimulus were obtained by means of specialized instrumentation incorporated into the experimental subject's crash helmet. (Author).

4,249

Roman, J.A., B.H. Warren and A. Graybiel 1963 OBSERVATION OF THE ELEVATOR ILLUSION DURING SUBGRAVITY PRECEDED BY NEGATIVE ACCELERATIONS. (U.S. Naval School of Aviation Medicine, Pensacola, Fla.) Joint Report No. 83, SAM/B TDR62 141, 15 May 1963. ASTIA AD 410 734.

ABSTRACT: By observing apparent displacements of a real target, and visual afterimages, during weightlessness preceded by positive or negative acceleration, it was possible to identify these displacements as a special case of the elevator illusion, as opposed to the oculogravic illusion. Positive and negative linear acceleration, as well as weightlessness, was obtained for this purpose in jet aircraft. (Author)

4,250

Roman, J.A., B.H. Warren & A. Graybiel 1963 OBSERVATION OF THE ELEVATOR ILLUSION DURING SUBGRAVITY PRECEDED BY NEGATIVE ACCELERATIONS
USAF School of Aerospace Medicine, Brooks AFB, Texas SAM-TDR-62-141 February 1963

ABSTRACT: By observing apparent displacements of a real target, and visual afterimages during weightlessness preceded by positive or negative acceleration,

it was possible to identify these displacements as a special case of the "elevator illusion," as opposed to the oculogravic illusion. Positive and negative linear acceleration, as well as weightlessness, was obtained for this purpose in jet aircraft.

4,251

Romba, J. J. & P. Martin 1961 THE PROPAGATION OF AIR SHOCK WAVES ON A BIOPHYSICAL MODEL. (Human Engineering Lab., Aberdeen Proving Ground, Md.) Technical Memo No. 17-61, September 1961. ASTIA Doc. No. AD-264 932.

ABSTRACT: Shock wave characteristics were studied in the field about and within the Rhesus monkey body form. Measurements were obtained in free air, top of the animal's head, the mid-brain and the lower thorax; with distance and position of the explosive varied in relation to the animal's body. The study of shock wave transmission from one body level to another was accomplished and the problem complexity of shock wave energy distribution in the field of the organism was emphasized. Shock wave forms were observed to be uniquely characteristic of the medium through which shock wave transmission occurred. In addition, body tissue was found to greatly attenuate the shock wave. The study of shock wave characteristics in and about biophysical media is believed to be relatively unexplored. (Author)

4,252

Romberg, I. 1939 DAS ANATOMISCHE BILD DER BLUTVERTEILUNG BEI BESCHLEUNIGUNGSWIRKUNG (Anatomical Aspects of Blood Distribution During Acceleration) (Deutsche Versuchsanstalt fur Luftfahrt, E. V., Berlin - Adlershof) Forschungsbericht Nr. 1110, 6 Oct. 1939 ASTIA ATI 66 450.

4,253

Romberg, H.W. 1940 DAS ANATOMISCHE BILD DER BLUTVERTEILUNG BEI BESCHLEUNIGUNG-WIRKUNG (Anatomical Aspects of Blood Distribution During Acceleration) Luftfahrtmedizin 4: 192-203

4,254

Romberg, H.W. 1940 ON THE MODE OF ORIGIN OF SOME FATAL INJURIES IN AIRCRAFT ACCIDENTS. (Uber die Entstehungsweise einiger todlicher Verletzungen bei Flugunfallen) Luftfahrtmed., 5:24-31

ABSTRACT: Sturdy seats and belts are of utmost importance to the safety of fliers. An analysis of crashes has shown that 50% of all injuries, and 80% of fatalities involve the head. Usually the safety factor given for a seat is the ability to withstand 1000 kg.; actually in one crash, the force calculated from deceleration and weight of the flier) was about 1400 kg. The author cites two accidents in which three people were killed. Failure of the seat to withstand the crash threw the victims forward against portions of the cabin. Two died as a result of fractures of the cervical vertebrae; the third suffocated from a fractured larynx.

4,255

Romer, E. M. 1962 VELOCITY REQUIREMENTS FOR TRANSFER BETWEEN CO-PLANAR, CO-AXIAL ORBITS. (AF Inst. of Tech., Wright-Patterson AFB, Ohio) Tech. Rept. No. 62-1, Proj. AFIT 61-23, 5 January 1962. ASTIA Doc. No. AD-269 872.

ABSTRACT: The total velocity requirements for coplanar, cotangential transfer between orbits with a common major diameter are examined. The results are valid for ascending, descending, intersecting, and non-intersecting orbits. Computational results obtained using the AFIR IBM 1620 computer are presented for elliptic, parabolic, and hyperbolic outer orbits as a function of the transfer and outer orbit geometries. For the parabolic outer orbit, the maximum velocity requirement is 18% greater than the escape velocity at the periapsis of the transfer orbit when the transfer orbit has an accentricity of 0.73. For hyperbolic orbits, maximum velocity requirements occur at particular elliptical transfer orbits where the velocities at infinity (i.e., the hyperbolic excess), are less than one third the reference escape velocity. (Author)

4,256

Rona, T. P. 1959 THE ACCELERATION RATE OF ONSET PROBLEM IN SIMPLE LINEAR SYSTEMS. (Air Force Missile Development Ctr., Holloman AFB, N. Mex.) AFMDC TN-59-21; ASTIA AD-219 311; July 1959

ABSTRACT: The experimental evidence that the rate of acceleration onset is one of the critical factors in damage sustained by living organisms is discussed from the viewpoint of applied mechanics. Such evidence is shown to be insufficient

to form a rational basis of design. The effect of rate of acceleration onset is then computed for a few simple models. The strain within these models is easily shown to depend on the first derivation of the acceleration rather than just on acceleration alone. (AUTHOR)

4,257

Rook, A.F. and D.J. Dawson 1938 HYPOTENSION AND FLYING.
Lancet, 2:1503-10

ABSTRACT: In flying tests distant vision was found to be impaired in a number of cases, but occasionally distant vision remained clear, whereas close objects appeared blurred. The most common symptom in flying is known as "blacking out". This varies from a dimming or graying of the whole field of vision to complete blindness, often with no effect on any of the other systems of the body. In one case a central scotma was experienced, and one subject described the loss of only the peripheral field. In most cases the loss of vision was gradual and even throughout the field. One aviator described the effect as similar to the drawing of a blind over the field of vision or to the closing of a diaphragm of a camera.

4,258

Roos, Charles 1958 BIBLIOGRAPHY OF SPACE MEDICINE. PRELIMINARY EDITION (National Library of Medicine, Reference Division, Washington, D.C.)
43 p. March 3, 1958

ABSTRACT: This bibliography, which will be issued in definitive form in mid-summer 1958, covers material related to physiological aspects of space flight from 1950 through early 1958.

4,259

Roos, C. A. 1959 BIBLIOGRAPHY OF SPACE MEDICINE
U. S. Armed Forces Medical Journal 10(2):173-217, Jan.-July 1959
See also (U. S. Dept. of Health, Education, & Welfare, National Library of Medicine, Wash., D. C.) Public Health Service Publication 617, Series 21, June 1958

ABSTRACT: References for this bibliography on space medicine were selected from a number of indexes and catalogs of the National Library of Medicine, and from examination of the principal aviation, aviation medicine, and astronautical pub-

lications. Items are arranged in broad subject classes (general, sealed cabin problems, acceleration/deceleration, fractional and zero gravity, cosmic radiation, survival problems, psychological and social problems, ground crew problems, extraterrestrial aspects and bibliographies) in inverse chronological order alphabetically by author within the years 1928-1958. Brief annotations have occasionally been added.

4,260

Roos, C.A. 1959 BIBLIOGRAPHY OF SPACE MEDICINE
(U.S. Dept. of Health, Education & Welfare, National Library of Medicine, Washington, D.C.) Public Health Service Pub. 617, Series 21, June 1958. See also U.S. Armed Forces Medical Journal 10(2):173-217, Jan-July 1959.

4,261

Root, G. T., & B. H. Christensen 1957 EARLY SURGICAL TREATMENT OF ABDOMINAL INJURIES IN TRAFFIC VICTIM. Surgery, Gynecology & Obstetrics 105(3):264-267, Sept. 1957

SUMMARY: 1) A review of 1,988 records of traffic victims seen at Highland Alameda County Hospital in Oakland, California, in 1955, reveals the regularity in occurrence of accidents month after month predominantly involving the male younger than 30 yrs of age. The manner in which the accident occurred, the subsequent care of the patient, and the type of injury have been presented. 2) Only 2.2 per cent of all patients had any abdominal signs or symptoms. The medical records of these 44 patients with abdominal symptoms were reviewed, with emphasis on the 12 patients who underwent abdominal exploration, 7 of whom lived and 5 of whom died. 3) There were 45 deaths in the entire series and 20 of these, or 44 per cent, were associated with abdominal injuries. In order to combat this high mortality in traffic victims, early thorough abdominal exploration is indicated in patients who have abdominal symptoms which persist or increase in severity, irrespective of the development of signs and symptoms which involve other systems. (AUTHOR)

4,262

Root, D. M. 1958 SELECTION AND DESIGN OF ESCAPE CAPSULES
S.A.E. Journal 66(11):46-50, Part 2.

ABSTRACT: This paper is an analysis of the problems involved in selecting and designing an escape capsule for supersonic aircraft. Five capsules were studied, varying in size from the smallest capsule that could be put within the cockpit to the largest breakaway section of an aircraft that was considered feasible. The limiting dynamic pressures are given for each of the five capsules.

4,263

Rose, B. 1941 PROGRESS REPORT OF THE WORK DONE DURING THE PERIOD OCT. TO DEC. (National Research Council, Canada) C-2103

ABSTRACT: This is a report made on expenditures in the construction and operation of the accelerator.

4,264

Rose, B. 1942 INCIDENCE OF NAUSEA AND DIZZINESS IN 95 SUBJECTS FOLLOWING RUNS IN THE ACCELERATOR (National Research Council, Canada) Report #C-2882, 27 August 1942

ABSTRACT: The incidence of nausea and vertigo in 95 subjects exposed to runs in the human accelerator is listed.

4,265

Rose, B. and W.R. Martin 1942 DETERMINATION OF BLACKOUT THRESHOLD IN AIRCREW TRAINEES, AND FACTORS CONCERNED IN ITS VARIATIONS. Proc. Assoc. Comm. Aviation Med. Research, NRCC, Appendix D, 22 October 1942

4,266

Rose, B., & W. R. Martin 1942 THE DETERMINATION OF THE BLACKOUT THRESHOLD IN AIRCREW TRAINEES, AND FACTORS CONCERNED IN ITS VARIATION. (Canada, National Research Council) Rept. C-2205, No. 4, 25 Sept. 1942

ABSTRACT: Eighty-eight subjects were given at least 10 runs each on the RCAF centrifuge at Toronto
(a) Average blackout threshold was 4 to 6 "g". Range was 3.5 to 9 "g".
(b) Average gray out level was one "g" below the blackout level; the average level of unconsciousness was one "g" above it.
(c) The blackout threshold is inversely related to the time of exposure to "g".
(d) At the blackout threshold, increasing the time of exposure to "g" may prolong blackout without producing unconsciousness.
(e) In any one man, the blackout threshold may vary by plus or minus one "g" in any one day.
(f) Continued exposure to acceleration does not increase the tolerance to "g".
(g) Frequent daily exposure to threshold "g" may reduce the tolerance to "g".

4,267

Rose, B., W.K. Kerr & W.A. Kennedy 1942 THE EFFECTS OF ACCELERATION ON THE PULSE RATE, ELECTROCARDIOGRAM, ELECTROENCEPHALOGRAM, AND THE EAR OPACITY (National Research Council, Canada) 30 Nov. 1942, C-2390

ABSTRACT: Pulse Rate: Acceleration produced an immediate and rapid increase in pulse rate, the duration of which was directly dependent on the time of exposure to maximum G. The highest pulse rate observed was 195. It might take from ten to thirty seconds at maximum G for the pulse to attain its highest rate during lengthy exposures to G. In runs of short duration there was some correlation between the maximum pulse rate attained and the height of the G. A more definite correlation existed when the duration of the exposure to G was 30 seconds more. With the decline of the G during runs of short duration, there was usually a sudden bradycardia. This was almost always to a level which was below that of the original resting level. The bradycardia was usually followed by one or more secondary rises in the pulse rate. Following runs of longer duration (30 sec. or more), the decline in pulse rate was more gradual. There was no characteristic change in the pulse rate with the onset or disappearance of visual symptoms during runs of short duration. During runs of longer duration, symptoms such as greying and blackout might appear or disappear without any alterations in the pulse rate. The rate of increase in pulse rate was not influenced by the height of G. It consequently reached a higher level during these runs as compared to the level reached during runs of low G. The rate of increase of pulse rate during exposure to acceleration was more rapid in subjects with a high blackout threshold. There was no difference between the maximum pulse rate attained by subjects with a high blackout threshold as compared to those whose blackout threshold is low.

4,268

Rose, B., W. K. Kerr, & W. A. Kennedy 1942 THE EFFECTS OF ACCELERATION ON THE PULSE RATE, ELECTROCARDIOGRAM, ELECTROENCEPHALOGRAM, AND THE EAR OPACITY. (RCAF, Toronto) Rept. No. 6, File No. A. H. 100-5; 30 Nov. 1942

ABSTRACT: 72 subjects--690 centrifuge runs. EKGs taken by means of 2 chest electrodes, one to left of apex, one over base of heart 1 inch below sternal notch. EEGs taken by 2 electrodes 2 inches apart transverse to sagittal suture, 1 inch anterior to midpoint between occiput and nasion. Ground electrode on mastoid process. Ear photoelectric cell on upper ear below helix.
Pulse Rate Changes--Preceding run, pulse may be elevated to 90-130 beats per min. (average 95). With onset of acceleration, the rate increases for 4-10 sec. after maximum "g" is attained. If the run is short, it may increase even when "g" decreases. The maximum pulse attained was 195 to 220, followed by bradycarida. During recovery the pulse may rise slowly and evenly or fluctuate wildly. There is no linear correlation between increases in pulse and the amount of "g" at values of "g" less than 3 on 5 second runs. On longer runs, G = K pulse. On reparted runs, pulse response is usually identical except for recovery period. There is no apparent relation between the pulse response and the severity of symptoms. There is no relation between the maximum pulse response and "g" tolerance. However, the average rate of increase of pulse correlates with a high "g" threshold.

EKG Responses--As the heart rate increases, the PR interval decreases from 0.07 to 0.06 sec. The P wave is frequently superimposed on the T wave, may be biphasic, notched or absent. The QRS complex diminishes in amplitude and the main deflection is down. QRS diminishes in duration with "g" and becomes normal as "g" is removed. Right axis deviation occurs, the electrical axis shifting from 90 degrees at the beginning of the run to a maximum of 150 degrees at the height of "g". It returns to normal suddenly.
The gradient of the ST segment disappears. It is isolectric at height of "g" and overcompensated on recovery. The T wave diminishes in amplitude or disappears altogether. It returns to normal very rapidly, often in a biphasic form. Following exposure, sinus arrhythmia is very common as is an increase in the amplitude of the T wave. Rare complications are ventricular extra systoles and lengthened PR interval with or without heart block. No permanent changes have been observed.
Ear Opacity--387 observations on 40 subjects. Opacity begins to decrease at 2 to 3 "g" and continues to decrease until just after "g" decreases. Following this, reactive hyperemia occurs for 5 to 15 seconds. Ear opacity decreases inversely with "g". It is not related to duration of "g". Reactive hyperemia lasts longer after long runs. On repeated runs to just below threshold, ear reactions are the same. Visual symptoms follow ear reactions approximately.
EEG Reactions--530 runs on 62 subjects. A muscle filter is used to take out frequencies of more than 30/sec. Readings are taken from motor areas. Most

Most frequent change in EEG is 16 to 26/sec. waves of 10 to 50 microvolts, probably muscular in origin. These waves last for the duration of the run. Sometimes high, slow (60 to 90 micro-volt, 2 to 6/sec.) waves appear during deep blackout. 5 to 14/sec., 30 to 90 micro-volt waves appear early in the run unaccompanied by symptoms in rare cases, and diminish before the maximum "g" is attained. The origin of these is unknown.
When consciousness is lost, 1.6 to 6/sec., 50 to 180 micro-volt waves usually appear at about the time consciousness is lost or 1 to 2 seconds before. In all probability they are due to cerebral anoxia. The EEG may remain normal for the entire run, even through consciousness is lost. Convulsive seizures occur in 69% of those who lose consciousness and are not accompanied by seizure discharges. Instead slow high waves of unconsciousness remain unchanged.
EEGs taken without muscle filters show the same pattern. In no case have grand mal or petit mal patterns been seen, nor have large random spikes been observed.
Discussion---It is concluded that no physiological measurements are of as much value as the simple signal system. Pulse increases compensate for the blood pressure drop. In those with rapid response, hydrostatic pressures determines the blackout threshold. In those with slow response, the pooling of blood is the limiting factor.

4,269

Rose, B. W., W. K. Kerr, & W. A. Kennedy 1942 THE AVERAGE BLACKOUT THRESHOLD IN AIRCREW TRAINEES AS DETERMINED BY MEANS OF THE CENTRIFUGE. (Canada, National Research Council) Rept. No. C-2393, 14 Dec. 1942

ABSTRACT: One hundred and twenty-four normal, physically fit aircrewmen were studied in upright position on 1568 centrifuge runs, usually of 25 seconds duration with 5 seconds exposure to maximum "g". Occasional runs were performed with up to 30 seconds exposure to maximum "g". Blackout threshold ranged from 2.5 to 9 "g".

Percent of Subjects	Vision Clear at
100	2 "g"
80	4 "g"
20	6 "g"
2 to 3	9 "g"

Slightly higher values of "g" can be withstood by all subjects with 2 seconds maximum exposure.

4,270

Rose, B. and A.J. Cipriani 1942 METHODS OF RECORDING AND APPARATUS USED IN THE CENTRIFUGE AT NO. 1 INITIAL TRAINING SCHOOL. Canadian Aviation Report #120, 4 November 1942

4,271

Rose, B. & A.J. Cipriani 1942 METHODS OF RECORDING AND APPARATUS USED IN THE CENTRIFUGE AT NO. 1 INITIAL TRAINING SCHOOL. (National Research Council, Canada) C2232, 4 Nov. 1942.
NOTE: CARI P&S 2.15 r; 2.2rc.

ABSTRACT: The purpose of this report is to describe tha apparatus and methods of recording in use at present in the Accelerator. A three channel electro-encephalograph was installed by means of which records may be taken during rotation of the Accelerator. The records include: electroencephalograph, electrocardiograph and ear capacity. The original signal system has been adapted to record on the same chart as the electroencephalograph channels.

4,272

Rose, B. 1942 ACCELERATOR RESEARCH
(National Research Council, Canada) C-2104, Jan. 30, 1942.

ABSTRACT: This is a preliminary report on the progress made on accelerator research and is concerned with only the installation of equipment and preliminary tests. It is recommended that groups of twenty airmen be made available for investigation of "blackout threshold".

4,273

Rose, B. 1942 REPORT OF THE MEETING ON ACCELERATION HELD AT THE NATIONAL ACADEMY IN WASHINGTON, D.C. APRIL 20, 1942.
(National Research Council, Canada) C-2143

ABSTRACT: The reports given at this meeting included one by Dr. Rose describing the accelerator in Toronto, Dr. Jasper on centrifuge experiments with cats and monkeys describing the effects of "G" on the circulation and the electrical activity of the brain and the effects of protecting animals by immersing them in a water-bottle, Lieutenant Ferwerda of the U.S. Navy on an air suit tested on the accelerator in Toronto, Dr. Britton on animal experiments done on centrifuge at the University of Virginia and Dr. Ham on an apparatus for measuring circulatory changes during flight.

4,274

Rose, B. & W.R. Martin 1942 REPORT ON THE VISIT OF LIEUTENANT T. FERWERDA, U.S. NAVAL AIR STATION, ANACOSTIA, D.C., TO THE ACCELERATOR HUT, NO. 1 C.I.U. MARCH 25, TO APRIL 13, 1942 FOR THE PURPOSE OF TESTING ANTI-G SUIT.
(National Research Council, Canada) C-2172

ABSTRACT: This suit consists of an inextensible outer covering, and a series of air-sacs which are activated by air pressure. The air pressure is regulated by a sylphon valve which alters the flow according to the degree of acceleration or "G". Since a definite degree of protection is afforded by the Ferwerda suit in its present state, and since it is easily put on and does not hamper movement, it is felt that such a suit could be of very definite value.

4,275

Rose, B. & A.J. Cipriani 1942 METHODS OF RECORDING AND APPARATUS USED IN THE CENTRIFUGE AT NO. 1 INITIAL TRAINING SCHOOL. Proc. Exec. Assoc. Comm. Aviation Med. Research, NRCC, Appendix F, Dec 3, 1942.

4,276

Rose, B. 1942 REPORT OF THE SECOND MEETING OF THE SUB-COMMITTEE ON ACCELERATION HELD AT WASHINGTON ON DECEMBER 2, 1942 (National Research Council, Canada) C-2247

ABSTRACT: Reports presented at this meeting include: (1) Report by Lieutenant Commander Ferwerda on Service tests of anti-G equipment at Cecil Field, Jacksonville, Florida, U.S.A. (2) Production aspects: Mr. Berger of the Ellsworth Manufacturing Company; (3) Report by Dr. Ham supplementary to that of Lieutenant Ferwerda; (4) Reports of work in progress at the centrifuge in Toronto and Mayo Clinic and in New Haven.

4,277

Rose, B. 1942 REPORT OF THE MEETING ON ACCELERATION HELD AT THE ACADEMY OF SCIENCES IN WASHINGTON, D.C. ON SEPTEMBER 28, 1942. (National Research Council, Canada) C-2264.

ABSTRACT: Reports presented at this meeting include: (1) B.Rose on centrifuge work at Toronto; (2) George Ham on portable ear opacity apparatus; (3) H.H. Jasper on animal centrifuge work; (4) J. Reach on the progress in construction of centrifuge at Wright Field;(5) T. Ferwerda on the pulsating anti G-suit; (6) Dr. Baldes on the Mayo Clinic centrifuge.

4,278

Rose, B. 1942 REPORT ON ACCELEROMETERS USED TO COMPUTE VALUES OF "G" IN THE ACCELERATOR CAR. (National Research Council, Canada) C-2147, May 20, 1942.

ABSTRACT: Two accelerometers have been used to measure acceleration in the accelerator, namely, the Kolsman Accelerometer (model 312-01-194) and the Pioneer (type #3402-1A-A-174) the former is calibrated with and the latter without the acceleration of gravity.

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Rose, B. 1942 DESCRIPTION OF THE HUMAN CENTRIFUGE AT NO. 1 INITIAL TRAINING SCHOOL, R.C.A.F., EGLINTON. (National Research Council, Canada) C-2145, April 16, 1942.

ABSTRACT: A detailed description of the human centrifuge, its control mechanism, the method of conducting runs and type of records obtained is given. The incidence of nausea and vertigo is discussed.

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Rose, B. & W.R. Martin 1942 ON THE OCCURRENCE OF CONVULSIVE EPISODES FOLLOWING LOSS OF CONSCIOUSNESS AS A RESULT OF EXPOSURE TO ACCELERATION. (National Research Council, Canada) C-2144, 28 April 1942.

ABSTRACT: In a study on blackout threshold in a group of 29 airmen, all potential aircrew, convulsive seizures varying from minor episodal tremors to a complete seizure involving the whole body have been observed. These episodes have been noted in particular individuals only. They come on only if unconsciousness has been produced by the acceleration, and appear to be pattern-like for each individual.

There appears to be some correlation between the susceptibility of subject to these seizures and the presence of episodal activity in the resting electroencephalogram. The importance of this finding is discussed from a tactical point of view.

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Rose, B., W.K. Kerr, & W.A. Kennedy 1943 AVERAGE BLACKOUT THRESHOLD IN AIRCREW TRAINEES AS DETERMINED BY MEANS OF THE CENTRIFUGE. Proc. Assoc. Comm. Aviation Med. Research, NRCC, Appendix L, p. 8, Feb. 1943

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Rose, B., W.R. Kerr & W.A. Kennedy 1943 EFFECTS OF ACCELERATION ON THE PULSE RATE, ELECTROCARDIOGRAM, ELECTRO-ENCEPHALOGRAM, AND EAR OPACITY. Proc. Assoc. Comm. Aviation Med. Research, NRCC, Appendix J, 27 Feb. 1943

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Rose, B., & Accelerator Section Staff 1943 THE PROTECTION AGAINST G AFFORDED BY THE CANADIAN PROTOTYPE FRANKS FLYING SUIT AS ESTIMATED BY TESTS MADE IN THE CENTRIFUGE. (Rept. to Associate Committee on Aviation Medical Research, Nat'l. Research Council of Canada) NRC Grant No. AM5 Rept. No. 9, File No. A.H. 100-5, 1 Sept. 1943.

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Rose, B., & W.K. Stewart 1944 REVIEW OF THE PRACTICABILITY OF AND NECESSITY FOR ANTI-G DEVICES IN THE RAF WITh PARTICULAR REFERENCE TO THE FRANKS' FLYING SUIT MK. III. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 584, July 1944.

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Rose, B. 1944 PROTECTION AGAINST G AFFORDED BY THE CANADIAN PROTOTYPE FRANKS FLYING SUIT AS ESTIMATED BY TESTS MADE IN THE CENTRIFUGE. Proc. Assoc. Comm. Aviation Med. Research, NRCC, Appendix X, 29 Sept. 1944.

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Rose, H. W., and P. H. Ripple 1951 VISUAL PROBLEMS OF PILOT IN PRONE POSITION
(USAF School Av. Med. Randolph Field, Texas) Proj. No. 21-24-011, Report No. 1, August 1951.

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Rose, D. C. 1960 SPACE SCIENCE ORGANIZATIONS AND THE SCOPE OF PLANNED PROGRAMMES. The J. of the Royal Astronomical Society of Canada 54(5):201-207, Oct. 1960

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Rose, Peter H. 1963 RESEARCH IN THE ENTRY PROBLEMS OF INTERPLANETARY EXPLORATION
Paper: American Astronautical Society Symposium on the Exploration of Mars, Denver, Colorado, June 6-7, 1963. Preprint (10)

ABSTRACT: A brief discussion of the entry problems peculiar to interplanetary travel is given. The desirability of high velocity entry into both the planetary atmospheres and back at Earth is pointed out. Aspects of entry contributing to the severity of the heating problem are discussed. Research in re-entry physics has always been paced by our ability to simulate the entry environment in the laboratory. Several new experimental techniques have been developed which are capable of producing the proper conditions for study. Recent investigations into the convective and radiative energy transport in ionized gases are discussed. Convective heating has been measured up to velocities of 55,000 ft/sec and the radiative properties of air are known up to about 10,000°K. The present uncertainties in this knowledge are discussed. A number of new problems which need to be faced in planetary entry are enumerated. Most of these problems are due to the coupling of the radiative energy transfer and the other aspects of the flow problem. The conditions under which these problems become significant are estimated.

4,289

Rosen, M. W. 1953 A DOWN-TO-EARTH VIEW OF SPACE FLIGHT.
Journal Brit. Interplanetary Soc., 12: 26-32.

Abstract: Manned flight has been accomplished to an altitude of 15 miles in a Douglas Skyrocket. Feasibility of manned flight between 15 and 50 miles has been demonstrated by instruments on recovered WAC Corporal rockets and sections from Aerobees ejected by parachute from an altitude of 50 miles. Accelerations encountered in the powered ascent to this altitude are within the limits of human tolerance. Temperatures on the surface of the vehicle rising to 50 miles are within the scope of our technology. Problems encountered in long flights at this altitude, such as radiation, meteor collisions, and free fall in a vacuum, cannot be adequately explored at this time because of the short flying time of manned rockets utilizing our present capabilities. The space above 50 miles presents even greater difficulties. Attempts of parachute recovery have not been successful. Accelerations of rockets which reach the heights above 50 miles may be beyond human tolerance. Temperatures encountered under such acceleration could also be beyond our present methods of control for any occupant of the rocket. The effects of cosmic and solar radiation are very little understood above 50 miles.

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Rosenblat, V. V. and L. S. Dombrovskii 1961 REMOTE RECORDING BY RADIO OF THE RATE OF HEART CONTRACTIONS IN FREELY MOVING HUMAN SUBJECTS L. M. Sechenov Physiol. J. USSR, June, pp. 718-724. Translation (Space Technology Laboratories, Inc., Los Angeles, California) STL-TR-61-5110-43. ASTIA AD 264072.

ABSTRACT: A detailed report on the radiopulsophone - a device which will record remotely by radio the rate of heart contractions of a man moving freely and performing his usual functions.

4,291

Rosenfeld, S. and C. F. Lombard 1949 THE COMPARATIVE PHYSIOLOGY OF THE CARDIOVASCULAR PRESSOR REFLEX MECHANISM UNDER HEAD-TO-TAIL ACCELERATION (Negative G). (University of Southern Calif., School of Medicine, Los Angeles) Contract N60ri77, Project NR 161-014, October 1949.

See also Fed. Proc., Vol. 9, 1950.

ABSTRACT: As a guide to choice of experimental animals useful in predicting the effects of negative G in man, studies were made of the comparative physiology of the cardiovascular pressor reflex mechanism in 4 species of animals. These animals were subjected to various degrees of head-to-tail acceleration on the human centrifuge. Studies of 28 experiments including 10 goats, 10 dogs, 5 monkeys, and 3 rabbits indicate that the monkey and the dog respond in a manner which most closely parallels the reflex cardiovascular response elicited by man during negative G. The goat does not simulate this response pattern.

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Rosenfeld, Sheldon and Charles F. Lombard 1950 CARDIOVASCULAR PRESSOR REFLEX MECHANISM AND CEREBRAL CIRCULATION UNDER NEGATIVE G HEAD-TO-TAIL ACCELERATION. J. Aviat. Med. 21(4):293-303,354.

SUMMARY: Studies of the effect of negative acceleration upon four species of animals indicate that certain species are not suitable for considerations relative to man.

Studies of 28 experiments including 10 goats, 10 dogs, 5 monkeys and 3 rabbits, and compared with data available for man, indicate that the monkey and the dog respond in a manner which most closely parallels the reflex cardiovascular response elicited by man during negative g. The

goat does not simulate this response pattern. The major changes to cephalic circulation during negative acceleration, as measured from the carotid artery and external jugular vein connected to Statham strain guages at the level of the brain, include the following:

At the onset of radial acceleration the arteriovenous pressure difference in man, monkey and goat is slightly increased, but in the dog slightly decreased. During radial acceleration of 15-second duration the arteriovenous pressure difference diminishes gradually in man (30 per cent), monkey (12 per cent), and dog (65 per cent), but increases in the goat (65 per cent), and is associated with a bradycardia of various degrees. At the termination of radial acceleration within 1 to 4 seconds the arteriovenous pressure difference drops markedly in man (65 per cent), monkey (40 per cent), dog (60 per cent), and drops to the normal pre-run level in the goat.

It is believed that at the termination of acceleration the animal or subject experiences the most harmful insult to cerebral circulation. Factors which tend to maintain minute cardiac output, as well as factors preventing generalized vasodilation should be investigated for possibilities of offering greater tolerance to negative acceleration.

Finally, it seems likely that the symptoms experienced by pilots exposed to negative g may be attributed to two phenomena: (1) the increase in intravascular and extravascular caphalic pressure, and (2) the stagnation of cerebral flow. The former produces the feeling of extreme fullness of the head, while the latter is probably responsible for factors of mental confusion, fainting and unconsciousness. However, the possibility of a central type of syncope from stimulation of the carotid sinus cannot be overlooked. Ferris, Capps, and Weiss have demonstrated the cerebral type of syncope in patients with hypersensitive carotid sinuses in which no detectable alteration of the cardiovascular system could be found.

4,293

Rosen, M. W., & F. C. Schwenk 1959 **NOVA - A MANNED LUNAR ROCKET** Astronautics 4(9):20-23, Sept. 1959

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Rosenfeld, S., and C.F. Lombard 1951 CARDIOVASCULAR PRESSOR REFLEX MECHANISM AND CEREBRAL CIRCULATION UNDER NEGATIVE G HEAD-TO-TAIL ACCELERATION. (University of Southern Calif., School of Medicine, Los Angeles) Contract N6ori77, Task 1, 31 March 1951
See also J. Avia. Med., 21:293, August 1950

ABSTRACT: Studies of the effect of negative acceleration upon four species of animals indicate that certain species are not suitable for considerations relative to man.

Studies of twenty-eight experiments including ten goats, ten dogs, five monkeys and three rabbits, and compared with data available for man, indicate that the monkey and the dog respond in a manner which most closely parrallels the reflex cardiovascular response elicited by man during negative g. The goat does not simulate this response pattern. The major changes to cephalic circulation during negative acceleration, as measured from the carotid artery and external jugular vein connected to Statham strain gauges at the level of the brain, are reported in this publication.

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Ross, E. L., & A. Olsen 1933 EFFECT OF DESTRUCTION OF ONE LABYRINTH ON REACTIONS AND ROTATION. Arch. Otolaryngol. 17:684-692

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Ross, J. C., G. D. Ley et al 1962 INFLUENCE OF PRESSURE SUIT INFLATION ON PULMONARY DIFFUSING CAPACITY IN MAN.
In J. Appl. Physiol. 17:259-262, March 1962.

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Ross, J. M. 1941 HEMORRHAGE INTO THE LUNGS IN CASES OF DEATH DUE TO TRAUMA.
Brit. Med. J. 1:79, 18 Jan. 1941.

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Rosman, R.R. 1960 THE TILTING CHAIR --TILTING ROD TASK: A METHODOLOGICAL NOTE
Percept. Mot. Skills. 10:9-10

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Rossanigo, F. & G. Meineri 1961 [BEHAVIOR OF SOME RESPIRATORY MEASUREMENTS IN PERSONS SUBJECTED TO ACCELERATION ALONG DIFFERENT BODY AXES.] Rev. Med. Aero (Paris) 2:34-39, Dec. 1961 (Fr)

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Rossanigo, F., & G. Meineri 1961 COMPORTAMENTO DI ALCUNE GRANDEZZE RESPIRATORIE IN SOGGETTI SOTTOPOSTI AD ACCELERAZIONI SECONDO DIVERSI ASSI CORPOREI (BEHAVIOR OF SOME RESPIRATORY VALUES IN SUBJECTS EXPOSED TO ACCELERATIONS ALONG DIFFERENT BODY AXES). Rivista di medicina aeronautica e spaziale (Roma) 24(4):485-500, Oct.-Dec. 1961

ABSTRACT: Eight normal men, averaging 28 years of age, were exposed to head-foot and chest-back accelerations on the human centrifuge. The time for each test was approximately 60 seconds, the desired level of acceleration being reached in 4 seconds. Deceleration time was prolonged proportionally to the multiples of g chosen for each given test in order to avoid labyrinthine disturbances. There was observed an increase in pulmonary ventilation proportional to acceleration values and corresponding variations of alveolar gas tension. Slight concurrent variations of vital capacity and inspiratory and expiratory reserve volumes were found, presumably of mechanical origin. More evident and significant phenomena were induced by positive acceleration.

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Rossanigo, F., & G. Meineri 1961 COMPORTAMENTO DI ALCUNE GRANDEZZE RESPIRATORIE IN SOGGETTI SOTTOPOSTI AD ACCELERAZIONI SECONDO DIVERSI ASSI CORPOREI (BEHAVIOR OF SOME RESPIRATORY VALUES IN SUBJECTS EXPOSED TO ACCELERATIONS ALONG DIFFERENT BODY AXES.) Rivista di medicina aeronautica e spaziale (Roma) 24(4):485-500, Oct.-Dec. 1961

ABSTRACT: Eight normal men, averaging 28 years of age, were exposed to head-foot and chest-back accelerations on the human centrifuge. The time for each test was approximately 60 seconds, the desired level of acceleration being reached in 4 seconds. Deceleration time was prolonged proportionally to the multiple of g chosen for each given test in order to avoid labyrinthine disturbances. There was observed an increase in pulmonary ventilation proportional to acceleration values and corresponding variations of alveolar gas tension. Slight concurrent variations of vital capacity and inspiratory and expiratory reserve volumes were found presumably of mechanical origin. More evident and significant phenomena were induced by positive acceleration. (J. Aerospace Medicine 33(8):1036, Aug. 1962)

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Rossbach, L.J. 1959 DEVELOPMENT OF A PHYSIOLOGICAL PRESSURE TRANSDUCER SYSTEM FOR RECORDING UNDER SEVERE ACCELERATIVE OR DECELERATIVE FORCES. (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: This is a report of the design and fabrication of a physiologic pressure transducer system for recording under severe accelerative or decelerative forces. The present system specifications include recording the equivalent of zero to 50 cm. Hg. with less than ± 3 per cent error full-scale, with a response time of 0.001 sec., under accelerations or decelerations of up to 200 G. The transducer itself is a small, blunt nosed, closed cylinder capable of being introduced into the heart of a small dog through the carotid artery. Its design combines evaporation deposition techniques with strain gage principles to reduce to a negligible value the effects of environmental acceleration inputs. The transducer output is amplified and reproduced on a recording oscillograph. Thus, the intralumen transducer system has a very high natural frequency is capable of operation under severe environmental acceleration inputs. The transducer output is amplified and reproduced on a recording oscillograph. Thus, the intralumen transducer system has a very high natural frequency, is capable of operation under severe environmental conditions, and is free of motion artefacts generally produced by pressure generated within the catheter due to accelerations of the contained column of fluid in standard manometer-catheter systems. (J. Aviation Med. 30(3):200, March 1959)

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Rossen, R., H. Kabat, & J. P. Anderson 1943 ACUTE ARREST OF CEREBRAL CIRCULATION IN MAN. Arch. Neurol. & Psychiat. 50:510-528

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Rossle, R. 1950 PATHOLOGY OF BLAST EFFECTS. In German Aviation Medicine, World War II, (Washington, D.C.: Government Printing Office, 1950) pp. 1260-1273

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Roth, E.M. 1955 MEDICAL ASPECTS OF TRAVEL IN OUTER SPACE Harvard Med. Alumni Bull. 20(4): 10-13, July 1955

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Roth, H. P. 1949 ACCELERATION - TIME - VELOCITY DISTANCE CHART (University of California, Los Angeles) 18 Aug. 1949

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Roth, H. P. 1952 PHYSICAL FACTORS INVOLVED IN HEAD-ON COLLISIONS OF AUTOMOBILES (Institute of Transportation & Traffic Engineering, Los Angeles, Calif.) ITTE Reprint No. 18, pp. 349-356

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Roth, H.P. 1953 IMPACT AND DYNAMIC RESPONSE OF THE BODY. In H. Haber ed., Symposium on Frontiers of Man-Controlled Flight (Los Angeles: The Instit. of Trans. and Traffic Engineering, Univ. of Calif.)

ABSTRACT: The general effects on the body of impacts of varying degrees of seve are fairly well known. Impacts of low order produce effects generally limited to discomfort; if somewhat more severe: pain. If they are still more severe, actual damage to body structure and interference with function may occur. Damage may range from that which is slight and repairable, to complete disintegration. However, interference with function may cause death with little discoverable evidence of its mechanism of operation.

4,309

Roth, H., C.F. Lombard, A.G.Gross & A.Z. Klain 1948 STUDIES OF NEW MATERIALS FOR CONTROLLED IMPACT ENERGY ABSORPTION. (Paper, nineteenth annual meeting of the Aero-Medical Association, Toronto, Canada, June 1948) Department of Aviation Medicine, University of Southern California Contract N6ori77, Task 1, 31 March 1951.

ABSTRACT: Utilizing newly developed impact-test apparatus enabling greatly improved resolution of force-time relations during impacts, preliminary studies were made of various materials which might find application in the protection of the human body (especially the head) against impact forces. Both theoretical analysis and experimental results demonstrated that low-density materials exhibiting largely non-resilient behavior under impact forces have definite value in design of protective equipment.

4,310

Roegner, H. F. 1960 CRASH INJURY EVALUATION: SUMMARY EVALUATION OF U. S. ARMY HU-1A BELL IROQUOIS HELICOPTER. (Aviation Crash Injury Research, Phoenix, Arizona) AvCIR 15-PR-126, TREC Tech. Rept. No. 60-73, December 30, 1960

ABSTRACT: This report reviews and discusses findings, conclusions, and recommendations forthcoming from the three evaluations and the five accident investigations. The purpose of the evaluations and investigations is to: (1) Evaluate the over-all crashworthiness of the basic aircraft structure; (2) Draw attention to all features which could either lead to or prevent unnecessary exposure of crew members and passengers to serious or fatal injury in accidents where crash forces are within survivable limits; (3) Make recommendations for remedial action in areas where deficiencies exist or are believed to exist in order to improve the crash safety aspects of the aircraft; and (4) Note the existence of effective crash safety features.

4,311

Roegner, H. F. & J. Carroll 1960 CRASH INJURY INVESTIGATION: U. S. ARMY HU-1A BELL IROQUOIS HELICOPTER ACCIDENT, FORT CARSON, COLORADO, 9 JUNE 1960. (Aviation Crash Injury Research, Phoenix, Arizona) AvCIR 12-PR-122, TREC Tech. Rept. 60-72, December 1960.

SUMMARY: This investigation revealed that the injuries experienced by the occupants resulted from vertical deceleration, failure of the troop seat, and failure of the transmission support, permitting displacement of the transmission into the cabin of the aircraft through the rear bulkhead. The side and the rear roof support members failed in this accident in a manner almost identical to failures of these parts experienced in other HU-1A helicopter accidents. The accident also revealed the excellent energy absorption characteristics of the skid landing gear and the crew seat cushion.

4,312

Roth, H. P., C. F. Lombard, A. G. Gross and A. Z. Klain 1951 STUDIES OF NEW MATERIALS FOR CONTROLLED IMPACT ENERGY ABSORPTION
(Office of Naval Research, Washington, D. C.)
March 1951 Contract N6ori77

SUMMARY: Utilizing newly developed impact-test apparatus enabling greatly improved resolution of force-time relations during impacts, preliminary studies were made of various materials which might find application in the protection of the human body (especially the head) against impact forces. Both theoretical analysis and experimental results demonstrated that low-density materials exhibiting largely non-resilient behavior under impact forces have definite value in design of protective equipment.

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Roth, H. P., C. F. Lombard, A. G. Gross, A. Z. Klain & S. W. Ames 1949 IMPACT ACCELERATION OF THE HUMAN HEAD USING PROTECTIVE HEADGEAR. (Dept. of Aviation Med., University of S. Calif., School of Medicine, Los Angeles, Calif.) Contract Noori77, Project NR161-014; March 18, 1949. ASTIA ATI 209 401

ABSTRACT: The immediate purpose of this preliminary series of tests was to determine the physical characteristics of tolerable impacts below the concussion level and to find out what correlation there might be between instrumental measurements obtained during impact blows and the subjective sensations of persons wearing various protective headgear.

The following conclusions have been reached as a result of this preliminary test program:

1. When wearing a suitable protective headgear, the human head can tolerate, without concussive symptoms, impacts with a delivered kinetic energy of 8.7 foot-pounds, at a velocity of 6.5 feet per second.

2. G-tolerance of the human head appears to vary with the site of impact, and probably lies within the range of approximately 15 to 40 "G".

3. Physical measurement of energy factors in impact situations correlates well with the subjective sensations of test subjects wearing protective headgear.

4. Although acceleration of the head itself may be inferred from study of the data from the present instrumental setup, even more significant data should result from use within helmets of a simulated head, equipped with its own accelerometer and with pressure pickups distributed over the area on which a helmet might bear.

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Roth, J. G., S. I. Cohen, A. J. Silverman, G. E. Johnson, et al. 1958 BIOELECTRIC MEASURES DURING FLIGHT. A PRELIMINARY REPORT. J. Avia. Med. 29(2):139-144, Feb. 1958

ABSTRACT: Preliminary experiments were conducted to determine the feasibility of in-flight bioelectric measurements. A JC-131B (Convair) aircraft was modified to permit the installation of a Galvanic Skin Response apparatus, an Electroencephelograph, and a pen and ink oscillograph. Although the components were too large for operational bombers and fighters, it was hoped that the design of smaller components would be aided by the results of this experiment. It is believed that bioelectric measures will provide greater insight into the stresses and requirements for successful operation of high performance aircraft.

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Rothert, G. D., Jr., B. Y. Creer, & J. G. Douvillier, Jr. 1959 USE OF FLIGHT SIMULATORS FOR PILOT-CONTROL PROBLEMS. (National Aeronautics & Space Administration, Washington, D. C.) NASA Memo 3-6-59A

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Rothman, M. I. 1954 TECHNICAL NOTES ON SLERAN (Holloman Air Development Ctr., Holloman AFB, N. Mex.) HADC TN 54-2, Feb. 1954

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Rothman, Max I. 1958 RESULTS OF ACCELEROMETER SHAKER TESTS (Air Force Missile Development Ctr., Holloman AFB, N. Mex.) Rept. AFMDC TN-58-13; ASTIA AD-154 102; Aug. 1958

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Rowe, D.E., J. L. Day, and L.H. Witbeck 1959 THE NOLC ROCKET SLED AS A SUPERSONIC ENVIRONMENT SIMULATOR (Naval Ordnance Lab., Corona, Calif.) NOLC rept. no. 468; NAVORD rept. no. 5967; 27 August 1959, ASTIA AD-229 429

ABSTRACT: The NOLC Rocket Sled was designed and built by the Naval Ordnance Laboratory Corona as a research test vehicle for use on the Supersonic Naval Ordnance Research Track (SNORT) at the Naval Ordnance Test Station, China Lake, Calif. It provides NOLC with a reliable means for the supersonic environment testing of guided missile components and ordnance items during their development and evaluation stages. It is believed that the design ideas incorporated in the sled can be adapted to the needs of other activities interested in building test vehicles for similar purposes. (Author)

4,319

Rowen, B. 1959 AEROMEDICAL SUPPORT OF THE X-15 PROGRAM. (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: For approximately ten years aeronautical engineers have been recording in-flight data from instrumented aircraft on ground read-out indicators through telemetry. During the flight phase of a research aircraft such as the X-2, the pilot's physiologic status was not recorded during flight. During the flight phase of the X-15 aircraft, physiologic data will be telemetered so that a flight surgeon observing the ground read-out can tell when the pilot is approaching the limit of his physiological tolerance. This will quantitatively identify the most stressful portion of a particular mission profile. Items usch as (1) cockpit and suit pressure differential (2) helmet

and suit pressure differential. (3) pilot's body surface temperatures, monitored during flight by a flight surgeon at the ground receiving station. The over-all objective is to obtain in-flight quantitative physiologic data, and to provide information of the man's ability to perform while under stress. Such data will provide future design criteria for the machine which will include the man as a useful component in the system. (J. Aviation Med. 30(3):200, March 1959)

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Rowen, B. 1959 HUMAN FACTORS SUPPORT OF THE X-15 PROGRAM. (presented April 27, 1959, at the 30th annual meeting of the Aero Med. Assoc., Los Angeles, Calif.) Aerospace Medicine, 30(11):816-820, November 1959

Abstract: The X-15 research program is being conducted as a national effort by the National Aeronautics and Space Administration (NASA), the United States Air Force, and United States Navy. Primary research interest is to obtain (1) knowledge of actual flight conditions beyond the earth's atmosphere; (2) determination of aerodynamic heating, heat transfer rates, and their effects on aircraft structure, and (3) quantitative physiological data during actual flight; additional research objectives include (4) knowledge of missions involving exit from and re-entry into the earth's atmosphere, and (5) man's reaction to space flight.

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Rowen, B. 1961 DYNA-SOAR PILOT TRAINING. Lectures in Aerospace Medicine 16-20 January 1961. (Conducted at the School of Aviation Medicine, Brooks AFB, Texas)

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Royal Aircraft Establishment 1953 PARACHUTE TESTS IN AFRICA (Autumn, 1952) (Royal Aircraft Establishment, Farnborough) Interim Rept., M. E. Dept. Test Note.

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Royal Australian Air Force 1944 MINUTES OF THE FIRST MEETING OF THE ACCELERATION SECTION OF NO. 2 FLYING PERSONNEL RESEARCH UNIT HELD AT THE OLD MEDICAL SCHOOL, SYDNEY UNIVERSITY, ON 29TH MARCH 1944 AT 2 P.M. (Royal Australian Air Force, Flying Personnel Research Committee) F.R. 78; 29 March 1944; ATI-156 761

4,324

Royal Canadian Air Force 1956 AEROMEDICAL HANDBOOK FOR AIRCREW. (Royal Canadian Air Force) Rept. No. AFA 69

ABSTRACT: This is a handbook designed to provide the aircrew with a better understanding of the human factors concerned in present-day flying. Included are chapters titled (1) physiology; (2) flying fitness; (3) physics of the atmosphere; (4) anoxia; (5) hyperventilation; (6) methods of increasing oxygen supply to the body; (7) oxygen equipment and its use; (8) standard diluter-demand system; (9) oxygen pressure-demand system and mask; (10) removal of oxygen mask at altitude; (11) decompression sickness; (12) effects of flight on the ears and sinuses; (13) expansion of gas in the abdomen; (14) effects of heat, cold, and noise; (15) explosive decompression; (16) vision; (17) care of personal equipment; (18) acceleration or g; (19) orientation and (20) physiological aspects of escape from aircraft.

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Rozenblyum, D. Ye 1939 THE EFFECT OF ACCELERATION ON THE ORGANISM. Military Sanitation Voyenno-Sanitarnoye delo 1:4-11

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Rozenblyum, D. 1959 PERED POLETOM CHELOVEKA V KOSMOS (Prior to the Flight of Man into Outer Space)
Meditsinskii Rabotnik (Moskva), 38 (1786): 2, May 12, 1959
See also: "Prior to Sending a Man In Outer Space Ships" Central Intelligence Agency Scient. Inform. Rep., Sept. 18, 1959, pp. 46-50. (PB 131891T30)

ABSTRACT: In any manned flight into space in a hermetically sealed cabin an artifically maintained microclimate is required. The selection of a system of air regeneration will present relatively few difficulties, since as early as the late 1930's four Soviet scientists successfully endured a period of 100 hours in a sealed cabin with a simulated environment. The inadequacy and unreliability of the sensory organs due to high speed, radial acceleration,

and weightlessness will require automatic devices for navigation and piloting. Prolonged transverse accelerations are well tolerated. The observation of animals in rocket flights and of Laika in Sputnik shows that respiration and circulation are not substantially distrubed by the weightless state. It is supposed that the initial symptoms of vertigo, disruption of fine motor coordination, and illusions disappear as the organism becomes adjusted to weightlessness. Meteors and short-wave untraviolet radiation are not regarded as serious threats. Information on the intensity of cosmic radiation obtained from the Sputniks and the Soviet space rockets will indicate means of protection for the astronauts from the effects of cosmic rays.

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Rubin, A., J. Winston, H. Metz-Rubin, & L. Berwick 1951 THE VESTIBULAR RESPONSES TO TURNING, WITH NOMOGRAMS FOR THE DETECTION OF STREPTOMYCIN AND OTHER DRUG TOXICITIES AND FOR THE PREDICTION OF THE NORMAL VARIATIONS OF NYSTAGMUS AND VERTIGO. Ann. Otol. Rhinol. Laryngol. 60:108-116

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Rubin, H. J. 1942 AIRSICKNESS IN A PRIMARY AIR FORCE TRAINING DETACHMENT J. Aviation Med. 13:2772-76, 1942.

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Rudeseal, P.R. 1954 HUMAN SUBJECT DOWNWARD EJECTION TESTS FROM B-47 AIRCRAFT. (Wright Air Development Center, Wright-Patterson AFB, Ohio) TN 54-100, Nov. 1954. ASTIA AD 88 324

ABSTRACT: A series of downward seat ejection tests were conducted from the navigator-bombardier position with human subjects on a B-47 aircraft to demonstrate that this was a safe method of escape. Prior to conducting the tests with human subjects, a series of tests were performed with instrumented anthropometric dummies to measure the force on the hands tending to break the handgrip during ejection. After the forces were determined, a shock absorbing device was installed in the handgrip system which enabled human subjects to be ejected at 425 knots IAS from 10,000 feet without injury. This proved that downward seat ejection was a feasible means of escape up to 425 knots IAS from the B-47 aircraft. (DFAWT summary)

4,330

Rudolph, J. 1952 STATIC TEST -PROTOTYPE 32G EJECTION SEAT AND RAILS- MODEL F-94C. (Lockheed Aircraft Corp., Burbank, Calif.) Report No. 8667, July 3,1952. ASTIA ATI 162 996

ABSTRACT: At the request of the F-94C Project Structures Engineer, static tests were conducted on the 32 G ejection seat rails. The seat was in the fully extended position during the tests. Inertia, catapult, and air loads at both low and high airplane speeds were simulated. Attention was given to the effect produced by the offset catapult.

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Rudolph, L. A., J. A. Schaefer, R. E. Dutton, & R. H. Lyons 1957 SERUM GLUTAMIC OXALACETIC TRANSAMINASE IN EXPERIMENTAL TISSUE INJURY. J. Lab. & Clin. Med. 49:31.

Cited Cope, F. W. Nov. 1957.

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Ruff, S. 1935 DIE BEGRENZUNG DER FLIEGERISCHEN LEISTUNG DURCH DEN MENSCHLICHEN ORGANISMUS (The Limitation of the Flying Performance Because of the Human Organism) Luftwehr. (Berlin) 2:297-300. ASTIA ATI 68 443.

ABSTRACT: A crew, trained for the endurance of excessive accelerations, can stand a maximum of 4- 5 g for 30- 40 sec, or 6-7 for 2- 3 sec. Beyond that point, visual disturbances and impairment of consciousness occur. At 10.5 g, concussion of the brain resulted. Ruptures of inner organs are to be expected at 6-7 g, and beyond this point, in addition to these lesions, concussions of the brain occur.

4,333

Ruff, S. 1936 TYPICAL FRACTURES OF FIBULA IN OBSERVATION PLANE PILOTS DUE TO ACCELERATION WHEN FLYING IN SHARP CURVES. (Wahrend des Fluges aufgetretene Fibulafrakturen, eine durch Fliehkräfte bedingte typische Verletzung von Beobachtern) Luftfahrtmed., 1:50-52

ABSTRACT: A series of fractures of the lower third of the fibula was investigated. In each case, the victim was a military observer and the fracture occurred when the plane described a curve while he was in a standing position. Although banking would give the plane a downward acceleration of 4.5 -5 g,

and increase the apparent weight of the body from 80 kg. to 300-400 kg, this weight should be safely supported even by one leg. However, further questioning disclosed the fact that of gravity of the observer out of the base of support of the body formed by his feet. The weight of the body was placed on one leg at such an angle as to cause the fracture.

4,334

Ruff, S. 1937 UNFALLERFAHRUNGEN (Protection Against Possible Injuries Caused by Airplane Crashes) Part V of 10 parts. March 1937. ASTIA ATI 60742

ABSTRACT: Protective measures against possible injuries to flying personnel by airplane crashes were investigated. Statistics show an overwhelming number of head injuries in airplane crashes. The causes of the injuries were investigated, and suggestions for the protection of personnel are presented. It is suggested that in addition to the crash-helmet, the pilot should be fastened to the seat by several belts (one belt around the abdomen being insufficient) The back strap should be tight enough and fastened in such a manner as to prevent a forward surge of the body. Suggestions for cockpit-seat improvements are made.

4,335

Ruff, S. 1937 HEAD INJURIES IN AIRCRAFT ACCIDENTS: THEIR ORIGIN AND THE POSSIBILITY OF THEIR PREVENTION. (Kopfverletzungen bei Flugunfallen, ihre Entstehung und Möglichkeiten zu ihre Minderung) Luftfahrtmed., 1:355-360

ABSTRACT: In 1936 more than 50% of all injuries and almost 80 percent of the fatal injuries to fliers involved the head. Faulty seats or safety straps or the complete lack of the latter were responsible in most cases. Numerous instances of the failure of seats were discovered. To be effective, a safety strap must be attached near the top of the chair back as well as at the seat, to keep the head and shoulders from being thrown forward when the plane stops suddenly.

4,336

Ruff, S. 1937 DIE LUFTKRANKHEIT (Airsickness)
Luftfahrtmedizinische Abhandlungen (Leipzig) 1: 277-285

4,337

Ruff, S. 1939 UEBER DEN EINFLUSS HOHER FLIEHKRÄFTE AUF DEN MENSCHLICHEN ORGANISMUS (Concerning the Influence of High Centrifugal Forces Upon the Human Organism)
Wiener klinische Wochenschrift (Vienna) 52:861-864.

ABSTRACT: A review of the effects of high centrifugal forces on man, such as appear in experimental flying with fast machines and while pulling out of a dive. The influence of weight, reaction, time and the direction of the aircraft is considered. In the normal sitting position the focus of the disturbances found in high flying occurs in the collection of considerable quantities of blood in the legs through the hydrostatic pressure differences exerted parallel to the great vessels. The circulation remains, on the other hand undisturbed, if one places the pilot in the aircraft so that momentum is exerted perpendicular to the great vessels, which means that the pilot is in a prone position.

4,338

Ruff, S. 1940 BIOLOGICAL PROBLEMS OF HIGH SPEED FLYING
(Biologische Probleme des Hochgeschwindigkeits fluges) ASTIA ATI-60571

ABSTRACT: A general discussion of the different biological problems which arise in high-speed flying is presented. The influence of centrifugal forces on body functions is explained with the aid of diagrams, graphs, and photographs. It was found that a person in a prone position is able to withstand centrifugal forces of much greater magnitude than a person sitting Experiments showed that accelerations of 14 to 16 g could be withstood if the crew of an airplane were in a prone position.

4,339

Ruff, S. 1938 ÜBER BLUTDRUCK UND PULSFREQUENZ MESSUNGEN BEI ZENTRIFUGAL-BESCHLEUNIGUNGEN IM FLUGZEUG (Concerning Blood Pressure and Pulse Frequency Measurements During Centrifugal Accelerations in the Airplane)
Luftfahrtmedizinische Abhandlungen (Leipzig) 2: 116-120.

4,340

Ruff, S. 1938 THE EFFECT OF CENTRIFUGAL FORCES ON THE HUMAN ORGANISM. (Ueber Beschleunigungsuntersuchungen am Menschen) ASTIA ATI-106 822, 12 January 1938

4,341

Ruff, Siegfried 1940 HIGH ALTITUDE ACCIDENTS DURING THE WAR - PART 1 of 3 PARTS (HOEHENFLUGUNFAELLE WAEHREND DES KRIEGES) ASTIA ATI 53562.

ABSTRACT: Statistics are given for the causes of accidents occurring during high altitude flight. The smallest number, 10 percent, are caused by the failure of instruments. Illness and consitutional disorders account for 14.5%. The greatest cause of accidents, 75.5%, proved to be lack of familiarity with the instruments and ensuing service failure. A lack of knowledge of the effect of high altitude upon the human organism also contributed to the accident rate.

4,342

Ruff, S. 1942 HUMAN RESISTANCE TO CERTAIN TYPES OF UNEVEN ACCELERATION. (Ueber die Beschleunigungsfestigkeit des Menschen...Beschleunigungen) ASTIA ATI-47632,

ABSTRACT: Studies were made by the German Aeronautical Research Institute on human resistance to certain types of shock accelerations. Results of experiments are discussed pertaining to the distribution of forces acting upon certain parts of the human body in airplane crash landings, parachute shocks and in the ejection of catapult type seats in modern aircraft. It was concluded that in airplane crash landings the body can tolerate force up to 26 g, with the necessary precautions, without injury. Experiments have proven that a 2000 kg shock can be absorbed without injury in parachute opening and 20 g can be endured with the ejection catapult seat.

4,343

Ruff, S. & H. Strughold 1942 EFFECTS OF ACCELERATION (RAF, Institute of Aviation Medicine, Farnborough) F. P. R. C. Report No. 422, February 1942.

Translation of a section from their Compendium of Aviation Medicine.

4,344

Ruff, S. 1938 UBER DAS VERHALTEN VON BLUTDRUCK UND PULSFREQUENZ UNTER DEM EINFLUSS VON FLIEHKRAFTEN UND UBER VERSUCHE ZUR STEIGERUNG DER BESCHLEUNIGUNGSERTRAGLICHKEIT. (Behavior of blood pressure and pulse frequency under the influence of centrifugal forces and research for the increase of acceleration tolerance.) Luftfahrtmedizin 2:259-280.

ABSTRACT: The author describes a method by which systolic and diastolic blood pressure may be registered about every 15 seconds, even under the influence of high acceleration.

With this method experiments were performed on man, using the centrifuge in connection with which the blood pressure and pulse were registered. These experiments showed that accelerations up to 3 g., even for considerable periods of time, were tolerated without disturbances and with no essential changes in blood pressure. The pulse, however, rose rapidly from the beginning in this as well as in all other experiments. In the presence of accelerations over 3 g. disturbances to vision and consciousness occurred, accompanied by considerable change in blood pressure. The changes adjustment of the circulation.

In experiments with accelerations up to 5 g. for brief periods, there were only slight changes in pulse rate. Reduction of systolic blood pressure and of blood pressure amplitude occurred only after 4 g. had been reached. There were no subjective disturbances in this group of tests. Further experiments had to do with determining the effectiveness of a number of measures for increasing the acceleration tolerance. It was found that during digestion the tolerance was greatly increased and that addition of CO_2 to the atmosphere (within the plane) was also helpful.

The use of abdominal girdles was not quite so effective. Another measure which increases tolerance to acceleration is lying down. In this position high speed does not affect the organism so much as in the sitting position.

4,345

Ruff, S., & H. Strughold 1942 COMPENDIUM OF AVIATION MEDICINE (GRUNDRISS DER LUFTFAHRTMEDIZIN.) (Leipzig: Johann Ambrosius Barth, 1939) Trans. Nat'l. Research Council, Washington, D. C. 1942.

ABSTRACT: German Aviation Medicine has valiantly kept pace with the astonishing rise of German aviation. Untiring in its research it has provided advice and help for the service and in return has derived its stimulus from the demands of the air corps. Not content with practical research alone, German Aviation Medicine, in the few years of its activity, has bodly attacked the scientific fundamentals of the problems of aviation;

the result is a new medical discipline. The medical profession at large is entitled to information regarding the results of these investigations for in their implications they touch upon nearly every field of medicine. It is therefore pertinent that the authors present a cross section of the status of Aviation Medicine today and make it accessible to the public. They are primarily addressing medical students and those physicians who are connected with aviation, to whom knowledge of aviation medicine is particularly desirable. The present compendium serves the purpose of explaining to those not specially trained in the main problems of Aviation Medicine.

4,346

Ruff, S. 1942 INFLUENCE OF GREAT TANGENTIAL FORCES ON THE HUMAN ORGANISM War Med.,(Chicago) 2(3):534-536. May 1942.

4,347

Ruff, S., tr., & J.B. Bateman 1945 MEDICAL PROBLEMS CONCERNING PARACHUTE JUMPS FROM HIGH ALTITUDES AND AT HIGH VELOCITIES.
(Paper, Lilienthal Association in Braunschweig, Salzburg and Thorn, winter 1941-1942)
Translated as Appendix 5 to Lovelace, W.R., E.J. Baldes, & V.J. Wulff, The Ejection Seat for Emergency Escape from High-Speed Aircraft ASTIA ATI 7245

ABSTRACT: With the steadily increasing performance of our aircraft a series of medical problems has arisen which are related to existing rescue devices and to others still to be developed. This report discusses briefly that phase of aviation medical knowledge and investigation which deals with the above questions- that is to say, with parachute jumps from present-day and future aircraft. The medical problems which arise in bailing out from modern aircraft are to be attributed to flight at increasing altitudes and at ever increasing velocities. (Author)

4,348

Ruff, S. 1946 HUMAN TOLERANCE OF ACCELERATION AND MEASURES IN AIRCRAFT CONSTRUCTION TO INCREASE IT. (Transl., U.S. Air Force Aero M. Cent., Heidelb.) Transl. from: Zschr. Ver. Deut. Ingen., 84:817

4,349

Ruff, S. 1950 BRIEF ACCELERATION: Less Than One Second. In Dept. of the Air Force, German Aviation Medicine, World War II. (Wash., D. C.: U. S. Govt. Printing Office, 1950). I, 584-597.

4,350

Ruff, S. & R. Schroedter 1957 EINE SCHLEUDER FÜR BESCHLEUNIGUNGSUNTERSUCHUNGEN (A Catapult for Acceleration Tests) Luftfahrttechnik. Pp. 38-39

4,351

Ruff, S. 1960 [AVIATION ACCIDENTS CAUSED BY HUMAN FAILURES] Hefte Unfallheilk 62:53-62

4,352

Ruff, S. 1961 THE HUMAN CENTRIFUGE AND ITS APPLICATION TO PILOT SELECTION. In Bergeret, P., ed., Bio-Assay Techniques for Human Centrifuges and Physiological Effects of Acceleration (New York: Pergamon Press, 1961) AGARDograph No. 48, pp. 1-13

ABSTRACT: The human centrifuge constructed for the Institute Fur Flugmedizin der Deutschen Versuchsanstalt Für Luftfahrt had to fulfill various technical demands: (1) A maximum acceleration of 40 g; (2) A wide range of acceleration rate, from 0.01 g/sec to about 20 g/sec, adjustable by hand as well as automatically; (3) A diameter not longer than 16 m; (4) Different arms should be provided for different purposes; (5) A sufficient quantity of collector rings should be provided for transmission. A short survey is given of the special technical devices chosen in order to satisfy these demands.
The second part of the paper deals with the centrifuge as a selection instrument: a choice reaction time test with visual and auditory stimuli was used to study efficiency impairment under acceleration. The rate of acceleration was 0.01 g/sec, later 0.1 g/sec. The run at 4 or 4.5 g lasted for a maximum of 5 minutes. (AUTHOR)

4,353

Rulon, P. J., P. B. Sampson, and B.Schohan 1951 THE EFFECTS OF "G" FORCES ON THE PERFORMANCE OF TELETYPE OPERATORS (Educational Research Corp., Cambridge, Mass.) WADC AF Techn. rept. no. 6568 Oct. 1951 ASTIA AD 1164

ABSTRACT: Twelve AF teletypists (hunt-and-peck and touch operators) were performance-tested under stright and level and g-force flight conditions in 3 different positions: facing forward, sideways, and rearward in the aircraft. The forces imposed ranged from 0 to 2 g, with intervals of straight and level flight interspersed with periods of turbulence and acceleration. The recorded data were collated in terms of events transpiring on the teleprinter simultaneously with a given g force. Speed and accuracy indexes were also calculated. Hunt-and-peck typist speed scores were greater, but accuracy scores were smaller under g force conditions than under optimum flight conditions. Speed and accuracy decreased for touch teletypist under g-force conditions. Under all flight conditions, maximum typing speed was achieved when the subjects faced rearward in the aircraft. No consistent evidence was obtained to justify the superiority of one position over the others with respect to typing accuracy. Speed and accuracy of typing improved consistently with practice. Consistent patterns were obtained for finger displacement errors about the intended teleprinter key with a radical decrease in frequency toward the peripheral keys. Displacements occurred more frequently in a lateral direction than vertically or diagonally.

4,354

Rushmer, R. F. 1943 PHYSIOLOGY OF INCREASED INTRATHORACIC PRESSURE IN RELATION TO THE EFFECT OF CENTRIFUGAL FORCES: I. INTRODUCTION; METHODS; CHANGES IN POSITION OF THE DIAPHRAGM, IN HEART SIZE, AND IN INTRA-ABDOMINAL PRESSURE DURING INCREASED INTRAPULMONIC PRESSURE. (School of Aviation Medicine, Randolph AFB, Texas) Proj. No. 160, Rept. No. 1; ASTIA AD-132 984; 10 Nov.1943

ABSTRACT: Similarities between the circulatory changes resulting from increased intrathoracic pressure and from positive radial acceleration indicate that compensation to these stresses depends upon closely related mechanisms. Initial observations have been made on certain effects of several modifications of the Valsalva maneuver. When intrapulmonic pressure is elevated to 40 mm Hg just after a full inspiration the diaphragm may move upward or downward, the cardiac silhouette on X ray gets smaller and the intragastric pressure usually approximates intrathoracic pressure. When intrapulmonic pressure is elevated to 40 mm Hg after a forced expiration the diaphragm invariably moves upward, the size of the cardiac silhouette is reduced usually to a lesser extent, and the intragastric pressure exceeds intrathoracic pressure by 5 mm to 23 mm Hg. When intrapulmonic pressure is maintained at 40 mm Hg while leakage of air occurs through a valve in the manometer system the gradient in pressure between thorax and abdomen is greatest of all. being as much as 35 mm to 50 mm Hg. (AUTHOR)

4,355

Rushmer, R. F. 1943 CIRCULATORY COLLAPSE PRODUCED BY STIMULATION OF AN ARTERIAL WALL. (USAAF School of Aviation Medicine, Randolph Field, Texas) Research Proj. No. 166, Report No. 1, 10 September 1943.

4,356

Rushmer, R. F. 1943 OVERVENTILATION IN SUBJECTS DURING THE SWING TEST (USAAF School of Aviation Medicine, Randolph Field, Texas) Rept. No. 133-1, May 1943.

4,357

Rushmer, R. F. 1943 PHYSIOLOGY OF INCREASED INTRATHORACIC PRESSURE IN RELATION TO THE EFFECT OF CENTRIFUGAL FORCES. CAM No. 234; 10 Nov. 1943

ABSTRACT: Similarities of circulatory changes resulting from increased intrathoracic pressure (cf. Valsalva maneuver) and from positive radial acceleration indicate that compensation to these stresses is based on similar mechanisms. (a) When intrapulmonic pressure is elevated to 40 mm Hg after forced inspiration (Vl maneuver), intragastric pressure is equal to intrapulmonic pressure. (b) When intrapulmonic pressure is elevated to 40 mm Hg after forced expiration (Ve maneuver) intragastric pressure is higher than intrapulmonic by 8 to 23 mm Hg. (c) When intrapulmonic pressure is maintained at 40 mm Hg while a leakage of air occurs through a manometric valve, (Ml maneuver) intragastric pressure is 35 to 50 mm Hg higher than intrapulmonic. Repeated performance of the Ml maneuver during centrifugation will raise blackout threshold 3 "g".

4,358

Rushmer, R. F. 1943 PHYSIOLOGY OF INCREASED INTRATHORACIC PRESSURE IN RELATION TO THE EFFECT OF CENTRIFUGAL FORCES: II. ARTERIAL PRESSURE, VENOUS PRESSURE, AND FINGER VOLUME DURING INCREASED INTRAPULMONIC PRESSURE. (School of Aviation Medicine, Randolph AFB, Texas) Proj. No. 160; Rept. No. 2; ASTIA AD-132 985; 1 Dec. 1943

ABSTRACT: Study was made of the effects of increased intrathoracic and intra-abdominal pressure on arterial pressure in the arm, on venous pressures in the arm and in the leg, and on volume of the finger. Venous flow from the arm to the thorax failed to occur in 75% of normal subjects during the Vi maneuver, in 100% during the Ve maneuver, and in 22% during the Ml maneuver. Venous return

failed to occur from the lower extremities to the abdomen in all subjects during all the maneuvers. A rapid increase in venous pressure was usually accompanied by a rapid increase in the volume of the finger and a poor compensation of the arterial blood pressure during the Vi maneuver. Individuals displaying a rapid increase in venous pressure during the Vi maneuver do so on subsequent trials and on subsequent days. The abdomino-thoracic gradient in pressure produced during the Ve and Ml maneuvers apparently facilitates the maintenance of arterial blood pressure. (AUTHOR)

4,359

Rushmer, R. F. 1943 PHYSIOLOGY OF INCREASED INTRATHORACIC PRESSURE IN RELATION TO THE EFFECT OF CENTRIFUGAL FORCES; ARTERIAL PRESSURE, VENOUS PRESSURE, AND FINGER VOLUME DURING INCREASED INTRAPULMONIC PRESSURE. CAM No. 233; 1 Dec. 1943

ABSTRACT:
(a) In normal subjects venous return from arm to thorax fails in 75% of men performing Vl breathing maneuver, in 100% performing Ve maneuver and in 22% performing Ml maneuver. Venous return from legs fails to occur in all subjects performing all three types of breathing maneuvers.
(b) Rapid increase in venous pressure is usually accompanied by a rapid increase in finger volume. Poor compensation of arterial blood pressure occurs during Vl maneuver.
(c) Individuals displaying a rapid increase in venous pressure during Vl maneuver do so on subsequent days.
(d) Abdomino-thoracic gradient in pressure produced during Ve and Ml maneuvers apparently facilitates maintenance of arterial blood pressure.

4,360

Rushmer, R. F. 1944 PHYSIOLOGY OF INCREASED INTRATHORACIC PRESSURE IN RELATION TO THE EFFECTS OF CENTRIFUGAL FORCES. (3) TWO CASES OF CIRCULATORY FAILURE DURING INCREASED INTRAPULMONIC PRESSURE. (School of Aviation Medicine, Randolph AFB, Texas) Proj. No. 160; Rept. No. 3; ASTIA AD-144 994; 10 Jan.1944

ABSTRACT: Two subjects performing modifications of the Valsalva maneuver while suffering, from primary neurogenic shock developed visual and cerebral disturbances and poor circulatory compensation to the maneuvers. A third subject, having poor tolerance to rapid changes in posture and to centrifugal force, demonstrated a subjective and circulatory response to increased intrathoracic pressure similar to the subjects mentioned above. Improvement in tolerance to increased intrathoracic pressure on repeated trials by Subject 3 was associated with a reduction in the rate of increase in venous pressure, especially during the VI maneuver. Correlation of the circulatory response to increased intrathoracic pressure with tolerance to G on the human centrifuge may lead to the development of a simple test for detection of poor tolerance to centrifugal forces. (AUTHOR)

4,361

Rushmer, R. F. 1944 PHYSIOLOGY OF INCREASED INTRATHORACIC PRESSURE IN RELATION TO THE EFFECT OF CENTRIFUGAL FORCES: IV. COMPARISON OF PHYSIOLOGICAL RESPONSES TO INCREASED INTRAPULMONIC PRESSURE AND TO APPLIED CENTRIFUGAL FORCES. (School of Aviation Medicine, Randolph AFB, Texas) Proj. No. 160, Rept. No. 4, ASTIA AD-132 986, 1 Aug. 1944

ABSTRACT: A summarization was made of the factors in the circulatory compensation to increased intrapulmonic pressure which aid in the understanding of tolerance to radial acceleration. During neurogenic peripheral circulatory failure in a limited number of human subjects, dimming of vision occurred at a systolic pressure of 65 mm Hg; blackout at 40 mm Hg; and unconsciousness when the blood pressure was not measurable. On the basis of these observations, it is predicted that the average individual who has a blackout threshold of 5g, develops a systolic blood pressure of 140 mm Hg at the level of the heart during the application of the force. Deductions from the results with the Valsalva maneuver and from the protective value of certain anti-g devices suggest that venous pooling in the extremities is not the most important variable concerned with the individual's tolerance to positive acceleration, provided the duration of the applied force is brief. Theoretical considerations and a few service observations make the crouching position seem just as effective in improving g-tolerance as any of the mechanical devices available but practical difficulties interfere with its full use in existing aircraft. It is recommended that further attempts be made to overcome the difficulties of using the crouching position in the human centrifuge, and to make precise measurements on the relation of position of the body to blackout threshold. (AUTHOR)

4,362

Rushmer, R. F. 1944 COMPARISON OF EXPERIMENTAL INJURIES RESULTING FROM DECELERATIVE FORCES APPLIED TO THE VENTRAL AND DORSAL ASPECTS OF RABBITS DURING SIMULATED AIRCRAFT ACCIDENTS
(School of Aviation Medicine, Randolph Air Force Base, Tex.)
Proj. no. 301 Rept. no. 1 8 Oct. 1944 ASTIA AD 135 555

ABSTRACT: Rabbits subjected to moderate amounts of decelerative force received somewhat less internal damage when the decelerative force was applied to the back by a flat surface than occurred in animals facing the force and supported by a web harness similar to a Sutton harness. When rabbits were subjected to decelerative forces or a magnitude of 300 g's to 400 g's with the force acting on areas of comparable size on the dorsal and ventral surfaces there was no apparent difference in the degree of internal injury sustained. The location of internal injury bore little relation to the site of application of a large force. This suggests that most of the trauma under these circumstances is the result of a combination of two factors: (1) high pressure waves, transmitted through the solid viscrea and fluid elements of the body, and (2) tearing of tissues such as liver, mesentery, intestinal tract, and large blood vessels, from sudden distortion of displacement. The most severe injuries resulted when the animals were loosely attached and allowed to continue to travel forward and decelerate against a flat surface which had completely decelerated at the time of impact by the animal. (Author)

4,363

Rushmer, R. F. 1944 A STUDY OF THE ROLE OF INTRA-ABDOMINAL PRESSURE IN TOLERANCE TO CENTRIFUGAL FORCE. (School of Aviation Medicine, Randolph AFB, Texas) Proj. No.316; Rept. No. 1; ASTIA AD-135 558; 9 Sept. 1944

OBJECT: To determine the importance of hydrostatic pressure provided by the mass of movable abdominal contents in supporting venous return from the splanchnic area. CONCLUSIONS AND RECOMMENDATIONS: (a) The intra-abdominal pressure of both dogs and man is sufficient to support, on the average, a column of blood from any level in the abdomen to a level a few centimeters below the dome of the diaphragm. (b) The combined effect of the intra-abdominal pressure and the intra-thoracic pressure is adequate to elevate blood above the level of the dome of the diaphragm in dogs. (c) The increase in intra-rectal (and intra-abdominal) pressure during positive radial acceleration is related to the magnitude of the centrifugal force. (d) The increase in intra-rectal pressure on the centrifuge during positive radial acceleration fails to reach levels predicted on the basis of a column of fluid of constant height. This is believed to be the result of protrusion of the anterior abdominal wall and compression of intestinal gas producing descent of the diaphragm. (e) The use of pneumatic anti-g devices which apply pressure (1 lb/sq. in./g) to the anterior abdominal wall increases the pressure within the abdomen to a level consistent with an elevation of the diaphragm to about its normal level. (f) A hypothesis is presented to explain the effectiveness of anti-g devices in terms of their ability to maintain the heart and diaphragm at or near their normal positions. (AUTHOR)

4,364

Rushmer, R. F. 1944 INTERNAL INJURY PRODUCED BY ABRUPT DECELERATION OF SMALL ANIMALS. (School of Aviation Medicine, Randolph AFB, Texas) Project No. 241, Rept. No. 1, 2 Sept. 1944

ABSTRACT:
(a) This article is mainly a description of an apparatus to produce abrupt deceleration in mice. The same type of internal injuries occur as those found in humans in aircraft accidents.
(b) The lungs, liver, spleen, and mesentery are most frequently affected by large forces applied transversely through the body and in that order.
(c) Decelerative forces developed at the upper end of the carriage of the apparatus are undoubtedly greater than those developed in the pilot compartment of aircraft. The forces calculated at the abdominal surface of mice ranged from 153-227 "g". It is entirely possible that forces of this magnitude may occur in airplane crashes.
(d) In spite of the fact that data obtained this way cannot be directly applied to the problem of aircraft accidents, fundamental investigation as to the mechanism of action of these forces, the effect of position on internal injury, and the incidence of injury to various tissues can be carried out.

4,365

Rushmer, R.F. 1945 THE CHANGES IN PRESSURE IN THE PERITONEAL CAVITY PRODUCED BY SUDDEN DECELERATION OF EXPERIMENTAL ANIMALS. (AAF School of Aviation Medicine, Randolph Field, Texas) Report No. 472-1

4,366

Rushmer, R.F. 1945 DECELERATION (Paper presented at conference on "Recent Developments in Aviation Medicine," AAF School of Aviation Medicine, Randolph Field, Texas, June 4 and 5, 1945)

4,367

Rushmer, R. F., E. L. Beckman and D. Lee 1946 PROTECTION OF THE CEREBRAL CIRCULATION BY THE CEREBROSPINAL FLUID UNDER THE INFLUENCE OF RADIAL ACCELERATION.
(Office of Naval Research, Washington, D. C.)
December 1946 CONTRACT N6ori77
Also see Am. J. Physiol., 151 (2):355-365, December 1947.

SUMMARY: The cerebrospinal fluid and venous pressures measured at head and neck levels in anesthetized cats varied simultaneously and by approximately the same amounts during wide variations in these pressures produced by positive and negative radial acceleration.

Both C. S. F. and venous pressures remained relatively enchanged at or near heart level during exposure to either positive or negative G.

Under the conditions obtaining in these experiments, the cerebrospinal fluid pressure appears to be primarily a reflection of the venous pressure existing at any level within the cerebrospinal cavity. The results of these studies indicate that the veins, and probably minute vessels, are almost perfectly protected against sudden changes in intravascular pressure by simultaneous changes of the same magnitude in cerebrospinal fluid pressure.

In a majority of cases, the arterial blood pressure at neck level increased by larger increments than the venous pressure at same time during the exposure to negative G. Since the artorial walls are called upon to support only the differential between intra-arterial and cerebrospinal fluid pressure, the cerebral arteries are afforded considerable but incomplete protection under these conditions.

4,368

Rushmer, R. F and G. M. Hass 1946 A COMPARISON OF CRASH INJURIES IN MAN AND IN LABORATORY ANIMALS
(School of Aviation Medicine, Randolph Air Force Base, Texas.)
Proj. no. 471 Rept. no. 1 25 March 1946 ASTIA AD 135 542

See also Am. J. Surg. 76(1):44-50, 1948.

ABSTRACT: A comparison is made of the internal injuries encountered during post-mortem examination of flying personnel killed in aircraft accidents with the pathologic lesions produced by abrupt deceleration of three species of laboratory animals: cats, rabbits, and mice. In spite of many differences in the conditions obtaining during the deceleration, the lungs revealed gross pathologic changes in more than 75% of both humans and experimental animals. In general, the types of lesions in the lungs, liver, spleen, diaphragm, kidneys gastrointestinal tract, and pancreas were similar in man and laboratory animals. The incidence and severity of the lesions were considerably greater in the human cases who died instantly. Extensive trauma to the brain, heart, and great vessels were not observed in the experimental animal. These findings indicate that direct experimentation on laboratory animals can be a valuable adjuct in the study of the mechanisms of production of internal injuries and possibly in designing methods of protection against large decelerative forces. (Author)

4,369

Rushmer, R. F., E. L. Beckman, and D. Lee 1947 PROTECTION OF THE CEREBRAL CIRCULATION BY THE CEREBROSPINAL FLUID UNDER THE INFLUENCE OF RADIAL ACCELERATION. Amer. J. Physiol. 151(2):355-365. Dec. 1947.

ABSTRACT: The cerebrospinal fluid and venous pressures measured at head and neck levels in anesthetized cats varied simultaneously and by approximately the same amounts during wide variations in these pressures produced by positive and negative radial acceleration. Both C.S.F. and venous pressures remained relatively unchanged at or near heart level during exposure to either positive or negative G. Under the conditions obtaining in these experiments, the cerebrospinal fluid pressure appears to be primarily a reflection of the venous pressure existing at any level within the cerebrospinal cavity. The results of these studies indicate that the veins, and probably minute vessels, are almost perfectly protected against sudden changes in intravascular pressure by simultaneous changes of the same magnitude in cerebrospinal fluid pressure.

4,370

Rushmer, R. F., E. L. Green, & H. D. Kingsley 1946 INTERNAL INJURIES PRODUCED BY ABRUPT DECELERATION OF EXPERIMENTAL ANIMALS. (School of Aviation Medicine, Randolph AFB, Texas) Proj. No. 401, Rept. No. 1, ASTIA AD-135 531; 15 Jan. 1946
See also J. Avia. Med. 17:511-525, Dec. 1946

ABSTRACT: Statistical appraisal of the results obtained using a strain gauge accelerometer to record decelerative forces in forty experiments revealed that this apparatus provides a reliable measure of the forces produced under the conditions obtained in this series of experiments. Forty cats under nembutal anesthesia were exposed in a random order to four different patterns of decelerative force. The animals were embedded in plaster of Paris in the supine position on a cart which was allowed to drop 19.25 feet. Using four different sets of paraffin blocks the cart was exposed to decelerative forces having peak forces averaging 1'0.9 g. 267.5 g. 626.1 g. and 10'.5.2 g. The internal injuries resulting from the application of such forces resemble grossly many of the traumatic lesions observed in man at post-mortem after air-craft accidents. Large decelerative forces acting for a brief period appear to produce injuries of greater severity than smaller forces acting over a longer period, if the velocity at impact is constant. The lunge, liver, and spleen were the most common sites of pathologic lesions in this series of experiments. The lesions in the lungs were characterized by hemorrhages and emphysematous areas within the parenchyma of the lungs. The most common lesions in the liver and spleen consisted of lacerations through the capsule and into the parenchyma in areas not likely to be exposed directly to externally applied force. Hemorrhages into the lung are not always revealed by roentgenograms of the chest. (AUTHOR)

4,371

Rushmer, R. F. 1947 A ROENTGENOGRAPHIC SUTDY OF THE EFFECT OF A PNEUMATIC ANTI-BLACKOUT SUIT ON THE HYDROSTATIC COLUMNS IN MAN EXPOSED TO POSITIVE RADIAL ACCELERATION.
(Office of Naval Research, Washington, D. C.)
December 1947 Contract N6ori77
Also see Am. J. Physiol., 151(2), December 1947.

SUMMARY: Roentgenograms were obtained of the head and trunk of subjects exposed to positive radial acceleration with and without pressurization of pneumatic anti-blackout suits. In this way measurements of the changes in the height of the hydrostatic column of abdominal organs, in the intrarectal pressure and in the distance from heart to brain have been obtained.

The diaphragm is depressed during exposure to radial acceleration and elevated above its normal level by pressurization on the abdominal bladder with a pressure of 1.2 pounds per g.

In addition to the changes in position of the diaphragm, pressurization of the anti-blackout suit increased the overall intrarectal pressure by an amount sufficient to support a column of blood from any point in the abdomen to a level above the diaphragm without a contribution by the vascular walls.

The overall increase in intrarectal pressure appeared to be produced by increased tension or stretching of the diaphragm.

The distance from the base of the heart to the base of the skull was reduced by an amount sufficient to provide a protection of about 0.5 g during exposure to 5 g.

In addition to this mechanism for protection there is probably an increase in blood pressure at heart level to account for the remainder of the protection produced by the anti-blackout equipment.

4,372

Rushmer, R. F., E. L. Green, & H. D. Kingsley 1946 INTERNAL INJURIES PRODUCED BY ABRUPT DECELERATION OF EXPERIMENTAL ANIMALS. J. Avia. Med. 17:511-525, Dec. 1946
See also (School of Aviation Medicine, Randolph AFB, Texas) Proj. No. 401, Rept. No. 1, ASTIA AD-135 531, 15 Jan. 1946

ABSTRACT: Statistical appraisal of the results obtained using a strain gauge accelerometer to record decelerative forces in forty experiments revealed that this apparatus provides a reliable measure of the forces produced under the conditions obtained in this series of experiments. Forty cats under nembutal anesthesia were exposed in a random order to four different patterns of decelerative force. The animals were embedded in plaster of Paris in the supine position on a cart which was allowed to drop 19.25 feet. Using four different sets of paraffin blocks the cart was exposed to decelerative forces having peak forces averaging 1'0.9 g. 267.5 g. 626.1 g. and 10'.5.2' g. The internal injuries resulting from the application of such forces resemble grossly many of the traumatic lesions observed in man at post-mortem after aircraft accidents. Large decelerative forces acting for a brief period appear to produce injuries of greater severity than smaller forces acting over a longer period, if the velocity at impact is constant. The lunge, liver, and spleen were the most common sites of pathologic lesions in this series of experiments. The lesions in the lungs were characterized by hemorrhages and emphysematous areas within the parenchyma of the lungs. The most common lesions in the liver and spleen consisted of lacerations through the capsule and into the parenchyma in areas not likely to be exposed directly to externally applied force. Hemorrhages into the lung are not always revealed by roentgenograms of the chest. (AUTHOR)

4,373

Rushmer, R. F. 1946 THE CHANGES IN PRESSURE IN THE PERITONEAL CAVITY PRODUCED BY SUDDEN DECELERATION OF EXPERIMENTAL ANIMALS. (School of Aviation Medicine, Randolph AFB, Texas) Proj. No. 472; Rept. No. 1; ASTIA AD-135 543; 19 April 1946.

See also J. Aviation Med. 18(2):199-206.

ABSTRACT: Using a strain gauge pressure recorder, measurements have been obtained of the changes in pressure occurring within the peritoneal cavity of anesthetized cats during exposure to about 270 g. The magnitude of the maximum positive pressure ranged from 803 to 2607 mm Hg, averaging 1657 mm Hg (15.6 to 50.5 p. s. i., a v. 31.9 psi) Since it is possible that the natural frequency of the recording system was low with respect to the duration of peak pressures, these figures may be low and the wave form may have been somewhat distorted. Demonstration of waves of pressure within the peritoneal cavity does not constitute evidence that these pressure changes are responsible for injury. However, this finding indicates the necessity for further investigation of the role of pressure changes during abrupt deceleration to the production of pathologic lesions. (AUTHOR)

4,374

MOTION PICTURE

Rushmer, R. F. 1946 CRASH INJURIES IN EXPERIMENTAL ANIMALS (AAF School of Aviation Medicine, Randolph Field, Texas)

ABSTRACT: This motion picture was designed to illustrate the effects of abrupt deceleration on experimental animals. Anesthetized cats were restrained in various ways in carts constructed so that obstructions could be installed which were similar to those found in aircraft cockpits. High speed motion pictures (3600 frames per second) were taken to observe the points of contact and distortion of animals at impact. The pathological lesions produced by the action of decelerative forces are shown in color.
Injuries of the lungs, liver, spleen, mesentery, spine and renal vessels were found which were similar to those encountered at post-mortem on humans following aircraft accidents. Injuries sustained by the lungs were characterized by diffuse hemorrhages into the parenchyma which were most commonly found in the middle and lower lobes. The location of these hemorrhages did not appear to be related to the direction of action of the decelerative force. Areas of emphysema along the lung margins were encountered in a few cases. The lesions found in the liver and spleen usually consisted of linear lacerations of the capsule on the diaphragmatic aspect, extending into the parenchyma and often associated with profuse hemorrhage. Pressure waves could be seen traversing the anterior abdominal walls of animals in the supine position. There was a great deal of variability in the severity of the injuries sustained by animals exposed to decelerative force under apparently similar conditions. (Federal Proceedings 5(1):90, 1946)

4,375

Rushmer, R. F. 1947 CIRCULATORY EFFECTS OF THREE MODIFICATIONS OF THE VALSALVA EXPERIMENT. AN EXPERIMENTAL STUDY. Amer. Heart J. 34:399-418.

4,376

Rushmer, R. F. 1947 THE CHANGES IN PRESSURE IN THE PERITONEAL CAVITY PRODUCED BY SUDDEN DECELERATION OF EXPERIMENTAL ANIMALS. J. Aviat. Med. 18(2):199-206.

SUMMARY & CONCLUSIONS: 1. Using a strain-gauge pressure recorder, measurements have been obtained of the changes in pressure occurring within the peritoneal cavity of anesthetized cats during exposure to about 270 G

2. The magnitude of the maximum positive pressure ranged from 803 to 2,607 Hg. averaging 1,657 mm Hg (15.6 to 50.5 p.s.i. av. 37.9 p. s. i.) Since it is possible that the natural frequency of the recording system was low with respect to the duration of peak pressures, these figures may be low and the wave form may have been somewhat distorted.

3. Demonstration of waves of pressure within the peritoneal cavity does not consitute evidence that these pressure changes are responsible for injury. However, this finding indicates the necessity for further investigation of the role of pressure changes during abrupt deceleration to the production of pathologic lesions.

4,377

Rushmer, R. F. 1947 THE EFFECT OF POSITIVE RADIAL ACCELERATION ON THE INTRARECTAL PRESSURE. J. Aviation Med. 18(1):96-1016, 104.

CONCLUSIONS: 1. Intrarectal pressures were recorded on subjects during exposure to varied amounts of positive radial acceleration. The intrarectal pressure was found to be directly proportional to the magnitude of the acceleration expressed in g's. This is evidence for the theory that the intra-abdominal pressure is primarily a hydrostatic type of pressure.

2. The intrarectal pressure increased by approximately 60 per cent of the control pressure at 1 G for each unit increase in the magnitude of the radial acceleration. It is believed that this represents progressive reduction in the height of the hydrostatic column of abdominal contents due to descent of the diaphragm.

3. Application of pressure (52 mm. Hg per G) to the anterior abdominal wall by means of a pneumatic anti-G suit produced an increase in intrarectal pressure equivalent to the hydrostatic effect of elevating the diaphragm less than 3 inches.

4. These findings suggest that the effectiveness of the anti-G suit in preventing blackout is related to the function of maintaining the heart and diaphragm at approximately their normal position during radial acceleration.

4,378

Rushmer, R. F., E. L. Beckman & D. Lee 1947 PROTECTION OF THE CEREBRAL CIRCULATION BY THE CEREBROSPINAL FLUID UNDER THE INFLUENCE OF RADIAL ACCELERATION.
Amer. J. Physiol. 151(2):355-365, Dec. 1947.

ABSTRACT: 1. The cerebrospinal fluid and venous pressures measured at head and neck levels in anesthetized cats varied simultaneously and by approximately the same amounts during wide variations in these pressures produced by positive and negative radial acceleration.

2. Both C.S.F. and venous pressures remained relatively unchanged at or near heart level during exposure to either positive or negative g.

3. Under the conditions obtaining in these experiments, the cerebrospinal fluid pressure appears to be primarily a reflection of the venous pressure existing at any level within the cerebrospinal cavity.

4. The results of these studies indicate that the veins, and probably minute vessels, are almost perfectly protected against sudden changes in intravascular pressure by simultaneous changes of the same magnitude in cerebrospinal fluid pressure.

5. In a majority of cases, the arterial blood pressure at neck level increased by larger increments than the venous pressure at some time during the exposure to negative g. Since the arterial walls are called upon to support only the differential between intra-arterial and cerebrospinal fluid pressure, the cerebral arteries are afforded considerable but incomplete protection under these conditions.

4,379

Rushmer, R.F. 1947 A ROENTGENOGRAPHIC STUDY OF THE EFFECT OF A PNEUMATIC ANTI-BLACKOUT SUIT ON THE HYDROSTATIC COLUMNS IN MAN EXPOSED TO POSITIVE RADIAL ACCELERATION. Amer. J. Physiol. 151(2):459-468, Dec. 1947.

ABSTRACT: Roentgenograms were obtained of the head and trunk of subjects exposed to positive radial acceleration with and without pressurization of pneumatic anti-blackout suits. In this way measurements of the changes in the height of the hydrostatic column of abdominal organs, in the intrarectal pressure and in the distance from heart to brain have been obtained.

The diaphragm is depressed during exposure to radial acceleration and elevated above its normal level by pressurization of the abdominal bladder with a pressure of 1.2 pounds per g.

In addition to the changes in position of the diaphragm, pressurization of anti-blackout suit increased the overall intrarectal pressure by an amount sufficient to support a column of blood from any point in the abdomen to a level above the diaphragm without a contribution by the vascular walls.

The overall increase in intrarectal pressure appeared to be produced by increased tension or stretching of the diaphragm. The distance from the base of the heart to the base of the skull was reduced by an amount sufficient to provide a protection of about 0.5 g during exposure to 5 g.

In addition to this mechanism for protection there is probably an increase in blood pressure at heart level to account for the remainder of the protection produced by the anti-blackout equipment.

4,380

Rushmer, R. F. and G. M. Hass 1948 COMPARISON OF CRASH INJURIES IN MAN AND IN LABORATORY ANIMALS. Amer. J. of Surg., 76(1):44-50. See also (School of Aviation Medicine, Randolph AFB, Texas) Proj. No. 471, Rept. No. 1, ASTIA AD-135 542, 25 March 1946.

ABSTRACT: A comparison is made of the internal injuries encountered during post-mortem examinations of flying personnel killed in aircraft accidents with the pathologic lesions produced by abrupt deceleration of three species of laboratory animals: cats, rabbits, and mice. In spite of many differences in the conditions obtaining during the deceleration, the lungs revealed gross pathologic changes in more than 75% of both humans and experimental animals. In general, the types of lesions in the lungs, liver, spleen, diaphragm, kidneys gastrointestinal tract, and pancreas were similar in man and laboratory animal. The incidence and severity of the lesions were considerably greater in the human cases who died instantly. Extensive trauma to the brain, heart, and great vessels were not observed in the experimental animal. These findings indicate that direct experimentation on laboratory animals can be a valuable adjunct in the study of the mechanisms of production of internal injuries and possibly in designing methods of protection against large decelerative forces. (AUTHOR)

4,381

Rushmer, R.F., Beckman, E.L., and D.Lee 1951 PROTECTION OF THE CEREBRAL CIRCULATION BY THE CEREBROSPINAL FLUID UNDER THE INFLUENCE OF RADIAL ACCELERATION. (University of Southern Calif., School of Medicine, Los Angeles) Contract N60ri77, Task 1, 31 March 1951

ABSTRACT: The cerebrospinal fluid and venous pressures measured at head and neck levels in anesthetized cats varried simultaneously and by approximately the same amounts during wide variations in these pressures produced by positive and negative radial acceleration.

The results of these studies indicate that the veins, and probably min ute vessels, are almost perfectly protected against sudden changes in intravascular pressure by simultaneous changes of the same magnitude in cerebrospinal fluid pressure.

In a majority of cases, the arterial blood pressure at neck level increased by larger increments than the venous pressure at some time during the exposure to negative G. Since the arterial walls are called upon to support only the differential between intra-arterial and cerebrospinal fluid pressure the cerebral arteries are afforded considerable but incomplete protection under these conditions.

4,382

Russian Handbook 1941 HIGH SPEED FLYING. BLIND FLYING. HIGH ALTITUDE FLYING. (RAF, Institute of Aviation Medicine, Farnborough), F. P. R. C. Report No. 392d.

4,383

Russian Handbook 1941 PARATROOPS. (RAF, Institute of Aviation Medicine, FARNBOROUGH) F. P. R. C. Report No. 392f.

4,384

Russel, W. E., J. R. Erwin, & H. R. DeHaven 1943 MEDICAL RESEARCH IN SOME ASPECTS OF AIRCRAFT DESIGN. J. Aeron. Sci. 10:227-231.

4,385

Rusk, H. A. 1952 NEW PLANES POINT UP NEED TO STUDY 'HUMAN ELEMENT' N. Y. Times, I, 49:1-3, May 25, 1952.

4,386

Rute, L. 1962 A STUDY OF AERODYNAMIC EFFECTS OF ISOTHERMAL AND TEMPERATURE GRADIENT ATMOSPHERES ON RE-ENTRY TRAJECTORIES (Polytechnic Inst. of Brooklyn, N. Y.) Contract AF 49(638)445, Proj. 9781, AFOSR-2411, ASTIA AD-281 765.

ABSTRACT: The behavior of skip and impact trajectories of space vehicles entering and atmosphere in which temperature varies with altitude is studied. The atmosphere is divided into layers, each of which is characterized by an

appropriate temperature gradient. Numerical results for heat transfer rates, relative decelerations and altitude as functions of flight time, and an altitude-range history for STD Day (ARDC Model Atmosphere, 1959) Hot and Cold Day, are presented for selected re-entry conditions. These results are compared with those obtained in an isothermal (exponential) atmosphere for the same re-entry conditions. The difference in peak heat transfer rates and maximum relative decelerations in the two atmospheric models is not significant for properly selected scale heights. However, the effect of temperature variation upon minimum elevation for the skip trajectory and upon range to point of impact for impact trajectories is noticeable. (Author)

4,387

Ryan, C. ed. 1952 ACROSS THE SPACE FRONTIER (New York: Viking, 1952)

ABSTRACT: An expansion of a scientific symposium first published in Collier's Authors of individual chapters, in addition to Ryan, are J. Kaplan, W. von Braun, H. Haber, W. Ley, O. Schachter, and F.L. Whipple.

4,388

Ryan, E. A., W. K. Kerr, and W. R. Franks 1950 SOME PHYSIOLOGICAL FINDINGS ON NORMAL MEN SUBJECTED TO NEGATIVE G. J. Aviation Med. 21(3): 173-194.

SUMMARY: 1. A feeling of pressure in the head region, sometimes of a throbbing nature, is the outstanding symptom on exposure to negative g (up to -3g).

2. Visual symptoms under negative g, especially of the higher magnitudes studied, are common and consist of blurring, greying or reddening of vision.

3. Negative g either on the tilt table (-1 g for one minute) or in the accelerator (up to 3 g negative for five seconds under the conditions of this study) produces slowing of the pulse rate in proportion to the magnitude of the negative acceleration, (i. e., the greater amount of negative g the more marked bradycardia).

4. While the greater part (93 per cent) of the pulse rate slowing on a negative tilt occurs within the first three seconds the maximum slowing is not attained until ten to fifteen seconds after the tilt. There is then a significant partial recovery in pulse rate above the lowest level until an equilibrium pulse rate is reached within the 25 to 45 seconds after the tilt. These changes may be mediated through the carotid sinus reflex.

5. The pulse rate quickly returns to its normal value or a little above it when the negative g passes off.

6. There is a more marked slowing of the pulse rate when exposed to 1 g negative on the tilt table on the last as compared with the first of a series of 1 g negative exposures occurring either on one or successive days. This change in pulse rate response is correlated with an acquired subjective increase in the negative g tolerance. There is a similar acquired tolerance on repeated exposures to the higher negative g values studied (-1 g to -3 g).

7. Electrocardiograms taken under negative g show many changes which become more marked as the amount of negative g increases. The most striking alteration is prolonged periods of cardiac asystole (in one -3 g test the asystole lasted for nine seconds). Despite these variations there were no subjective cardiac symptoms. The electrocardiographic changes are strikingly similar to those resulting from pressure on a sensitive carotid sinus.

8. Healthy young men can, under the experimental conditions outlined, safely withstand 3 g negative for 5 seconds.

4,389

Ryan, J. J., & J. P. Stapp 1959 HUMAN EXPERIMENTS ON AIR TRANSPORT CRASH PROTECTION. (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959).

ABSTRACT: Modulated Deceleration. It has been found in experimental tests with human subjects on the principle of the hydraulic cylinder and piston for controlled attenuation that: (1) Hydraulic shock absorbers afford maximum protection to human occupants upon crash; (2) inherent design makes possible protection for different loads, speeds and displacements; and (3) maximum energy absorption is provided with minimum weight, complexity and modification. Applicability on Air Transports. Although the human tests were made with the automobile as the research vehicle, including restraints accompanied by quick retraction of dangerous projections, the hydraulic energy absorber may be applied in air transport crash protection as follows: (1) attachment to seat tracks in a jet airliner; (2) distribution of absorber forces in aircraft structure; and (3) individual absorbers on seat supports. This paper includes calculations, designs and conclusions for maximum human protection in aircraft utilizing hydraulic shock absorbers.
J. Aviation Med. 30(3):201, March 1959)

4,390

Ryan, J. J. 1960 CRASH-DECELERATION TESTS WITH HUMAN SUBJECTS. (Presented before the Fourth Annual Meeting of the Human Factors Society, Boston, Mass., 14 Sept. 1960). In Human Factors in Technology (New York: McGraw-Hill Book Co., 1962), Chapt. 15.

4,391

Ryan, J.J. 1961 HUMAN CRASH DECELERATION TESTS ON SEAT-BELTS. (Paper, Annual Meeting of the Aerospace Med. Assoc., Chicago Ill., 26 April 1961)

ABSTRACT: Tests have shown that seat-belt forces applied to the human subject in deceleration are sinusoidal in character, are determined by the natural frequency of the spring-mass system and by damping, and are dependent upon the ti e history of the forces applied at the belt connections. The development of favorable seat-belt characteristics is described. The limiting forces are dependent upon the ability of the pelvic bone system to transmit the sinusoidal rearward and downward forces exerted by the belt on the body. A secondary problem is the rotation of the upper torso about the seat-belt after impact. The results of these force applications from tests are noted. Criteria of aircraft design are suggested to allow maximum impacts without immobilizing injury, permitting immediate evacuation.

4,392

Ryan, J.J. 1962 AUTOMOTIVE HUMAN CRASH STUDIES In Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, Pp 345-354.

ABSTRACT: The development of safety devices for vehicles has required research into the application of engineering principles for the mechanical reduction of impact forces. It has been shown that the forces exerted on a human supported by a seat-belt may be reduced four times through proper engineering design of the vehicle and the belt. Further studies with human beings in the seat-belt environment using the apparatus available require an extension of the engineering with bio-physics and applied medicine.

4,393

Ryan, J.J. 1962 HUMAN CRASH DECELERATION TESTS ON SEAT-BELTS.
(1961 Annual Meeting of the Aero Medical Association, Chicago, Ill., 26 April)
Aerospace Med. 33(2):167-174, Feb. 1962.

ABSTRACT: Tests have shown that seat-belt forces applied to the human subject in deceleration are sinusoidal in character, are determined by the natural frequency of the spring-mass system and by damping, and are dependent upon the time history of the forces applied at the belt connections. The development of favorable seat-belt characteristics is described. The limiting forces are dependent upon the ability of the pelvic bone system to transmit the sinusoidal rearward and downward forces exerted by the belt on the body. A secondary problem is the rotation of the upper torso about the seat-belt after impact. The results of these force applications from tests are noted. Criteria of air-craft design are suggested to allow maximum impacts without immoblizing injury, permitting immediate evacuation.

4,394

Ryan, J.J. 1962 MECHANICAL REDUCTION OF IMPACT FORCES BY AUTOMOTIVE DESIGN. (Presented before the Annual Meeting of the American Med. Assoc., New York, 27 June 1961) Published in Research Review 6(2):1-37 by the National Safety Council, Chicago, June 1962.

4,395

Ryan, J.J. 1962 REDUCTION IN CRASH FORCES.
In Cragun, M.K., ed., The Fifth Stapp Automotive Crash and Field Demonstration Conference, Sept. 14-16, 1961, Pp. 48-89

4,396

Ryker, N. J. and S. h. Bartholomew 1951 DETERMINATION OF ACCELERATION BY USE OF ACCELEROMETERS
(Prosthetic Devices Res. Proj., Inst. of Engr. Res., Univ. of Calif., Berkeley, Calif.)
Series 11, Issue 17, Sept. 1951.

4,397

Ryker, N.J. 1962 MANNED SPACE FLIGHT
(North American Aviation, Inc., Space and Information Systems Division, Downey, Calif.) July 17-19, 1962.

ABSTRACT: Herein is described the major difference between several manned space flight missions and their effect upon the hardware design of spacecraft sub-systems.

4,398

Ryabchikov, E. 1962 IN THE CITY OF "THE CELESTIAL BROTHERS".
Trans. from Pravda (Moscow) (USSR) Aug. 7, 1962, p. 4.
(Office of Technical Services, Washington, D.C)
Nov. 9, 1962 63-13886

ACCELERATION

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4,399

Sabbagh, E.N. 1956 PERFORMANCE CHARACTERISTICS OF CUSHIONING MATERIALS IMPACTED UNDER A HEAVY WEIGHT HIGH IMPACT SHOCK MACHINE. (Lowell Technological Institute Research Foundation, Mass.) Rept. for Dec. 1954-June 1955, Contract No. AF18(600)-127, Rept. No. TR-55-229, Feb. 1956. ASTIA AD 90 856

ABSTRACT: The energy absorption characteristics of cushioning materials impacted under a heavy-weight high-impact shock machine (AD 90 917) are reported as analyzed by an analog computer system. Test specimens were fabricated in the shape of circular cylinders; the diameter of the circular bases was 24 in. and the thickness of the specimen was either 2, 4, or 6 inches. Specimens for tests at standard conditions were stored for 5 days on racks in an air-conditioned testing room at 70 degrees F and 56% RH. Cushioning materials tested at -67 degrees F and 160 degrees F were conditioned in a temperature chamber for 3 to 4 hours prior to testing. The impacting hammer had a static weight of 1.28 psi over the area of the sample throughout the tests. The velocity of the hammer at the time of initial contact varied from 20 to 50 fps in increments of 5 fps. Graphs of energy are presented for 36 materials. Test results are also given in tabular form for certain values of thickness and velocity in order to present strain data, values of resilience, and other information. Results for 15 additional materials, for which insufficient quantities were available for complete tests, are also presented in tabular form. The tests show that the expanded polystyrenes are the best energy absorbers. Wood fiberboard, high-density wool pads, and cane fiberboard, respectively, follow the expanded polystyrenes in energy absorbing capacity.

4,400

Sabetay, I. 1960 PREPARATIONS FOR LAUNCHING A MANNED SATELLITE INTO SPACE Stiinta si Tehnica 1960(10):14-15, 17

ABSTRACT: Based on the successful recovery of two dogs in a Soviet biosatellite on August 19, 1960, the article deals with various preparations for launching a manned satellite into space. The USSR started examinations on the vital activity of animals in hermetically closed cabins launched by a rocket to an altitude of 100 km already in 1949. One of the dogs was jettisoned at an altitude of 90 km with the parachute opening after 3 sec. of free fall. Thus, the dog had to sustain an acceleration force 7 times greater than the terrestrial gravity force.

The behaviour and the physiological functions of the animals launched and recovered by the USSR in August 1960 was watched by TV during the whole flight. At present, the biologists are studying the effects of the flight on the organisms of two dogs, mice, flies, plants, and microbes which were in the space ship. All these experiments are only preparations for the launching of the first man into space. (CARI)

4,401

Sabrie, R. 1951 LA MALADIE DES TRANSPORTS MARITIMES, TERRESTRES, AERIENS. SON IMPORTANCE AUX ARMÉES, SA THERAPEUTIQUE. (The Sea, Ground and Motion Sickness; Its Military Importance and Its Therapy) Journal des Praticiens, Paris, 65:359-361, July 1951.

4,402

Sabrie R. 1958 ANTI-EMETIC DRUGS IN MOTION SICKNESS Prod Pharm 13:[illegible]-54, Nov. 1958

4,403

Sachs, L.D. & G.E. Hirt 1951 STATUS REPORT CATAPULT DEVELOPMENT PROGRAM (Pitman-Dunn Laboratory, Frankford Arsenal, Philadelphia) May 1951. ASTIA ATI 115678

ABSTRACT: This is a report of development, performance tests, and vibration tests of various catapults and cartridges.

4,404

Sachs. L.D. 1952 HISTORICAL SKETCHES OF THE CATAPULT DEVELOPMENT PROGRAM. ASTIA AD 14 357

ABSTRACT: Motion sickness results from inadequate adaptation of medular, cerebral, and spinal centers to continuous nonphysiological stimuli. Not motion as such, but the rhythmical repetition of exterior stimuli disturbs the adaptive mechanism. Vestibular, proprioceptive and visual senses take part in the development of the symptoms. The receptors of the inner ear constitute a major etiological factor. A well-functioning layrinth has been called a prerequisite to motion sickness. The vagus is the effective nerve,

and vagotonics are particularly prone to motion sickness. Circulatory disturbance, cerebral anemia, optokinetic nystagmus, shifting tensions and stresses in the abdomen, and neurosis are additional etiological factors. The effectiveness of the German drug "Vomex A" (beta-dimethylaminoethyl bezhydryl ether-1,3-dimethyl-8-chloro-xanthine) is discussed and statistically documented.

4,405

Sadoff, M., N.M. McFadden, & D.R. Heinle 1961 A STUDY OF LONGITUDINAL CONTROL PROBLEMS AT LOW AND NEGATIVE DAMPING AND STABILITY WITH EMPHASIS ON EFFECTS OF MOTION CUES (Ames Research Center, Moffett Field, Calif.) NASA Technical Note D-348, Jan. 1961. NASA N62-70922.

ABSTRACT: An investigation was conducted in several types of simulators, including the Johnsville centrifuge, and in-flight to assess the effects of incomplete or spurious motion cues on pilot opinion and task performance over a wide range of longitudinal short-period dynamics. Most of the tests were conducted with a conventional center stick; however, a brief evaluation in the centrifuge of a pencil type side-arm controller was also made.

4,406

Saenger, E. 1949 THE LAWS OF MOTION IN SPACE TRAVEL. Interavia 4:416

4,407

Sais, V. 1959 RADIOLOGICAL STUDY OF THE CERVICAL VERTEBRAE IN FLIGHT PILOTS A.M.A. Proceedings, April, 1959

Abstract: It was the purpose of this study to determine the extent to which high accelerations cause deformities of the spinal column in jet pilots, particularly with relation to the cervical region. X-rays of 228 fighter pilots revealed the following abnormalities: twelve subjects showed slightly flattened lordotic curvatures, in fifty-nine subjects the cervical region showed a stretched, straight-line profile, and in seventeen cases there was evidence of inverted lordosis. The results are correlated to conditions prevailing in high-speed flight.

4,408

Saito, I., Y Ueno, M. Iwane, M Ishizaki et al. 1962 THE INFLUENCE OF ACCELERATION ON THE CARDIAC FUNCTION. PART I. HEART SIZE AND ELECTRO-CARDIOGRAPHIC FINDINGS UNDER G AND THEIR RELATION TO THE FATALITY
In The Reports of the Aero-Medical Laboratory, Japanese Air Self Defense Forces, Tachikawa, Japan. 2(2):1-11, March 1962.

ABSTRACT:

1. The alteration of ECG findings and the heart size were studied in fifteen dogs under the positive G. The heart size was examined through X-ray movie picture.
2. The pulse rate increased in accord to higher G.
3. The alteration of ECG under G has taken place as following: sinus non-respiratory arrhythmia → supra-ventricular premature beat → nodal rhythm → paroxysmal ventricular tachycardia ——— ventricular fibrillation → death
cardiac arrest → death

When the nodal rhythm has lasted more than two to three minutes, these changes were irreversible and dogs usually expired.

4. Both the size of the heart shadow and the difference of the area of systolic and diastolic phase have increased suggesting the augmentation of the cardiac output. Above 5 to 6 G, these have decreased, and on 10 G, there recognized only minimal heart contraction. (Author)

4,409

Saito, I., and M. Ishizaki 1962 THE INFLUENCE OF TRANSVERSE G ON THE PULMONARY FUNCTION.
In The Reports of the Aero-Medical Laboratory, Japanese Air Self Defense Forces, Tachikawa, Japan. 2(2):12-17, March 1962.

ABSTRACT:

1. The pulmonary function was studied under six transverse G while breathing room air or 100% oxygen.
2. The vital capacity, inspiratory capacity and tidal capacity have increased significantly when the subjects breathed 100% oxygen instead of the room air.
3. As subjective findings, there appeared the dry cough, inspiratory difficulty of breathing and also the prominent second pulmonary sound were noticed.
4. The possible cause for these findings was discussed. (Author)

4,410

Saito, I., M. Iwane, M. Ishizaki et al. 1962 THE FLICKER FUSION FREQUENCY AND POSITIVE G.
In The Reports of The Aero-Medical Laboratory, Japanese Air Self Defense Forces, Tachikawa, Japan, 2(1):23-29, March 1962.

ABSTRACT: The flicker fusion frequency threshold for both eyes was determined

on human subjects exposed to positive acceleration. A series of 73 runs were made at acceleration ranging one to five G at Human Centrifuge, Tachikawa.

The flicker fusion frequency threshold decreased moderately 6%, 9%, 11.6% and 19.6% respectively at 2,3,4, and 5 G compared to the value of 1.4G on which levels of G it is suspected there is no remarkable hemodynamic changes.

In order to clarify the cause of the decrease of the flicker fusion frequency threshold under higher G, the investigation was made while the subjects were breathing low oxygen enough to produce low arterial saturation up to 60%, revealing there are no changes in the threshold.

The real cause of the decrease in the flicker fusion frequency threshold under G is still obscure. (Author)

4,411

Saito, I., Y. Ueno, & M. Ishizaki 1962 G-LOAD DURING SPECIAL FLIGHT IN THE T-33. Boei Eisei (National Defense Medical Journal) (Tokyo) 9(3):99-100, March 1962

ABSTRACT: Four test pilots were used to determine the g-loads during various airplane maneuvers. For each maneuver the maximum g-load and the increase in the rate of g are given. The maneuvers tested were the vertical turn, loop, dive recovery, the Immerman turn, and the clover leaf. No adverse effects on visibility were found, and no differences in sensations from those of centrifugal-gravity simulators were noted. (Aerospace Medicine 33(11):1397, Nov. 1962)

4,412

Saito, I., Y. Ueno, M. Ishizaki, & H. Fujihara 1962 EFFECTS OF ACCELERATION LOAD ON CIRCULATORY FUNCTION. Boei Eisei (National Defense Medical Journal) (Tokyo) 9(3):26, March 1962

ABSTRACT: Both men and dogs were exposed to forces of 5-10 g in a centrifugal-force apparatus. In dogs cardiac output decreased abruptly at 7-8 g and nearly ceased at 10 g. It appeared that the safe limit for life is at the point where nodal rhythm has been operating for no longer than 1 or 2 minutes. In the majority of dogs there was no evidence to show a lack of blood in the brain. Organs below the level of the heart were hyperemic as expected. In humans black-out occurred within a minute at 5-6 g. (Aerospace Medicine 33(11):1397, Nov. 1962)

4,413

Sala, O. and G. Pivotti 1952 RICHERCHE SUI RAPPORTI TRA STIMOLI ACCELERATORI DI ALTO VALORE FISICO E RISPOSTA VESTIBOLARE (INVESTIGATIONS ON THE RELATIONS BETWEEN ACCELERATION STIMULI OF HIGH INTENSITY AND VESTIBULAR RESPONSE) Bollettino della Societa italiana di biologia sperimentale (Napoli), 28(11):1750-1753

ABSTRACT: The correlation of the amount and duration of angular acceleration with postrotatory nystagmus was established experimentally on 15 rabbits at angular accelerations higher than 666 degrees/sec^2. In that range, increases of angular deceleration were not followed by a proportional increase in the duration of nystagmus and in the number of eye movements (as was the case at lower accelerations).

4,414

Sala, O., and G. Pivotti 1953 SUI CARATTERI DEL NISTAGMO VESTIBOLARE EVOCATO DA STIMOLI ACCELERATORI DI MOLTO ALTO VALORE FISICO (ON THE CHARACTERISTICS OF VESTIBULAR NYSTAGMUS EVOKED BY ACCELERATORY STIMULI OF VERY HIGH PHYSICAL VALUE)
Bolletino della Societa italiana di biologia sperimentale, (Napoli) 29 (1): 104-106. Jan. 1953. In Italian.

ABSTRACT: High accelerations (3500°/sec. for 120/1000 of a second) did not induce a nystagmic response in guinea pigs. This response is usually produced by changes in the vestibular centers. However, a vestibular nystagmic response was obtained by successive moderate accelerations.

4,415

Salathé, A. 1877 PHYSIOLOGIE EXPERIMENTALE. Traveux du Laboratoire de M. Marey III. 251-272, (In French)

ABSTRACT: Salathé, in his classical studies on the effects of gravitation, first used clearly formulated questions to attack the problem on centrifugal effects (1877). For his animal experiments he used a horizontal centrifuge 1.50 m. (4.92 ft) in diameter. A simple arrangement permitted the recording of respiration while the centrifuge was running.

4,416

Salathe, A. 1877 DE L'ANEMIE ET DE LA CONGESTION CEREBRALE PROVOQUEE MECANIQUEMENT CHEZ LES ANIMAUX PAR L'ATTITUDE VERTICALE OU PAR UN MOUVEMENT GIRATOIRE (Concerning Anemia and the Cerebral Congestion Mechanically Caused in Animals by Vertical Position or by a Gyratory Motion)
Physiol. Exper. 3: 251-272

4,417

Salaznev, V.P. 1958 ISKUSSTVENNYY SPUTNIK ZEMLI (ARTIFICIAL EARTH SATELLITE) (Moscow: Oborongiz, 1958)

ABSTRACT: On the basis of domestic and foreign, chiefly American sources, the author discusses the theoretical problems involved in the construction and launching of Soviet artificial satellites, specifically Sputnik I, the world's first. He indicates the path to be followed by scientists in solving the problem of conquering space, mentioning past and future difficulties, and pointing out the main problems the artificial satellites will solve. He reviews the successive stage in the conquest of space, beginning with the launching of the unmanned earth satellite and ending with the establishment of interplanetary space stations and the use of space ships. Several models of the earth satellite, celestial rockets, and space stations are described. The principles of control and celestial orientation of the artificial satellite during its orbital flight are reviewed, and a description is given of the most important instruments installed in the satellite. (CARI)

4,418

Salis, G. Oct. 1958 SOME TESTS ON BEFAB 'SAFELAND' SAFETY BARRIERS (Advisory Group for Aeronautical Research and Development) Rept # 228, ASTIA AD 227 469.

SUMMARY: This Report describes results obtained during tests carried out at the Italian Air Force Test Centre on a device known as the Befab 'Safeland' Barrier, the object of which is to arrest jet aircraft in short distances. Tests were carried out with two types of barrier, the 4-3F and the 6-3F, using DH. 100, Fiat G. 80, F86E and F.84F aircraft. The results show that it is possible to arrest jet aircraft in landing or takeoff, in relatively short distances and with an almost constant longitudinal deceleration of about 1 g. Braking action is smooth enough not to affect the pilot and damage to the aircraft is easily repaired by the squadron second line maintenance service. During the tests it was found that some precautions were necessary in setting up the arresting net in order to guarantee good operation of the barriers. Setting up of the unit is simple and quick, and does not require any preliminary ground preparation. Maintenance is simple and straightforward.

4,419

Salonna, F., & L. Carbonara 1956 AZIONE DI ALCUNI FARMACI SEDATIVI SULLA REFLETTIVITA VESTIBOLARE (EFFECT OF SOME SEDATIVES ON VESTIBULAR REFLEXES). Archivio italiano di otologia rinologia e laringologia (Milano) 64(4):507-513 July-Aug. 1956

ABSTRACT: The administration of a barbiturate, Luminal (phenylethylmalonyl uric acid), and a paraaminobenzoic acid derivative, Nevanide (diethylammonium paraaminobenzoate) to guinea pigs prior to rotatory stimulation induced a decrease in post-rotatory nystagmus. Vestibular reflexes were more pronounced and of shorter duration for Luminal, and moderate and of longer duration for Nevanide. The dosage required to obtain a decrease in vestibular reflexes was higher for Luminal than for Nevanide.

4,420

Salpeter, M.M. and C. Walcott 1960 AN ELECTRON MICROSCOPICAL STUDY OF A VIBRATION RECEPTOR IN THE SPIDER. Exp Neurol. 2:232-50, June 1960

4,421

Salzman, E. W., & S. D. Leverett 1956 STUDIES IN ORTHOSTATIC VENOCONSTRICTION. I. PERIPHERAL VENOCONSTRUCTION DURING ACCELERATION. II. ROLE OF THE CAROTID SINUS MECHANISM. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 56-483; ASTIA AD-97 298; Sept. 1956

ABSTRACT: A technique for demonstrating active venous constriction has been developed, using miniature intravascular balloons. Validation of the technique was performed in vitro and by drug studies and direct stimulation of the sympathetic chain in vivo. Active venous constriction was demonstrated in dogs during acceleration on the centrifuge. The magnitude of the venous response was strongly correlated with the animals' ability to maintain arterial pressure. The importance of the venous system in supporting the circulation under a hydrostatic load is discussed. The demonstration of peripheral venoconstriction during common carotid artery occlusion implicated the carotid sinus mechanism in the control of peripheral venous tone. Deafferentation of the aortic arch by cervical vagotomy enhanced the venous response to carotid occlusion. Venoconstriction was correlated with arteriolar constriction of peripheral venomotion and arteriolar reactivity is suggested. (AUTHOR)

4,422

Salzman, E.W. and S.D. Leverett 1956 PERIPHERAL VENOCONSTRICTION DURING ACCELERATION AND ORTHOSTASIS.
Circulation Res. 4(5):540-545. Sept. 1956.

ABSTRACT: Using a miniature balloon technique, peripheral vaso-constriction was measured in dogs given two types of centrifuge runs; one in which a peak of 3 g was reached in 3 to 4 seconds and held for a 15 second plateau, and the other in which the acceleration was gradually increased at the rate of 1 g per 10 seconds. By eliminating the constriction with Dibenzyline, an adrenergic blocking agent, the semiquantitative interpretation of results was made possible. Active peripheral venoconstriction was observed in dogs exposed to centrifugal acceleration. The magnitude of the venoconstrictor response was strongly correlated with the animal's ability to maintain arterial pressure, suggesting the importance of contraction of the venous reservoir in the support of cardiac output under a hydrostatic load.

4,423

Salzman, E. W. 1957 REFLEX PERIPHERAL VENOCONSTRICTION INDUCED BY CAROTID OCCLUSION. Circulation Res. 5:149-152.

4,424

Sampson, Philip J., Edwin H. Elkin, James Heriet & Robert Nelsen 1960 HEAD AND EYE TRACKING IN RESPONSE TO VELOCITY AND ACCELERATION INPUTS (Institute for Applied Experimental Psychology, Tufts University, Medford, Massachusetts) Office of Naval Research Contract No. Nonr 494(16) Project No. N.R. 144-122, April 1960. ASTIA AD 237445

ABSTRACT: This study was conducted to find out how well visual tracking could take place when both the head and eyes were free to follow moving targets and to discuss the relevance of the findings to the notion of using the eye as a control mechanism. The target used in this experiment swung horizontally about the subject at three different velocities (30, 60, and 90°/ sec.) and three accelerations (5, 20, and 45°/ sec.^{2}). The tracking error record obtained indicated that the eye was able to track the targets within the same tolerances reported for eye tracking when the head was fixed. In addition there was the suggestion that by permitting both head and eye movements, higher velocities could be tracked than by the eyes alone.

A reasonable constant head lead angle was found for the constant velocity inputs which varied with the magnitude of the input. Various implications of this finding were discussed.

An electric circuit analog was developed for part of the data and used to predict head and eye output in response to acceleration inputs, using constants derived from the velocity input data. The agreement between the obtained and the predicted function appeared promising.

4,425

Sand, A. 1940 THE MECHANISM OF THE ACUSTOLATERAL SENSE ORGANS IN FISHES WITH SPECIAL REFERENCE TO PROBLEMS IN THE PHYSIOLOGY OF THE SEMI-CIRCULAR CANALS Proc. Royal Soc. Med. 33:741-750

4,426

Sander, E.G. 1960 STRESS EFFECTS ON GASTRO-INTESTINAL PHYSIOLOGY (Aerospace Medical Division, Wright Air Development Division, Dayton, Ohio) Project 7163(805), Internal

ABSTRACT: The objective of this research is to determine the effects of vibrational stress upon the function and physiology of the gastro-intestinal tract. The functions to be studied are digestion, nutrient absorption, rate of food passage, and nutrient requirements. Digestion studies will include estimates of calcium, phosphorus, and nitrogen retention. The absorption rates of glucose, one fatty acid, one amino acid, one vitamin, calcium, and phosphorus, shall be determined using radioisotopes. The above factors will be studied in rats under different frequencies of vibration as well as different durations of exposure.

4,427

Santa, G.P. 1955 ACCELERATION PROBLEMS IN EJECTION SEAT DESIGN.
In U.S. Assistant Secretary of Defense (Research and Development) Washington D.C., Shock and Vibration Bulletin No. 22. Supplement.
ASTIA AD-94 697

4,428

Santos, F.R. dos 1952 SALTO PARAQUEDAS, DECISAO E PROBLEMAS.
(PARACHUTE JUMPING: DECISION AND PROBLEMS.)
Imprensa medica (Rio de Janeiro), 28 (459) : 51-67

ABSTRACT: The decision to bail out from an airplane is influenced by factors related to the aircraft (type, condition, position in the air, velocity, and degree of maneuverability), by factors related to the altitude (degree of anoxia temperature, and distance from anti-aircraft fire in combat), by terrain features, and by atmospheric conditions. Factors determining the degree of safety during the jump are as follows: acceleration during free fall, deceleration during opening of the parachute, and impact on hitting the ground.

An analysis of 50 fatal instances (17.5%) out of 400 emergency bailouts revealed the following causes: (1) bailout elevation was too low, 48%; (2) the parachute got caught in the plane, 10%; (3) the subject was hit by the plane during fall, 20%; and (4) other causes (parachute was improperly adjusted prior to jump, parachute caught fire from burning plane, drowning of airman), 22%. Bone fractures on hitting the ground occurred three times less in experienced parachute jumpers than in those who had never jumped. In conclusion, the most important reasons for the unsuccessful outcome of emergency bailouts are summarized.

4,429

Sapirstein, L. A. & E. Ogden 1961 THE CORONARY HEMODYNAMIC RESPONSE TO ENVIRONMENT.
(USAF Aero Syst. Div., Wright-Patterson, AFB, Ohio) ASD TR 61-161, Nov. 1961

4,430

Sarnoff, C. A. and J. C. Mebane 1958 EPISODIC PSYCHOGENIC G FORCE INTOLERANCE. A STUDY OF THREE CASES.
J. of Aviation Medicine 29(4):287-290, April 1958.

ABSTRACT: Intolerance to G forces was exhibited by three military aviation students, referred for study by the flight surgeons of their training organizations, which had become noticeable during acrobatic flying. None had unusual physical or neurologic findings but all possessed disturbed personality patterns and developed incapacitating anxiety under stress.

4,431

Saruta, N. & K. Shimizu 1959 A STUDY ON THE EFFECT OF A CENTRIFUGAL FORCE ON LIVING BEINGS. Kyushu J. Med. Sci. 10:251.

ABSTRACT: Insects (a vivaparous fly, the Sarcophaga peregrina) and plants (Phaseolus aureus) were subjected to multiples of G for the entire duration of their growth in order to study the effect of centrifugal force on the various stages of their biological cycle.

Of 40 larvae subjected to 20 G, eight died during the first week and the others did not go through the metamorphosis until the stage of the perfect insect. Of an equal number of larvae subjected to 9 G, four died during the first week and only eight developed into a perfect insect.

Of the larvae subjected to 4 G none died and 25 reached the insect stage. Obviously, all of the 40 control larvae lived and went through the entire process of evolution.

4,432

Sasaki, Frank T., Norman F. Eslinger & Glen L. Neidhardt 1959 MODEL TESTS AND STUDIES OF THE PROBLEMS OF DYNAMIC TENSIONS IN AIRCRAFT-ARRESTING GEAR CABLES
(American Machine & Foundry Company, Mechanics Research Division) Contract No. AF 33(616)-5282 WADC TR 59-495 Project No. 1351-60716 Oct. 1959 ASTIA AD 237 294

ABSTRACT: The results of tests performed on a one-tenth scale model aircraft arresting gear are reported. The model incorporated a means of cable tension alleviation and was designed to have dynamic similitude to a full-scale arresting gear. The purpose of the test program was to obtain experimental verification of an analytical method, developed under this same contract, for determining cable tensions in an arresting gear with the inclusion of tension alleviation.

Comparisons between actual and calculated cable tension curves are presented and show close agreement. It is, therefore, concluded that the analytical method can be used in order to determine cable behavior in an arresting gear with sufficient accuracy. Moreover, the method is a practical one.

4,433

Sauers, W. F. April 1943 TEST FLIGHT OF PRONE POSITION FLIGHT CONTROLS INSTALLED IN CG-4A GLIDER. (Inter-Office Memo, Glider Branch to Design Branch, Aircraft Lab.) 2 April, 1943.

4,434

Savely, H.E. 1945 EFFECTS OF ACCELERATION ON MAN.
(War Depart., Air Forces) TSELA-3-697-11, Feb. 28, 1945.
Appendix 1

4,435

Savely, H.E., W.H. Ames, & H.M. Sweeney 1946 LABORATORY TESTS OF CATAPULT EJECTION SEAT USING HUMAN SUBJECTS.
(AMC, Wright Field, Dayton, Ohio) Memo Rept. TSEAA 695-66C Oct. 1946. ASTIA ATI 119947

ABSTRACT: The purpose of this report is to present the results of ejection seat experiments on the 30-foot test tower using the T2 catapult. Successful utulization of the present type catapult ejection seat requires a solution to the following problems: (a) Reduction of the added acceleration imposed on the occupant because of the effects of cushioning, compression of the body, and slipping forward in the seat. (b) Provision of safeguards against extreme flexion or extension of the neck during the ejection stroke. Before human subjects are used with the next higher fractional charge of cartridges of Type IOW 6030-S, namely the 67-7-gram charge, either in aircraft or in experimental tests, a larger number of subjects should be used with the lower fractional charges in order to find a solution to the problems detailed in this report. An indoctrination program involving ejection on a test tower should be required of all personnel flying airplanes equipped with ejection seats. The two 100-foot test towers now under construction will provide experimental conditions more nearly simulating those in aircraft.

4,436

Savely, H. E. 1952 HUMAN PROBLEMS IN ESCAPE FROM HIGH-SPEED AIRCRAFT.
Air Univ. Quart. Rev., 5 (2): 65-67.

ABSTRACT: (1) The use of high-pressure masks, breathing helmets, and elastic vests has proven disadvantageous (painful distension of unprotected facial areas, pooling of blood in the limbs, leakages through the masks). - (2) Determinations of human acceleration tolerance by means of catapult devices revealed that an average of 20 g's for 1/10 second, or 25 g's for .01 second is withstood without injury. The rate of application of the ejecting force has an influence on the interaction between man and seat; slower application of force will make higher ejection velocities tolerable. - (3) Measurements carried out on the linear decelerator (deceleration cart) have shown that man can tolerate up to 45 g's wearing a simple crash harness. The rate of application of the decelerating force determines again the effect on the human organizm (shock signs were observed at deceleration rates of 1360 g/sec., while a rate of 493 g/sec. caused no ill effects at decelerations up to 40 g). Experimental investigations of decelerations of longer duration with the body rotating in one or more planes are still outstanding. (4) Wind-blast effects were measured under simulated conditions in wind-tunnel tests on unprotected humans at wind speeds up to 425 m.p.h. (normal

bailouts) and up to 470 m.p.h. (test seat ejections). Blasts at sonic speeds were directed at dummies wearing an A-13A oxygen mask and U.S. Air Force F-3 helmets. Tissues of the body protected from the direct force showed no ill effects. Medium-weight winter flying clothing affords ample protection against high-altitude temperatures (up to 80,000 ft.)

4,437

Savely, H.E. 1955 THE PHYSIOLOGY OF ESCAPE
(Paper, Symposium on Escape from High Performance Aircraft, Oct. 1955)

4,438

Savely, H.E., & J.P. Henry 1957 A NEW LOOK AT AVIATION PHYSIOLOGY
J. Aviation Med. 28(6):531-534

4,439

Savoini, C. S., G. A. Reed, & H. W. Burnette 1962 AUTOMATIC COMPUTER PROCESSING OF CHIMPANZEE PHYSIOLOGICAL AND PSYCHOMOTOR DATA. (Paper, 33rd Annual Meeting of the Aerospace Medical Assoc., 9-12 April 1962, Atlanti- City, N. J.)

ABSTRACT: The Computation Division at Holloman AFB was able to process automatically chimpanzee physiological and psychomotor data from centrifuge tests conducted at the University of Southern California by the Aeromedical Field Laboratory. The magnetic tape playback speed-up technique, the analog computer technique of handling physiological data, and the digital computer processing of physiological and psychomotor data are described. The psychomotor data was processed thru a unique method that allowed the computer to recognize the psychomotor behavior as well as reaction time. (Aerospace Medicine 33(3):350-351, March 1962)

4,440

Sawyer, E.V. 1951 LANDING OF SPACECRAFT
Brit. Interplan. Soc. J. 10:300-301, Nov. 1951

ABSTRACT: The most efficient braking device is the parachute drag brake (also known as "drogue chute" or "parabrake"). It is controlled by a drag cord passing through rings on the skirt of the canopy so that the drag force ca.. be varied

4,441

Scano, A. and G. Meineri 1961 THE ACTION OF SOME SYMPATHICOMIMETIC SUBSTANCES ON RESISTANCE TO POSITIVE ACCELERATION.
In Riv. Med. Aero. 24:335-342, July-Sept. 1961 (Italy).

4,442

Scano, A. 1961 RESEARCH ON ACCELERATIONS IN ITALY
(Paper, Panel on Acceleration Stress of the Armed Forces-NRC Committee on Bio-Astronautics, 6-11 March 1961, NASA Ames Research Ctr., Moffett Field, Calif.)

4,443

Scano, A. 1962 LA CENTRIFUGA UMANA: STRUMENTO DI INDAGINE E DI ADDESTRAMENTO (THE HUMAN CENTRIFUGE: INSTRUMENT OF RESEARCH AND TRAINING) Rivista di medicina aeronautica e spaziale (Roma) 25(1):121-130, Jan.-Mar. 1962

ABSTRACT: The human centrifuge was developed to simulate accelerations of various speeds, directions, and durations analogous to those of aircraft in order to study the physiological reactions of humans exposed to them. The first centrifuge of note, however, was used to treat mental disorders. It was built in 1818 in a Berlin psychiatric clinic, rotated at 40-50 turns per minute, and managed to attain 5 g at the outer arm level. In 1877, Salathe used a small centrifuge of 1.5 meters in diameter for acceleration studies in small animals, and in 1898, Wenusch constructed a centrifuge with a maximum velocity of rotation to about 8 g, also for treating mental disorders. It was not until 30 years later in Germany and in the United States that the first human centrifuge for research purposes was developed. In 1938, the Center of Studies and Research in Aviation Medicine, Torino, constructed the first Italian centrifuge which attained 20 g. The latter apparatus is described and illustrated, and its modifications (eventually between 1 and 33 g was attained) and research possibilities are explored. (J. Aerospace Medicine 33(10):1280, Oct. 1962)

4,444

Schafer, E. 1938-39 THE INFLUENCE OF BODY POSITION UPON ALTITUDE TOLERANCE. (Uber den Einfluss der Korperhaltung auf die Hohenfestigkeit) Luftfahrtmed., 3:257-266

ABSTRACT: The effects of postion on the heart, circulation and general condition were studied using 8 male aviators as subjects, during ascent, descent and level flight in a low pressure chamber at 6500 m. In the recumbent position, the diastolic blood pressure dropped but the increase in pressure amplitude was the highest in this position. The pulse rate attained the same frequency in all positions at a level of 6500 m.

Danger of collapse in the standing position is produced by orthostatic factors as well as by oxygen deficiency. (J. Aviation Med., 11(1):51-52)

4,445

Schaefer, Hans 1947 WORK ON PHYSIOLOGY OF THE CIRCULATORY SYSTEM AND ON ELECTROPHYSIOLOGY (BEITRAEGE ZUER KRISLAUFPHYSIOLOGIE UND ELEKTROPHYSIOLOGIE) ASTIA ATI 12793

ABSTRACT: The author reviews the research work and accomplishments of the division of experimental pathology and therapy of the W.G. Kerkhoff institute of Bad Nauheim. A four-stage amplifying apparatus was constructed for the recording of the potentials of the heart, the heart nerves, and muscles. Among the subjects studied are listed electrophysiology of the circulatory system, cardiac reflexes, sensitivity as a disease factor, anoxemia, tetanus, choline esterase, and coronary circulation.

4,446

Schaefer, J., & S. Kubicki 1956 ZUR ABLEITUNG VON EEG (EKG UND AUGENNYSTAGMUS) BEI DREHBEWEGUNGEN (RECORDING OF EEG (ECG AND EYE NYSTAGMUS) IN ROTATORY MOVEMENTS) Zeitschrift fur die gesamte experimentelle Medizin (Berlin) 128(1):50-54, Nov. 1956

ABSTRACT: An apparatus is described which permits the simultaneous registration of the vestibular optic nystagmus induced by rotation together with the effect of centrifugal forces on the electroencephalogram and electrocardiogram. A small laboratory animal may be rotated and nystamgus, EEG and ECG recorded electrically during rotation.

4,447

Schaefer, K.E., ed. 1962 ENVIRONMENTAL EFFECTS ON CONSCIOUSNESS. (New York: The MacMillan Co., 1962)

ABSTRACT: Proceedings of the First International Symposium on Submarine and Space Medicine, U.S. Submarine Base, New London, Conn., Sept. 8-12, 1958. Contents include:

Noell, W.K., Effects of High and Low Oxygen Tension on the Visual System;
Wing, K.G., Effects of Certain Environmental Changes Upon the Cochlear Response of the Cat;
Therman, P.O., Neurophysiological Effects of Carbon Dioxide;
Stein, S.N., The Neurophysiological Effects of Oxygen Under High Pressure;
Taylor, H.J., Neurophysiological Effects of Nitrogen;
Davis, H., The Problem of Consciousness;
Graybiel, A., Orientation in Space, with Particular Reference to Vestibular Functions;
Gerathewohl, S.J., Effect of Gravity-Free State;

4,448

Schaefer, V.H. and R.G. Ulmer 1959 A REPRESENTATIVE BIBLIOGRAPHY OF RESEARCH IN LOW-FREQUENCY MECHANICAL VIBRATION. U.S. Army Med. Res. Lab. Rep. 405:1-27, 12 November 1959

4,449

Schafer, G. E. and R. T. Gallagher 1952 ILLUSIONS Flying Safety 8:18-22, July 1952

4,450

Schalkowsky, S., & H. F. Blazek 1961 ROTATING PENDULUM ACCELEROMETER American Rocket Society J. 31(4):469-473, Apr. 1961

ABSTRACT: The basic features of precision accelerometers particularly adapted to the measurement of slowly varying low level accelerations and their specific applications to space vehicles are considered. The contrast between the rotating pendulum and conventional approaches to accelerometer instrumentation is discussed. (JPL)

4,451

W. Schaub 1952 GEDANKEN EINES ASTRONOMEN ZUR WELTRAUMFAHRT (THOUGHTS OF AN ASTRONOMER ON ASTRONAUTICS) Weltraumfahrt 3:34-38, April 1952

4,452

Schechter, H. B. 1960 SOME WEIGHT CONSIDERATIONS FOR MANNED LUNAR MISSIONS American Rocket Society J. 30(2):195-197, Feb. 1960

ABSTRACT: The total weight requirements for three possible types of manned, round-trip, soft-landing lunar missions are investigated, all starting out from a space station circling the earth at an altitude of about 350 miles. The first and second missions follow direct hit flight trajectories and employ chemical and nuclear power plants, respectively. Thrust magnitudes needed are determined by imposing an initial landing deceleration load factor of 3 earth g. The third mission makes use of a nuclear power plant as a sort of "ferry boat" to reach a circular orbit around the moon, whereas for the landing and ascent portions at the moon, the final payload is propelled by chemical rockets. After rendezvous with and attachment to the orbiting ferry boat, the payload is returned to the earth space station.

4,453

Scheele, Leonard A. 1957 SUMMARY OF MEDICAL ASPECTS OF AUTOMOBILE CRASH INJURIES AND DEATHS
The Journal of the American Medical Association, Vol. 163, No. 4, Jan. 26, 1957

ABSTRACT: Motor-vehicle accidents represent a health problem of tremendous significance. They demand attention as insistently as any epidemic disease. They represent the interaction of the driver, the vehicle, and the road as host, agent, and environment respectively. The driver requires study just as do the other two elements, and the licensing of drivers calls for a more extensive medical evaluation than is now provided. A cooperative effort is necessary in which manufacturers, traffic engineers, law-enforcing agencies, and the medical profession will concentrate on the solution of this urgent problem.

4,454

Scheetz, H.A. and G.J. Hasslacher, III 1959 DESIGN AND EVALUATION OF THE DROP TOWER FACILITY FOR SHOCK TESTING. (Pennsylvania State U., University Park) Technical rept. no. 17, ASTIA AD-235 360, 15 Sept. 1959

ABSTRACT: A drop tower shock testing facility for testing small end items such as panel type milliammeters was constructed. A combination pneumatic-hydraulic decelerator utilizin g a standard automobile tire was developed. The shock pulse produced was free of high frequency ringing and secondary impacts. The differential equations of motion for the deceleration cycle were derived and used to analyze the impactor displacement, velocity and acceleration. The effects of damping on the shock pulse were studied. Curves showing typical shock pulses for heights up to 60 feet are presented. (Author)

4,455

Schelhorn, A. E. 1959 A STUDY OF THE DYNAMIC RESPONSE CHARACTERISTICS OF FLIGHT SIMULATORS (Wright Air Development Center, Wright-Patterson, AFB, Ohio) WADC Technical Report 59-98, April 1959, ASTIA AD-210 566.

4,456

Schellong, F. & M. Heinemeir 1933 ÜBER DIE KREISLAUFREGULATION IN AUFRECHTER KÖRPERSTELLUNG UND IHRE STÖRUNGEN (Concerning the Circulatory Regulations in Perpendicular Body Position and Their Disturbances)
Zeitschrift für die gesamte experimentelle Medizin (Berlin) 89: 49-60

4,457

Scher, S. H. 1948 PILOT ESCAPE FROM SPINNING AIRPLANES AS DETERMINED FROM FREE-SPINNING-TUNNEL TESTS (National Advisory Committee for Aeronautics, Washington, D. C.) Research Memo. No. L8D28. Sept. 9, 1948.

4,458

Scher, S. H. 1951 PILOT ESCAPE FROM SPINNING AIRPLANES AS DETERMINED FROM FREE-SPINNING-TUNNEL TESTS. (National Advisory Committee for Aeronautics, Washington, D. C.) Oct. 1951.

ABSTRACT: Procedure for pilot escape from spinning airplanes has been determined by means of tests in which pilot escape was simulated from 21 airplane models spinning in the Langley 20-foot free-spinning tunnel. The results in general indicated that the pilot should bail-out of the outboard side. Calculated centripetal accelerations acting on the pilot during a spin are presented.

4,459

Scherberg, M.G., & H. Ferguson 1952 INVESTIGATION OF THE ACCELERATION AND JOLT HISTORIES DURING ESCAPE FROM HIGH SPEED AIRCRAFT (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 52 278, Oct. 1952. ASTIA AD-5010

ABSTRACT: Accelerations having short durations (less than 5 sec) and orders of magnitude above 2 g were represented by the equation of motion, $X = K \times 2$, where $\dot{x}$ and $\ddot{x}$ are the velocity and acceleration, respectively, and K is a positive constant. Calculations of the maximum acceleration expected at a given time (t) after the initiation of escape were made to obtain upper bounds for escape acceleration histories depending only on the initial velocity of escape. Graphs of these upper bounds are given for t = 0.5 to 4.0 sec and for initial speeds at 200-mph intervals, from 400 to 1800 mph. For upper bounds from t - 0.0 to 0.5, the method was not applicable; an alternate method is given for these values. Graphs which show the rate of onset of acceleration (defined as a jolt and represented by the third derivative $\dddot{x}$) as a function of the initial acceleration are included for initial speeds from 400 to 1800 mph in 200-mph intervals. Contrary to the upper-bound results, the jolt results appeared to be valied at transonic and supersonic as well as at heoretically, around the calves than around the thighs. This differential is not provided by leggings.
(e) It is suggested that the tilt table is a valuable testing instrument for anti- "g" devices.

4,460

Scheubel, F. N. 1950 PARACHUTE OPENING SHOCK
In German Aviation Medicine, World War II
(Government Printing Office, Washington, D. C.) Vol. I, pp. 599-611

4,461

Scheuler, O. 1959 SPACE FLIGHT SIMULATORS.
In Alperin, M. and H.F. Gregory, Eds., Vistas in Astronautics
(New York: Pergamon Press, Ltd.) Vol. II

4,462

Schiele, J. S., & H. B. W. Sheasby 1961 RUNWAY DECELERATION TESTS WITH WESTINGHOUSE DECELOSTAT CONTROLLER EQUIPMENT. (Central Experimental & Proving Establishment, Canada) Addendum No. 1 to CEPE Rept. No. 1536; ASTIA AD-261 243; May 1961

SUMMARY: The Cosmopolitan anti-skid brake tests proved the Westinghouse Decelostat System to be reliable and effective in stopping the aircraft without tire damage. Although the operation of the system was not as smooth as that of comparable equipment now in service, it was considered satisfactory for installation on all Cosmopolitan Aircraft. (AUTHOR)

4,463

Schinkl, K. 1957 THE EFFECT OF AIRCRAFT SPINS ON THE HUMAN BODY.
(Einwirkung des Trudelvorganges auf den menschlichen Korper)
Zeitschrift fur Flugwissenschaften (Braunschweig), 5(8): 221-227

ABSTRACT: The effects of the radial and angular accelerations generated in a spin of an aeroplane on the human body are discussed. The danger from radial and angular accelerations is threefold: (1) the impairment of free movements of body and limbs, the weight of which is increased many times as the result of acceleration, (2) the impairment of vision and consciousness due to impeded cerebral circulation at certain positions of the body during the spin, and (3) the impairment of the sense of direction because of incompatible information from the visual senses and the vestibular system. The receptors in these organs are greatly overstimulated by the angular accelerations of the spin. Certain prophylactic measures are reviewed.

4,464

Schlang, H.A., A.L. Hasleys & R.J. Pearson, Jr. 1957 COARCTATION OF THE AORTA WITH RESISTANCE TO BLACKOUT FROM ACCELERATION FORCES.
U.S. Armed Forces Med. J. (Wash) 8(5):725-729. May 1957.

4,465

Schlomka, G. 1938 EFFECT OF FLYING ON THE CIRCULATION. Med. Klin., 1: 421-423

ABSTRACT: Flying makes two special claims on the circulation. One arises from the accelerations occurring in precipitate flying when the plane curves or is intercepted; these accelerations affect the circulation directly; the other claim comes from the indirect effect of the heart on the deficient O_2 saturation of the blood. The blood displacement appearing from the effect of centrifugal accelerations- there takes place, according to the opinions of many workers, a "coagulaton" of the blood in the vessels of the lower part of the body at the expense of the cranial vascular regions - seems to constitute the true circulatory dynamic factor at such accelerations. This blood displacement means, hemodynamically, for the circulation the same thing as a sudden vasomotor failure, although the clinical phenomena do not exactly resemble the latter. At attempts to restrain failure of circulation in high accelerations, the author warns of the use of abdominal muscular pressure, as there is the fear that it is done more or less in the shape of the Valsalva pressure which leads, because of the lessening blood influx into the right ventricle, to an undesired premature failure of the circulation. Raising of the acceleration endurance by crouched posture and consequent confénement of respiration and the squeezing out of the blood reservoir of the abdominal viscera appears possible if this measure can be carried out the flying practice. For very considerable accelerations the possibilities of the swinging seat are pointed out.

THE INFLUENCE OF SPEED IS OF GREAT IMPORTANCE TO THE CIRCULATION. THE MAIN role is played here by the centrifugal acceleration. The latter effects a disproportionate distribution of the blood in the body and a reduction in the circulatory amount of blood. The sound circulation is capable of setting against it a great number of compensatory forces, but the faulty circulation is seriously endangered thereby. The amounts of blood engorged in individual portions of the body by the centrifugal acceleration may cause blood vessels to burst, especially so if they are changed by arteriosclerosis. Further-more atmosphereic illness which is identical with sea-sickness, has a bad effect upon the injured circulation. The author concludes that flying entails a considerable burden on the circulation and that, therefore, persons with faulty circulation should abstain from flying.

4,466

Schmaltz, G. 1932 THE PHYSICAL PHENOMENA OCCURRING IN THE SEMICIRCULAR CANALS DURING ROTATORY AND THERIME STIMULATION. Proc. Roy. Soc. Med. 25:359-381

4,467

Schmidt, C.F. 1943 SOME PHYSIOLOGICAL PROBLEMS OF AVIATION. Tr. Stud. Coll. Physicians, (Philadelphia) 11:57-64

ABSTRACT: Lately engineers have provided us with airplanes capable of greater

speed, maneuverability, altitude and range, than human beings could tolerate without dangerous or fatal consequences. The success of aviation, therefore, depends on intimate and effective association between medical research groups, engineers and training groups

Regarding high altitudes, up to 8,000 feet, usually no effects are discernible, except slight acceleration of the pulse, but above, safe zone symptoms of anoxia begin. Above 35,000 feet anoxemia develops; 50,000 feet being the absolute ceiling for flight with ordinary oxygen equipment.

In problems related to motion (effect of centrifugal force) the loss of vision or consciousness is due to acute anemia of the retina and of the brain, because of decreased cardiac output.

In dive bombing, it is customary to open flaps in the wings to slow the dive, so that the pilot may pull out without "blacking out", but this makes the plane an easier target.
When the plane is turned with the pilot's head outward (negative acceleration), the phenomena are those of acute cerebral congestion, leading to mental confusion or red vision ("red-out".)

4,468

Schmidt, I. 1938 BIBLIOGRAPHIE DER LUFTFAHRTMEDIZIN. (Bibliography of Aviation Medicine)
(Berlin: J. Springer, 1938)

ABSTRACT: The first volume of an important bibliography, covering the literature in aviation medicine and high-altitude research up to the end of the year 1936. Constitutes a survey of world literature on the subjects of psychophysiology of the flier, altitude research, acceleration research (including centrifugal forces, parachute jumping, and air sickness), accidents, effects of sound, fatigue, flying sickness, flying fitness and aviation hygiene.

4,469

Schmidt, I. 1943 BIBLIOGRAPHIE DER LUFTFAHRTMEDIZIN. ZWEITE FOLGE. EINE ZUSAMMENSTELLUNG VON ARBEITEN UBER LUFTFAHRTMEDIZIN UND GRENZGEBIETE, 1937 BIS ENDE 1940. (Bibliography of Aviation Medicine, Part Two).
Luftfahrtmedizin Vol. 8, No. 1, March 1943.

ABSTRACT: The second volume of an important bibliography, covering the literature in aviation medicine and high-altitude research through the years 1937 to the end of 1940. Constitutes a survey of world literature on the subjects of psychophysiology of the flier, altitude research, acceleration research (including centrifugal forces, parachute jumping, and air sickness), accidents, effects of sound, fatigue, flying sickness, flying fitness and aviation hygiene.

4,470

Schmidt, I. 1948 BIBLIOGRAPHY OF AVIATION MEDICINE. VOLUME III. (Incomplete) (School of Aviation Medicine, Randolph Air Force Base, Texas)

ABSTRACT: A compilation of reports pertaining to Aviation Medicine and its borderline fields, covering the years 1941 through 1945, and including supplementary references for the year 1940.

After the present material had been supplemented above all by Anglo-American literature, it was supposed to be published as the third volume of the "Bibliographie der Luftfahrtmedizin". But the war prevented its completion. As we believe that these references will be of interest to many an aeromedical scientist, they will be disseminated for public use. The references concern first of all German publications, but include also those foreign papers which have been accessible. Anglo-American references have been omitted, since they are all listed in the "Bibliography of Aviation Medicine" by E. C. Hoff and J. F. Fulton.

4,471

Schmidt, L. 1952 VERSUCHE ZUR LIEGENDEN UNTERBRINGUNG DES FLUGZEUGFUEHRERS (Investigations on the Prone Position for Pilots) (Royal Aircraft Establishment, Gt. Britain) Library Trans. No. 396 Jan. 1952.

ABSTRACT: The 'B.9" is a twin engine, cantilever, lowwing monoplane of composite construction, stressed for an ultimate factor of 22 g. The pilot is placed in the fuselage nose. The bed on which the pilot lies is provided with for and aft adjustment and an adjustable chin rest. There are arm rests, and the legs are slightly bent. A back parachute replaces the conventional chest-type parachute. Modified stick controls (in preference to wheel controls) are used. Brakes and rudder are controlled by the feet in the conventional manner. All secondary controls and switches are situated on the port side of the fuselage. The prone position was considered comfortable by the pilots. Fatigue was experienced by some in the nape of the neck and in the shoulders. The chin rest was considered disturbing in horizontal flight. The relative position of the field of view, as compared to the seated position, shifted into a position with the main line of vision declined 30 degrees below the horizon. Flight handling was not encountered difficult. The feeling os "suspension" was absent in the vertical dive. Maximum accelerations of 8.5 g pullouts and 6 g in steep spirals were tolerated over several seconds.

4,472

Schmitt, T.J. 1954 WIND-TUNNEL INVESTIGATION OF AIR LOADS ON HUMAN BEINGS. (Navy Department, The David W. Taylor Model Basin Aerodynamics Lab., Washington, D.C.) Report 892 Aero 858, Jan. 1954.

ABSTRACT: An investigation was conducted in the Taylor Model Basin 8- by 10-foot subsonic, atmospheric Wind Tunnel 2 to determine the drag coefficient

of man. Tests were made at several yaw angles with subjects of various sizes in five body positions: standing, sitting, supine, and two squat positions. Data were obtained for the subjects in both the clothed and nude conditions.

A parameter was formulated from the available physical characteristics of the subjects tested and all coefficients were based on this. Drag coefficients were obtained which should be reliable in predicting drag forces on men of average stature under a variety of conditions. Lift, side force, and moments were also obtained which indicate relative trends of motion for each position.

4,473

Schnee, L. 1961 CENTRIFUGE AND SIMULATED HIGH ACCELERATION TEST ANALYSIS AND RESULTS OF THE 16 PIGA. (Instrumentation Lab., Mass. Inst. of Tech., Cambridge) Report no. E-1079, ASTIA AD-335 392, Nov 1961

4,474

Schneider, B. A. 1945 THE INJURY RECORD FOR PLANES INVOLVED IN ACCIDENTS, U. S. ARMY AIR FORCES, CONTINENTAL U.S. FOR JAN. 1944 - JUNE 1945 (Office of Air Surgeon, Washington, D. C.)

4,475

Schneider, J. 1938 SEGELFLUG UND UNFALL. (Sailplane and Accidents) Luftfahrtmed., 2:303-313

ABSTRACT: This is a general review article in which the author discusses the typical injuries arising from glider crashes. He advocates a flat pedal rather than the rod type of rudder control, to minimize fractures of the talus, seats that permit forward motion of the body instead of the "anatomical" design in use, and adequate shoulder harnesses and crash helmets.

4,476

Schneider, J. 1938 MEDICAL PEHNOMENA OBSERVED DURING A GLIDER FLIGHT IN A THUNDERSTORM - PART 5 OF 10 PARTS

ASTIA ATI 60991

ABSTRACT: Phenomena observed on an aviator injured in a glider flight in a thunderstorm are analyzed. Photographs of the lacerated face and swollen hands show the seriousness of the case. Embolism occurred in the third week after flight. For a long time the heart condition remained labile. The discussion of the case described includes several suggestions, such as, after reaching a certain altitude, covering the face and ears of the flier with a heavy cream layer. It is stressed that electrostatic dangers in high-altitude gliding are negligible in comparison with dangers produced by cold.

4,477

Schneider, J. 1950 DER MENSCH IM SCHWERFELD. (Man in a Gravitational Field). Weltraumfahrt. 1. 82-85.

4,478

Schneider, Justus 1950 PROTECTION MEASURES FOR PREVENTION OF INJURIES-ESPECIALLY SPINAL FRACTURES IN AIRCRAFT ON SKIDS. German Aviation Medicine-World War II, pp 612-616.

4,479

Schneider, R. C., E. Reifel, H. O. Crisler, & B. G. Oosterbaan 1961 SERIOUS AND FATAL FOOTBALL INJURIES INVOLVING THE HEAD AND SPINAL CORD. J. American Medical Association 177(6):362-367, August 12, 1961

ABSTRACT: A neurosurgical review was made of the direct football fatalities in the 1959 season, with a study of the postmortem findings and types of injury. Three case reports have been presented in detail to show the types of injury. One of these mechanisms of cervical injury was due to vascular insufficiency of the vertebral arteries following severe cervical hyperextension, resulting in the syndrome of acute central cervical spinal cord injury. A patient with such an injury made a complete recovery. In the second case report the player had severe hyperextension of the cervical spine with fracture-dislocation, tetraplegia, and death. The third case, discussed in detail, showed an atlanto-axial dislocation with probable vertebral artery compression, cord injury, and death within one and a half hours. Three other patients listed in the summary of 1959 case fatalities exhibited a serious injury due to hyperextension of the cervical spine.
The possibility of carotid artery injury with severe torsion due to wrenching of the face guard was described.
On the basis of these studies suggestions were made concerning revision of the helmets with special attention to alteration and type of materials of which they are constructed, the removal or changes in the plastic face guard, and improvement in the chin strap.
The remarkable thing about such an investigation is that considering the vast number of participants in football there are only an infinitisimal number of fatal injuries. (AUTHORS)

4,480

Schneider, W. G., E. B. Wilson, P. E. Cross, et al., ed. M. P. White 1946 EFFECTS OF IMPACT AND EXPLOSION. (Office of Scientific Research and Development, and National Defense Research Committee, Division 2, Washington, D.C.) Vol. I; ASTIA ATI-37 735

ABSTRACT: A summary technical report by NDRC covers the study of the effects of impact and explosion research as carried out was divided into five categories,

namely: explosions in air, water and underground with the inclusion of muzzle blast control; the terminal ballistics of steel armor, concrete, plastic protection, and earth, and the development of a frangible bullet for training aerial gunners. Other investigations covers the properties of matter concerning the propagation plasticity in solids, the behavior of steels under very large pressures, and the design of a separate wind tunnel; studies of protective measures; of the application of information on weapon and effectiveness to the problems of selective weapons for specific targets, and with estimated resulting damage.
CONTENTS INCLUDES:

Schneider, W. G., et al., Underwater Explosives and Explosions;
Kennedy, W. D., Explosions and Explosives in Air;
Lampson, C. W., Explosions in Earth;
Slade, J. J., Jr., Muzzle Blast, Its Characteristics, Effects & Control;
Beth, R. A., Fundamentals of Terminal Ballistics;
Curtis, C. W., Terminal Ballistics of Armor;
Beth, R. A., Terminal Ballistics of Concrete;
Stipe, J. G., Jr., Terminal Ballistics of Plastic Protection;
Stipe, J. G., Jr., Terminal Ballistics of Soil;
Cross, P. E., et al., The Frangible Bullet for Use in Aerial Gunnery Training;
Puckett, A. E., Design of Model Supersonic Wind Tunnel
White, M. P., Behavior of Materials under Dynamic Loads;
Bridgman, P. W., et al, Deformation of Steel under High Pressure;
Pugh, E. M., Defense against Shaped Charges;
White, M. P., Structural Protection;
Stipe, J. G., Jr., Target Analysis and Weapon Selection;
Slutz, R. J., The Division 2 Technical Library;
Stipe, J. G., Jr., Training of Operation Analysts;
Stipe, J. G., Jr., Weapon Data Sheets;

(CARI)

4,481

Schock, G. J. D. 1960 AIRBORNE GSR STUDIES A PRELIMINARY REPORT
Aerospace Medicine 31(7):543-546 July 1960

ABSTRACT: Evidence gained from subjects exposed to pre-weightlessness accelerations and weightlessness suggest changes in GSR and heart rate to be due to emotional factors rather than to weightless or positive G. Instrumentation techniques for high performance aircraft are presented for measuring GSR and heart rate of human subjects.

4,482

Schock, G.J.D. 1960 PERCEPTION OF THE HORIZONTAL AND VERTICAL IN SIMULATED SUBGRAVITY CONDITIONS.
U. S. Armed Forces Med. J. 11:786

ABSTRACT: This investigation was conducted with the aim of ascertaining the role played by the labyrinth in the perception of the body position in subgravity

conditions. The subject was seated in a special rotating chair and had to orient a fluorescent rod in a dark room without any reference marks, according to his own evaluation of the true horizontal and vertical. The error relative to the real coordinates was measured with a special device.

The tests were carried out under the following conditions: 1) head inclined to the lefy at 45° (upheld by a special support); 2) body inclined to the left at 42°; 3) body inclined to the left at 28°; 4) seated, with head and rtunk erect. The tests were executed on the ground and in the water. In the latter case the subject was wearing a breathing set. Each of the five subjects gave eight evaluations, four for the horizontal and four for the vertical, alternating the rotation of the rod from clockwise to anticlockwise.

On the whole, the tests have shown that absolute orientation deteriorates when the subject lacks any visual reference point under subgravity conditions, and that body position has an important bearing upon this function.

4,483

Schocken, K., & S.J. Gerathewohl 1960 A QUANTITATIVE EVALUATION OF THE ELECTROCARDIOGRAMS OF TWO SQUIRREL MONKEYS UNDER CHANGING CONDITIONS. (Army Ballistic Missile Agency, Redstone Arsenal, Alabama) Rept. No. DV-TN-12-60

ABSTRACT: The following cardiodynamic effects of changes of the gravitational force have been previously observed: 91) a marked increase in cardiac rate occurs in almost all subjects during acceleration and deceleration periods, (2) the electrocardiogram is generally normal in the zero-G state, (3) the heart rate is increased and unstable during post-acceleration weightlessness, (4) transient changes may occur in the electrocardiogram if the state of the gravitational field changes, (5) the steady cardiodynamic state seems to be the same for zero G as for the one G condition, (6) increased G loads lead to the condition of physiological stress, (7) the absence of G-forces is a mechanically stressless condition, (8) the stresses imposed by acceleration and the condition of weightlessness encountered in aircraft and missile flights are within the range of tolerance of the human and animal organism. These cardiodynamic effects are confirmed by the electrocardiographic findings of the 2 bioflights of monkeys. A rigorous statistical evaluation of the limits of normality, in a similar manner as was carried out previously in humans, is possible and can be performed as soon as sufficient statistical material is available.

4,484

Schoeck, P., & F. Halberg 1962 EFFECTS OF DECELERATION IN MAN ON PLASMA 17-HYDROXYCORTICOSTEROIDS. Minnesota Med. 45(6):625-631, June 1962

ABSTRACT: A 34-year-old male volunteer was subjected to rapid acceleration

followed by prompt deceleration. Plasma hormone determinations were made 15, 30, and 105 minutes following a crash against a wall at 25 m. p. h. These 17-hydroxy-corticosteroids values seem significantly elevated, compared with the mean values expected at corresponding times when a two-fold standard of comparison is used. A 24-hour profile on the same subject on an uneventful day is made available for comparison. (AUTHOR)

4,485

Schoenherr, K.E. and W.F. Brownell 1963 THE HIGH-SPEED BASIN AND INSTRUMENTATION AT THE DAVID TAYLOR MODEL BASIN. (David Taylor Model Basin, Washington, D.C.) Report no. 1660, ASTIA AD-297 122, January 1963

ABSTRACT: The 2968-ft high-speed model basin and several instrumentation systems used for testing a wide variety of models such as full-scale, torpedoes towed and self-propelled, hydrofoils, planing boats, pumpjets, propellers, and other high-speed vehicles are described. Information concerning the basin; towing carriages; and propulsion, force, and speed measuring instrumentation is presented. Typical test procedures and usage of the carriages are discussed. New instrumentation nearing completion, which will greatly extend the high-speed basin testing capabilities, is described. (Author)

4,486

Scholander, P.F. 1943 FINAL REPORT ON TEST OF ANTI "G" DEVICES FOR PILOTS (ANTI-BLACKOUT DEVICE) (Eglin Field, Proof Dept., AAF Proving Ground Command) Serial No. 7-43-9., 4 Nov. 1943

ABSTRACT: (a) The Berger Bros. gradient pressure suit and the Clark Wood arterial occulusion suit were compared by 24 experienced pilots. Both suits were effective in preventing blackout up to 8 to 9.5 "g" in planes. Both effectively prevent "g" fatigue.
(b) When 2 to 3 "g" are held continuously for two to ten minutes, the AOS produces severe pain or distracting discomfort in the limbs. No discomfort is produced by the GPS when 2 to 3 "g" are held continuously for 20 minutes. Hence the GPS is preferred by most pilots. Both suits are comfortable when worn outside aircraft and offer good flotation.
(c) The GPS pressure equipement operates satisfactorily from the standard instrument vacuum pump with special oil filter in tests up to 33,000 feet. The few failures encountered in the tests could be easily prevented in the future. The AOS requires an electric motor, pump, and switch to power it. Serious failures in the powering devices occurred. Out of 4 pumps tested, one was completely broken in the process and 2 partially broken.

4,487

Scholtz, G. 1935 AKTUELLE FRAGEN DER PHYSIOLOGIE DES FLIEGENS (Actual Questions About the Physiology of Flying)
Deutsche Medizinische Wochenschrift (Stuttgart) 61: 780

4,488

School of Aviation Medicine 1959 REPORTS ON SPACE MEDICINE - 1958 (School of Aviation Medicine, Randolph AFB, Texas)

ABSTRACT: A series of articles and reports by research scientists at the School of Aviation Medicine, USAF, including:

1. Human Performance in the Space Travel Environment, George T. Hauty
2. Supersonic and Hypersonic Human Flight, Julian E. Ward, Siegfried J. Gerathewohl and George R. Steinkamp
3. Human Engineering of the Sealed Space Cabin, Julian E. Ward and George R. Steinkamp
4. Fatigue, Confinement, and Proficiency Decrement, George T. Hauty and R.B. Payne
5. The Feasibility of Recycling Human Urine For Utilization in a Closed Ecological System, Willard R. Harkins
6. Space Cabin Requirements as Seen by Subjects in the Space Cabin Simulator, Willard R. Hawkins and George T. Hauty
7. Weightlessness: The Problem and the Air Force Research Program, Siegfried J. Gerathewohl

4,489

Schreiber, B., T. Gualtierotti, D. Mainardi and D. Passerini 1957 EFFECTS OF ACCELERATIONS ON CEREBELLAR POTENTIALS IN BIRDS AND ITS RELATION TO THE SENSE OF DIRECTIONS. (Italy, University of Milan)
Technical note AFOSR TN-57-519, ASTIA AD 136 601, Jun 56-May 57
Also: Am. J. Physiol., 197(2):469-474, Aug 1959

ABSTRACT: Rotatory and post-rotatory cerebellar responses of homing and domestic pigeons and of migratory and sedentary doves have been studied by means of a centrifuge, the speed and plane of rotation of which could be changed at will. No appreciable differences have been found in the rotatory cerebellar responses in any of the animals tested.

4,490

Schreiber, H. 1952 THE MAZE OF ACCIDENT STATISTICS
Interavia, Geneva, 7:196 April 1952

4,491

Schrenk, O., R. Irrgang 1941 UNTERSUCHUNGEN ZUM SITZKATAPULT (Studies for the Design of Ejection Seats) ASTIA ATI 71651

4,492

Schrenk, O., & R. Irrgarg, tr. J. B. Bateman 1945 STUDIES ON THE CATAPULT SEAT. (Zentrale Fur Wissenschaftliches berichtswesen der Luftfahrtforschung Des Generalluftzeugmeisters) Technische Berichte 8:24-30, 1941.
Translated as Appendix 3 to Lovelace, W. R., E. J. Baldes, & V. J. Wulff, The Ejection Seat for Emergency Escape from High-Speed Aircraft.

ABSTRACT: The accelerations which can be tolerated by human beings depend very greatly upon direction and are also significantly greater when the time of action is short than they are when it is long. These physiological conditions must be taken into account in the design of a catapult seat. During the process of ejection of a pilot successive accelerations acting in different directions come into effect. It is shown by experiments with models and by calculations at the Ernst Heinkel aircraft factory that the accelerations which occur are physiologically tolerable although they sometimes approach the limit of tolerance. The vertical accelerations required in the actual ejection are especially favorable when designed for the clearance of a double tail (7 g, compared with 18 g in the case of a central vertical stabilizer). The backward acceleration caused by air movement is about 24 g in the most unfavorable case considered here (v = 900 km./hr.; see Figure 16). This acceleration can just be tolerated in the vertical position; it diminishes very rapidly. Steps must be taken to insure that after the ejection the pilot is not turned head over heels and thus brought into the physiologically dangerous horizontal position in which the acceleration will act in the direction of the feet. It is best to arrange for a gentle backwards rotation under all conditions. The results of the investigation are established by means of various model experiments and calculations. (Author)

4,493

Schroeder, F.J., R.H. Putz et al. 1956 FEASIBILITY STUDY OF A HIGH G CENTRIFUGE (Aircraft Armaments, Inc., Cockeysville, Md.) Rept. no. ER-953, Contract DA 36-039-sc-72311, 1 June-31 Aug 56. Oct 1956, ASTIA AD-111 965.

ABSTRACT: "This report contains a summary of the design work done to date on the high G centrifuge. The procedure, assumptions, and equations used in the design of the centrifuge containers, arm, and shaft are discussed in detail, covering such facotrs as strength, aerodynamic drag, flutter and vibration, and choice of material and working stresses. In addition, consideration is given to the selection of suitable shaft bearings, power plant, and vacuum pumps. The preliminary design of the evacuated test chamber is qualitatively presented. A number of drawings predicated on the above design considerations are included at the end of the report. It is felt that no problem has presented itself to date whose seriousness is sufficient to jeopardize the feasibility of the design (Contractor's abstract)

4,494

Schroeder, F. J. 1956 FEASIBILITY STUDY OF A HIGH G CENTRIFUGE, SECOND QUARTERLY REPORT FOR THE PERIOD 1 SEPTEMBER 1956 TO 30 NOVEMBER 1956. (Aircraft Armaments, Inc., Cockeysville, Md.) ASTIA AD-121 744.

4,495

Schroeder, H. A., & O. Horwitz 1943 ANALYSIS OF CRASHES FROM THE VIEWPOINT OF CERTAIN PHYSIOLOGICAL DISTURBANCES. (Naval School of Aviation Medicine, Pensacola, Fla.) Research Rept. X-115., 22 Feb. 1943.

ABSTRACT: Of 30 crashes occurring in the past 6 months at Pensacola in two-seated trainers, 19 were due to obvious causes (fatalities - 4). The remaining 11 (8 fatalities) were due to a combination of vertigo and acceleration.

4,496

Schroeder, H. A. 1945 HIGH ACCELERATIONS IN INTERMEDIATE TRAINING: INCIDENCE OF SYMPTOMS AND AN ESTIMATE OF TOLERANCE TO "G". (Naval School of Aviation Medicine, Pensacola, Fla.) Research Rept. X-71; 12/29/45

ABSTRACT: Questionnaire submitted to students and instructors showed that one-half had either grayed or blacked out, one-eighth did so frequently. The "g" involved was never over 6 and was usually less than 5 "g" applied for less than 4 seconds. Pilots were very ignorant as to the cause of blackout. In 165 cases, Immelman turns, split S's, sharp pull outs and pull ups were the most frequent causes of blackout.

4,497

Schroeder, H.A. 1951 PREVENTION OF INJURIES DUE TO CRASH. J. Aviation Med. 22:306-311

4,498

Schroeder, H. A. 1953 PERTINENT STUDIES OF HUMAN TOLERANCE TO ACCELERATION Shock and Vibration Bulletin No. 19.

4,499

Schroers, R. 1951 SOME DEVELOPMENTS FOR GREATER CRASH SAFETY IN AIRCRAFT (Civil Aeronautics Administration) Oct. 1951

4,500

Schubert, G. 1931 ÜBER DIE PHYSIOLOGISCHEN AUSWIRKUNGEN DER CORIOLISKRÄFTE BEI TRUDENBEWEGUNG DES FLUGZEUGES, VORLÄUFIGE MITTEILUNG (Concerning the Physiological Effects of the Coriolis Forces During Rolling Movement of the Airplane, Temporary Announcement)
Acta oto-laryngologica (Stockholm) 16: 39

ABSTRACT: Coriolis forces are forces due to a coriolis acceleration. Accelerations perpendicular to the track of the relative movement occur in all relative movements in which the system rotates. There are no prescribed movements for the pilot because, depending on the movements of the plane, a certain movement of the head may hinder or help, for it may produce delusory perceptions which would prompt the pilot to steer the plane the wrong way. It is desirable to keep still and to try to keep looking at the horizon or the earth's surface.

4,501

Schubert, G. 1932 DIE PHYSIOLOGISCHEN AUSWIRKUNGEN DER CORIOLIS-BESCHLEUNIGUNGEN BEI FLUGZEUGSTEIGERUNG (The Physiological Effects of the Coriolis Accelerations During Aircraft Ascent)
Zeitschrift für Hals-, Nasen- und Ohrenheilkunde (Berlin) 30: 595-604.

4,502

Schubert, G. 1933 LES EFFETS PHYSIOLOGIQUES DES ACCELERATIONS DE CORIOLOS (The Physiological Effects of Coriolis Accelerations)
Congr. int. Sécurité aérien. (Paris) 4(9): 151-155

4,503

Schubert, G. 1934 AKTUELLE MEDIZINISCHE FRAGE IN DER AVIATIK. (Actual Medical Problems in Aviation.) Med. Klin., 30: 1321-1326, October. 5, 1934

ABSTRACT: In considering the disturbances caused by aviation it is necessary to take into account the effects of various types of flight, i.e., oblique, level and centrifugal.

In oblique flight hyperirritability of the labyrinth is likely to occur with abnormal Purkinje turning sensations, falling reactions and nausea. The simultaneous depressor vascular reflex may lead to transitory deficiency of the cebral circulation.

In level flight one has to consider the air-pockets. Here proper strapping of the pilot is of paramount importance to prevent air sickness from irritation of the otolith apparatus.

In centrifugal flight the circulatory effect is due to increased bydrostatic pressure. The vascular region below the heart is dilated, filling the venous reservoirs and diminishing the circulating blood, the end phase consisting in empty pulsation of the heart.

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Schubert, G. 1935 PHYSIOLOGIE DES MENSCHEN IN FLUGZEUG. (Physiology of human subjects in flight) (Berlin: Springer, 1935)

ABSTRACT: This book is published as vol. 34 of the monograph. A.d. Gesgeb. d. Physiol. der Pflanzen u. Tiere. The book is written largely from the standpoint of the neurologist but contains chapters on respiration, circulation, metabolism and altitude flying. Each chapter has a bibliography and there is a good index. The effects of flying on the different senses and on the central nervous system are discussed. One reviewer emphasizes that one great merit of the book is that it shows how very much in its infancy the study of physiology of aviation still remains, and the wide field that still remains to be explored. ABSTRACT: Journal of Aviation Medicine , 8 (1): 60, March 1937

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Schubert, G. 1936 PHYSIOLOGIE DES FLIEGERS (Physiology of the Flyer) Münchener medizinische Wochenschrift (Munich) 83: 374

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Schubert, G. 1954 CORIOLIS-NYSTAGMUS. J. Aviation Med. 25(3):257-259.

SUMMARY: Coriolis-accelerations elicit typical vestibular nystagmus in human subjects as revealed by the electro-nystagmogram. In the experiments the Coriolis accelerations were produced by bending or raising the head during a rotation with constant angular velocity (turning chair). By this, with respect to man, an objective evidence is furnished for the supposition that the Coriolis-acceleration produces an additional endolymph flow in the semi-circular canals. Consequently it becomes obvious that the sensations of tilting as well as the symptoms of nausea are caused by excitation of the semicircular canal system.

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Schubert, G. 1959 VESTIBULAR FUNCTION AND GRAVITY
(2nd World and 4th European Congress on Aviation & Space Medicine, Rome, Italy, 27-31 October 1959)

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Schubert, G., & H. Kolder 1962 FACTOR ANALYSIS OF SPACE ORIENTATION. Rivista di medicina aeronautica e spaziale (Roma) 25(1):64-86, Jan.-Mar.1952

ABSTRACT: Information from the visual system sufficed to set the apparent vertical according to visual clues in four persons exposed to radial accelerations on

a centrifuge of 2.5 g. At 3 g, space orientation according to visual clues was more difficult. Without visual clues, information originating in the otolithic organs improved perception of resultant acceleration proportionally to the degree of tilting of the longitudinal axis of the head toward the direction of resultant acceleration. Information from somesthetic receptors did not interact with perception of the direction of resultant acceleration mediated by labyrinthine receptors, as long as the direction of acceleration acting on them was oblique. The change in perception of the apparent vertical with head tilting was different when the direction of the longitudinal axis of the body coincided with the direction of the resultant acceleration without visual clues. Information from somesthetic receptors, acted upon in the "normal" direction, suppressed to a certain degree additional information from the otoliths. There was no further improvement of the setting of the apparent vertical unless the longitudinal axis of the head was placed about 10 degrees toward the direction of the resultant acceleration. (Aerospace Medicine 33(10):1269, Oct. 1962)

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Schuetze, U. 1940 EFFECT OF HIGH WIND VELOCITIES ON THE HEAD (UNTERSUCHUNGEN UEBER DEN EINFLUSS HOHER WINDGESCHWINDIGKEITEN AUF DEN KOPF)
ASTIA ATI 25690

ABSTRACT: Wind-tunnel tests on models, and flight tests on human subjects were made in an effort to determine the maximum accelerations the human head can withstand without danger. Results have shown that a dynamic pressure up to 1130 kg/m^2 could be safely withstood without a head-rest, breathing was still possible, and the eyes withstood the pressure well. At pressures over 2000 kg/m^2 goggles become a danger to the eye. With a head-rest 2 or 3 times the width of the head, flutter of the cheeks decreases, breathing is made easier, and periodic opening of eyes is possible.

4,510

Schütze, U. 1941 STUDIES CONCERNING THE EFFECT OF HIGH WIND VELOCITIES ON THE HEAD. Luftfahrtmedizin 5(4):322-336

ABSTRACT:

Experiments in the wind tunnel and in aircraft are reported. These experiments show the tolerance of the human head to those high wind blast pressures which occur at the velocity of flight of modern aircraft. Following the description of the experimental setup, the results are set forth and illustrated by means of curves and diagrams. When the human head was unsupported it was found that wind blast pressures up to 1130 kg/m^2 (1.6 p.s.i) (corresponding to wind velocities of 500 km/h (311 m.p.h) near ground level) can be well tolerated on the whole. It was still possible to breathe under these conditions. The eyes also withstood the pressure well. In one

experiment an accident occurred; this is discussed in detail. Various types of breathing mask and mouthpiece were investigated from the point of view of their appropriateness for use in bailing out from high speed aircraft. It was found that even with wind blast pressures of 30 to 450 kg/m2 (0.5 to 0.6 p.s.i.) these devices were blown away, especially when the head was turned slightly away from the wind.

4,511

Schütze, U., tr., J. B. Bateman 1945 STUDIES CONCERNING THE EFFECTS OF HIGH WIND VELOCITIES ON THE HEAD. Luftfahrtmedizin 5(4):322-336, 1941
Translated as Appendix 15a to Lovelace, W. R., E. J. Baldes, & V. J. Wulff, The Ejection Seat for Emergency Escape from High-Speed Aircraft, ATI No. 7245

SUMMARY: Experiments in the wind tunnel and in aircraft are reported. These experiments show the tolerance of the human head to those high wind blast pressures which occur at the velocity of flight of modern aircraft. Following the description of the experimental setup, the results are set forth and illustrated by means of curves and diagrams. When the human head was unsupported it was found that wind blast pressures up to 1130 kg/m^2 (1.6 p.s.i.) (corresponding to wind velocities of 500 km/h (311 m.p.h.) near ground level) can be well tolerated on the whole. It was still possible to breathe under these conditions. The eyes also withstood the pressure very well. In one experiment an accident occurred; this is discussed in detail. Various types of breathing mask and mouthpiece were investigated from the point of view of their appropriateness for use in bailing out from high speed aircraft. In was found that even with wind blast pressures of 350 to 450 kg/m^2 (0.5 to 0.6 p.s.i.) these devices were blown away, especially when the head was turned slightly away from the wind blast.
Studies of goggles showed that when wind blast pressures of more than 2000 kg/m^2 (2.8 p.s.i.) (corresponding to velocities of more than 600 km/h (540 m.p.h.) near ground level) were incident normally upon the face, there was danger to the eyes from breakage of the goggles. When the wind is obliquely incident, the ordinary rubber strap gives way even with a wind blast pressure of 300 kg/m^2 (0.4 p.s.i.) (250 km/h (155 m.p.h.)) and goggles are lifted away from the face. In experiments with boards of different widths placed behind the head, it was shown that the subjectively unpleasant effects of wind blast (such as flapping of the cheeks and impairment of breathing) could be considerably ameliorated by a head board two to three times the width of the head. It was also found that with a broad head rest it was easily possible to keep the eyes open, as long as the air is free from dust. (AUTHOR)

4,512

Schurr, G.G. 1962 STUDY OF SOFT RECOVERY FROM TWO-STAGE VEHICLES.
(Space Recovery Systems, Inc., El Segundo, Calif.)
ASTIA AD-272 857, January 1962

ABSTRACT: Possible recovery methods for vertically re-entering payloads released from two-stage boosters are investigated and discussed. Reentry

trajectories including deceleration and heating rates were calculated for a series of reentry velocities and ballistic parameters. The influence of drag variation during reentry on peak deceleration and heating rates is investigated. A recovery method using a variable area drag brake (flexibrake), a parachute system and aerial snatch by helicopter was selected as the most suitable system for recovery of a payload released from a booster consisting of an XM-33 rocket as first stage and an ABLX 244 rocket as second stage. The flexibrake will limit the maximum deceleration to 15 G and the maximum deceleration onset rates to 300 G/sec. Altitude stabilization of the payload during the entire flight is maintained by a hydrogen peroxide attitude control system. Preliminary weights and volumes for the payload and recovery vehicle were estimated. (Author)

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Schwab, R.S. 1947 SYNDROME OF CEREBRAL CONCUSSION FROM AIR BLAST
Arch. Neurol. Psychiat. 58:97-103

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Schwarz, E.R., & W.J. Hamburger 1946 IMPACT INVESTIGATION ON TEXTILE MATERIALS. (Textile Div., Massachussets Institute of Technology, Div. of Industrial Cooperation Contract #2-6343; Fabric Research Laboratories, Inc., Contract #C45589; U.S. Army Air Corps, Materiel Div., Wright Field, Dayton, Ohio, Order #N33-038 AC-12462) June 30, 1946, ASTIA ATI No. 87219

TABLE OF CONTENTS:

Theoretical Discussion of Physical Requirements of Suspension Lines
A. Energy Absorption
B. The Effective Gage Length Method for Determining Load-Elongation Diagrams
C. Elongation Balance in the Conventional Core, and Sleeve Type Braided Suspension Lines
D. Inherent Yarn Elongation, Crisp and Helix Effects,
Energy Absorption of Properties of Sleeve Yarns
Energy Absorption Properties of Core Yarns
Energy Absorption Properties of Suspension Lines
Shock Loading Characteristics of Parachute Suspension Lines

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Schwarz, E.R., et al. 1946 IMPACT INVESTIGATION ON TEXTILE MATERIALS. (Textile Div., Mass Inst. of Technology, Div. of Indl. Cooperation) Progress Rept. No. 11, 10 Sept. 1946

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Schweer, H.W. and G.J. Walhout 1962 S-2B SNOW AERIAL APPLICATOR AIRCRAFT ACCIDENT, PHOENIX, ARIZONA, 18 OCTOBER 1961. (Aviation Crash Injury Research, Phoenix, Arizona) Rept. No. AvCIR 62-4, DA 44-177-tc-802, TCREC TR 62-43, May 1962. ASTIA AD 277 2o/L.

ABSTRACT: A snow aerial applicator, Model S-2B, crashed near Phoenix, Arizona, on 18 October 1961. At the time, the aircraft was engaged in applying insecticide to a cotton field. Severe impact conditions accompanied in the crash, resulting in major damage to the forward fuselage section. Crash protection features incorporated into the aircraft were instrumental in crash force attenuation to the cockpit section and damage reduction to the cockpit environment Moderate injuries sustained by the pilot are directly related to the improper use of the shoulder harness. The investigation further revealed that the location of the shoulder harness anchorage is of special significance relative to occupant retention. (Author)

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Schwichtenberg, A. H. 1960 SPACE MEDICINE AND ASTRONAUT SELECTION Minnesota Med. 43(12):797-812, Dec. 1960.

ABSTRACT: The interdependence of the fields of medicine, design engineering, and human engineering in the support of manned space flight is demonstrated in a discussion of the external stresses and hazards of space flight, including acceleration, heat, vibration, meteorites, hypoxia, decompression, radiation, weightlessness, noise, glare, and problems of the cabin environment and atmosphere. The various physical tests developed on the basis of the knowledge and experience gained from aviation medicine for the selection of astronauts are described. It is suggested that the research techniques employed in the space program, such as the data-processing technique for the handling of information on applicants for the astronaut program, may be usefully applied to general medical practice.

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Schwichtenberg, A. H. 1961 MEDICAL ASPECTS OF SPACE FLIGHT Ann. Rev. Med. 12:299-322, 1961.

ABSTRACT: A brief outline is given of space exploration information made possible by great advances in the physical sciences, mathematics, engineering, technology, and the life sciences. Lack of communication among highly specialized physical scientist, engineers, and physicians is largely responsible for the unusually slow adaptation of many of these advances to medical research, instrumentation, and practice. Aerospace medicine requires a board, multidisciplinary approach to the study of external stresses (both within the atmospheric envelope of the earth and in the environmental space beyond) that are

imposed upon the human organism by circumstances of flight. Attention is given to the following stresses involved in space flight and their medical implications: acceleration, heat, vibration, radiation, decompression, hypoxia, weightlessness, noise and illumination, as well as those concerned more directly with the operation of the space craft itself, such as the cabin environment and atmospheres. The selection of astronauts, function of man in space, and man-machine relationships are also discussed.

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Schwimmer, S. and R.A. Wolf 1962 PRELIMINARY RANKING OF INJURY CAUSES IN AUTOMOBILE ACCIDENTS. (In M.K. Cragun, ed., The Fifth Stapp Automotive Crash and Field Demonstration Conference, Sept. 14-16, 1961) Pp. 6-19

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Schwimmer, Seymour and Robert A. Wolf 1962 LEADING CAUSES OF INJURY IN AUTOMOBILE ACCIDENTS. (Automotive Crash Injury Research of Cornell University) June 1962

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Schwinge, H.T. 1962 EFFECTIVENESS AND LIMITATIONS OF MOVING POLYNOMIAL ARC SMOOTHING OF POSITION-TIME DATA FROM THE HOLLOMAN TRACK. (Air Force Missile Development Center, Air Force Systems Command, Holloman AFB, New Mexico)

ABSTRACT: Various specifications concerning the testing and calibration of inertial guidance systems on the Holloman Track limit the tms error of the vehicle velocity to 1 part in 20,000. This report investigates the data accuracy obtained by applying moving polynomial arc smoothing to the measured displacement time data. A number of possible modifications concerning data acquisition and handling and the elimination of the major error sources are recommended.

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Scott, J. C. 1936 THE CARDIAC OUTPUT IN THE STANDING POSITION. Amer. J. Physiol. 115:268-274

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Scott, S. 1919 VERTIGO AND NYSTAGMUS ASSOCIATED WITH INFLATION OF THE EUSTACHIAN TUBE. J. Laryng., 34:51-52

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Scott, W. W. 1940 PHYSIOLOGY OF CONCUSSION
Arch. Neurol. & Psychol. 43:270-283

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Scudder, N.F. & H.W. Kirschbaum 1936 FURTHER MEASUREMENTS OF NORMAL ACCELERATIONS ON RACING AIRPLANES (NACA, Langley Aeronautical Laboratory, Langley Field, Hampton, Va.) Technical Note No. 556, Feb. 1936

ABSTRACT: The work of collecting acceleration data for racing airplanes during races, started in January 1934, has been continued by obtaining similar data in the airplanes winning first and second places in the 1935 Thompson Trophy Race. Records were taken in the Howard Racer "Mr. Mulligan" and in the Wittman D-12 Racer. The maximum positive accelerations were generally smaller than those recorded in other airplanes during earlier races; the maximum in the Howard Racer was 2.8 g, and one value of 4.25 g was obtained in the Wittman Racer. Minimum values were as low as -0.55 g in the Howard Racer and 0.3 g in the Wittman Racer.

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Searle, G. F. C. and F. A. Lindeman 1917 PRELIMINARY REPORT ON THE MEASUREMENT OF ACCELERATIONS OF AEROPLANES IN FLIGHT. (British Advisory Comm. for Aeronautics) Reports and Memoranda, No. 376, Sept. 1917.

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Searle, G. F. C., & W. Cullimore 1918 REPORT ON MEASUREMENT OF ACCELERATIONS ON AEROPLANES IN FLIGHT. (British Advisory Committee for Aeronautics) Reports and Memoranda No. 469, June 1918

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Seat, R.L. 1961 ENVIRONMENTAL TESTING OF THE PROJECT MERCURY. (Institute of Environmental Sciences, Mt Prospect, Ill.) Reprint 61-21

ABSTRACT: Project Mercury is a national effort of the United States, conceived and organized to send man on his first step into space. Basic responsibility for this effort has been placed with the National Aeronautics and Space Administration. This paper discusses the major systems of the Mercury Spacecraft; electrical, communication, instrumentation, environmental control, sequential control, rockets and pyrotechnics, altitude control, and landing.

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Seckel, E., I.A. Hall, D.T. McRuer, and D.H. Weir 1958 HUMAN PILOT DYNAMIC RESPONSE IN FLIGHT AND SIMULATOR (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC Technical Report 57-520, August 1958, AD 130 988

ABSTRACT: This report presents the results of an effort to determine the difference in pilot tracking behavior resulting from differences between flight and ground simulator control environments. The investigation has been centered on an experiment designed to estimate the quasi-linear describing functions and linear correlations of several pilots when engaged in lateral and longitudinal tracking tasks with random appearing forcing functions. A Navion aircraft functioned as the controlled element in the flight environment and the same airplane, with aircraft dynamics generated with analog computer techniques, provided the ground simulator controlled element. Statistical analyses of describing function and linear correlation data revealed that: (1) Individual run phase angle (in degrees) amplitude ratio (in db), and linear correlation data are approximately normally distributed about their mean values for all runs. (2) The mean values of pilot's describing functions in longitudinal flight and simulator control exhibit significant differences in both amplitude ratio and phase angle. (3) The mean values of pilot's describing functions in lateral flight and simulator control exhibit significant differences in phase angle and no significant differences in amplitude ratio. (4) Significant differences between flight and simulator linear correlations were present for both lateral and longitudinal control. (5) The flight and simulator variances for lateral amplitude ratio and lateral and longitudinal phase were significantly different. No significant differences appeared between flight and simulator variances for longitudinal amplitude ratio and lateral and longitudinal linear correlation.

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Seeney, H.M. 1951 HUMAN DECELERATOR. J. Aviation Med. 22(1):39-41, 49. Feb. 1951.

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Seibert, E.G. 1918 THE EFFECTS OF HIGH ALTITUDES UPON THE EFFICIENCY OF AVIATORS. Milit. Surg., 42:145-148

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Seifert, H.S. ed. 1959 SPACE TECHNOLOGY. (New York: John Wiley & Sons, Inc.)

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Sells, S.B. & C.A. Berry, eds. 1961 HUMAN FACTORS IN JET AND SPACE TRAVEL: A MEDICAL-PSYCHOLOGICAL ANALYSIS
(New York: Ronald Press, 1961)

ABSTRACT: Contents include: "Medical Aspects of Jet and Space Travel" by A. Graybiel; "Natural Environment and the Environment of Flight" by H.B. Hale; "Radiobiology and the Environment of Flight" by G.L. Hekhuis; "Basic Aspects of Skilled Performance" by W.A. Wilbanks; "Human Operator Performance Under Non-normal Environmental Operating Conditions" by W.G. Matheny; "Group Behavior Problems in Flight" by S.B. Sells; "Human Qualifications for and Reactions to Jet Flight" by C.A. Berry; "Human Requirements for Space Travel" by S.B. Sells and C.A. Berry; "Protective Medicine in Jet and Space Flight" by J.A. Norton; "Air Craft Accidents and Flight Safety" by H.G. Moseley; "Human Factors Related to Jet Aircraft" by T.G. Hanks; "The Engineered Environment of the Space Vehicle" by H.G. Clamann; "Operational Aspects of Space Flight" by A.M. Mayo; "Speculations on Space and Human Destiny" by H.B. Webb.

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Sells, S.B. 1961 MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. AN ANNOTATED BIBLIOGRAPHY. III. ENVIRONMENTAL STRESS AND BEHAVIOR ECOLOGY. (Arctic Aeromedical Lab., Fort Wainwright, Alaska) Rept. No. AAL TR 61-21, Project 8243-11, Oct. 1961. ASTIA AD-276 829.

ABSTRACT: Abstracts of studies on measurable dimensions of group structure and their relations to group behavior are presented. It is organized in 10 sections: (1) General Studies and Reviews, (2) Autonomy, (3) Clarity of Goals and of Roles, (4) Cohesiveness, (5) Control of Behavior of Group Members, (6) Homogeneity of Memberships, (7) Participation in Group Activities, (8) Potency of Group to Its Members, (9) Size of Group, and (10) Status Hierarchy and Stratification. (Author)

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Selye, H. 1950 THE PHYSIOLOGY AND PATHOLOGY OF EXPOSURE TO STRESS. (ACTA, Inc., Montreal, Canada)

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Sem-Jacobsen, C. W., O Nilseng, C. Patten and O. Eriksen 1958 AIRBORNE EEG RECORDING IN HIGH-PERFORMANCE AIRCRAFT. (Air Force Office of Scientific Research, Washington, D. C.) AFOSR-TR 59-35, Sept. 1958. ASTIA AD 213 038.

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Sem-Jacobsen, C.W., O. Nilseng, C. Patten and O. Eriksen 1958 AIRBORNE EEG RECORDING IN HIGH PERFORMANCE AIRCRAFT. (Presented at Third World Congress of Aviation Medicine, Brussels, 1958).
See also (Air Force Office of Scientific Research, Washington, D.C.) AFOSR TR 59-35, Sept. 1958. ASTIA AD 213 038.

ABSTRACT: Under this contract it was attempted to try (a) to solve technical problems related to airborne EEG, (b) to evaluate the data obtained by this technique. Ten commonly flown maneuvers were selected as a standard test. During the ten maneuvers, changes were seen in the EEG recording in response to the most stressful maneuvers. The pilots were divided into three groups on the basis of the EEG records. Group A showed only minimal changes in response to the test flight. Group B showed marked high voltage changes of short duration in response to same maneuvers. In the EEG's of the pilots belonging to group C gross changes of probably more pathological nature were seen. The EEG recording appears to give promising data about the pilot's actual physiological capability under the physical and mental stress caused by the maneuvers.

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Sem-Jacobsen, C.W., O. Nilseng, C. Patten, and O. Eriksen 1959 ELECTRO-ENCEPHALOGRAPHIC RECORDING IN SIMULATED COMBAT FLIGHT IN A JET FIGHTER PLANE: THE PILOT'S LEVEL OF CONSCIOUSNESS. J. EEG & Clin. Neurophysiol. 11:154-155.

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Sem-Jacobsen, C.W. 1959 ELECTROENCEPHALOGRAPHIC STUDY OF PILOT STRESSES IN FLIGHT. J. Aviation Med. 30(11):797-801

SUMMARY: With 8-channel airborne EEG equipment, tracings were made of a group of jet pilots, as well as personnel with no previous flight experience, during simulated combat flight. A uniform standardized flight schedule was utilized. On the basis of the EEG tracings, thirty jet pilots were divided into three groups according to the changes seen in the records. A minimal, B marked, and C gross. The same pilots were graded by the Air Force according to their flight performances. The results obtained strongly support a close correlation between the changes in the brain as measured by EEG during flight stress and the pilot's ability to perform under these conditions. Airborne EEG recording is demonstrated as a new method for studying the stress to which the jet fighter pilot is subjected.

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Sem-Jacobsen, C.W. 1961 "BLACK-OUT" AND UNCONSCIOUSNESS REVEALED BY AIRBORNE TESTING OF FIGHTER PILOTS.
Aerospace Med. 32(3):247, March 1961.

ABSTRACT: To verify and substantiate earlier work, fifty pilots were, during the months of August and September, 1960, tested with airborne EEG recording. The tests were carried out at Wright-Patterson Air Force Base in a F-100 under the supervision of the Aerospace Medical Laboratory. Most of the pilots were selected from different commands and bases. The EEG tracings were supplemented with recordings of the EKG, the respiration, and the flight pattern. Movies were also taken intermittently during simulated combat flight. The results demonstrate that a number of active fighter pilots had brief periods of unconsciousness during manoeuvres frequently flown by T.A.C. fighters. Several had convulsive jerks. It should be noted that some of them, however, on the centrifuge did not black out or lose consciousness when subjected to the same or even heavier G-loads. These observations were made in a number of pilots of whom several had committed pilot error." No indication of "black-out" or unconsciousness was found in a group of instructors or test pilots subjected to the same examination. The study reveals a reason "pilot error" and may explain a number of aircraft accidents. Taken into use the test may increase flight safety and decrease the number of unfortunate fatalities.

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Sem-Jacobsen, C. W. 1961 BLACK-OUT AND UNCONSCIOUSNESS REVEALED BY AIRBORNE TESTING OF FIGHTER PILOTS. (Paper, 32nd Annual Meeting of the Aerospace Medical Association, Palmer House, Chicago, Illinois, April 24-27, 1961)

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Semotán, J. 1961 VYZNAM DUSEVNI HYGIENY V ASTRONAUTICE (The Importance Of Mental Hygiene In Astronautics)
Cekoslov. Psychiat. (Prague), 57(1):61-69, Jan. 1961 (in Czechoslovakian with English summary).

ABSTRACT: Attention is called to the most important somatogenic as well as psychogen noxious factors in the microclimate of space ships, and to the influence of these factors on the higher nervous activity. Among the most outstanding specific one, influencing mental functions, are weightlessness, forces of gravity and subgravity, noise, ultransound and infrasound, vibrations, isolation complicated by sensory and motor deprivation, etc. Some mental disorders endangering the crew while on space mission are analyzed in some detail. Psychogenic approaches to the selection of spacemen or members of space crews are specified and advocated. Possibilities and means of preservation and development of mental health, and prevention of its distrubances in spacemen and among space crews form part of the complex task of mental hygiene. Research trends in psychogenic problems of space flight are outlined.

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Senelar, R., R. Loubiere, F. Violette 1959 EFFETS DES ACCELERATIONS POSITIVES REPETEES DE FAIBLE INTENSITE ET LONGUE DUREE. ETUDE ANATOMIQUE SUR LE RIEN DE CHIEN. (EFFECTS OF REPEATED POSITIVE ACCELERATIONS OF SMALL INTENSITY AND LONG DURATION: ANATOMICAL RESEARCH ON DOG KIDNEY) Medecine Aeronaut. (Paris) 14(4):339-352, 1959
See also In Bergeret, ed., Bio-Assay Techniques for Human Centrifuges and Physiological Effects of Acceleration (London, New York, Paris: Pergamon Press, 1961) AGARDograph 48. Pp. 107-118

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Senelar, R., R. Loubiere, F. Violette 1961 EFFECTS OF REPEATED POSITIVE ACCELERATIONS OF SMALL INTENSITY AND LONG DURATION: ANATOMICAL RESEARCH ON DOG KIDNEY. (EFFETS DES ACCELERATIONS POSITIVES REPETEES DE FAIBLE INTENSITE ET LONGUE DUREE. ETUDE ANATOMIQUE SUR LE RIEN DE CHIEN) In Bergeret, ed., Bio-Assay Techniques for Human Centrifuges and Physiological Effects of Acceleration (London, New York, Paris: Pergamon Press, 1961) AGARDograph 48. Pp. 107-118
See also Medecine Aeronaut. (Paris) 14(4):339-352, 1959

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Sergeyev, A. A. 1956 VLIYANIYE USKORENIY NA ORGANIZM LETCHIKA (INFLUENCE OF ACCELERATIONS ON THE BODY OF A PILOT) (Voyenizdat, 1956)

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Severy, D.M., J.H. Mathewson and A.W. Siegel n.d. AUTOMOBILE SIDE-IMPACT COLLISIONS. (Society of Automotive Engineers, Inc., New York) SP 174

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Severy, D. M., et al. n.d. TECHNICAL FINDINGS FROM AUTOMOBILE IMPACT STUDIES (Institute of Transportation & Traffic Engineering, University of California, Los Angeles, Calif.) Rept. #41

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Severy, D. M. 1954 AUTOMOBILE CRASH EFFECTS
(Calif. State Governor's Safety Conference, Engr. Div.) Oct. 1954

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Severy, D.M., J.H. Mathewson, and C.O. Bechtol 1955 CONTROLLED AUTOMOBILE REAR-END COLLISIONS, An Investigation of Related Engineering and Medical Phenomena. Series I. Canadian Services Medical Journal 11:727-759, Nov. 1959. See also (Institute of Transp. & Traffic Engr., Univ. of Calif., Los Angeles) ITTE Rept. No. 40.

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Severy, D.M., & P. Barbour 1956 ACCELERATION ACCURACY: ANALYSES OF HIGH-SPEED CAMERA FILM. (Institute of Transportation & Traffic Engr., University of Calif.) Rept. No. 47.
See also J. Soc. Motion Picture & Tele. Engrs. 65(2):96-99

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Severy, D.M., & J.H. Mathewson 1956 AUTOMOBILE BARRIER IMPACTS, SERIES I AND SERIES II. (Institute of Transportation and Traffic Engineering, University of California, Los Angeles, Calif.)

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Severy, D.M., & J.H. Mathewson 1956 AUTOMOBILE-BARRIER IMPACTS, SERIES II. Clinical Orthopaedics 8:275-300
See also (Institute of Transp & Traffic Engr., Univ. of Calif.) ITTE Reprint No. 50.

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Severy, D.M. and J.H. Mathewson 1958 AUTOMOBILE BARRIER AND REAR-END COLLISION PERFORMANCE. (Paper, Society of Automotive Engineers Summer Meeting, Atlantic City, N.J. 8-14 June 1958) SAE Preprint 62C.

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Severy, D.M., J.H. Mathewson and A.W. Siegel 1958 AUTOMOBILE HEAD-ON COLLISIONS, SERIES II. (Presented at the SAE National Passenger Car, Body and Materials Meeting, Detroit, Mich., 4-6 Mar. 1958) (Dept. of Engineering, Univ. of Calif., Los Angeles) Report 58-41
See also: Transactions, SAE 67:238-262, 1959.

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Severy, D. M., J. H. Mathewson, & A. W. Siegel 1959 AUTOMOBILE SIDE IMPACT COLLISIONS. (Institute of Transportation & Traffic Engineering, Dept. of Engineering, University of Calif., Los Angeles) Rept. SP-174.

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Severy, D.M., J.H. Mathewson, & A.W. Siegel 1959 AUTO CRASH STUDIES. (Institute of Transp. & Traffic Engr., Univ. of Calif., Los Angeles, Calif) Rept. No. 59-10. Jan. 1959.

4,560

Severy, Derwyn M. 1960 AUTOMOBILE COLLISIONS ON PURPOSE (UCLA, Institute of Transportation and Traffic Engineering, Los Angeles, Calif.) ITTE Preprint 89, Nov. 1960, See Also J. Human Factors Society 2(4):186-202.

ABSTRACT: This paper presents a brief discussion of some of the findings from 48 full-scale automobile collision experiments conducted at UCLA during the past ten years. These experiments have provided critically needed data on physical factors relating to vehicular collision dynamics and attending motorist injuries. Use of both human subjects and anthropometric dummies facilitate procurement of critically needed data on the relation of design to injury causation.

4,561

Severy, D. M. 1960 AUTOMOBILE COLLISIONS ON PURPOSE
Hum. Factors 2(4):186-202, Nov., 1960.

ABSTRACT: A brief discussion was presented of some of the findings from 48 full-scale automobile collision experiments. The experiments have provided data on physical factors relating to vehicular dynamics and attending motorist injuries. Both human Ss and anthropometric dummies have been used to secure specific data on 1) deceleration patterns for different locations on the driver and car structure, 2) the relation of impact speed to deformation and repair costs, 3) the performance of motorist restraining devices, and 4) the interaction of the dirver with the car's interior and external environment during collisions. Public acceptance of safety devices and design changes known to reduce injury was discussed.

4,562

Severy, D. M., et al. 1960 AUTOMOBILE SIDE-IMPACT COLLISIONS, SERIES II (Society of Automotive Engineers, Inc., New York) SP 232, Jan. 1960

4,563

Severy, D. M., et al. 1961 BARRIER COLLISIONS, SERIES IV: AN EVALUATION OF MOTORISTS' FORCE AND INJURY CONTROL SYSTEMS. (Presented to Highway Research Board Annual Meeting, Jan. 1961)

4,564

Severy, Derwyn M. and A.W. Siegel 1962 ENGINEERED COLLISIONS.
In M.K. Cragun, ed., The Fifth Stapp Automotive Crash and Field Demonstration Conference, Sept. 14-16, 1961. Pp. 33-47

4,565

Sewall, H. 1946 THE CLINICAL RELATIONS OF GRAVITY AND CIRCULATION
Amer. J. Med. Science 151:491

4,566

Shablin, V.A. 1961 THE INFLUENCE OF ANGULAR DISPLACEMENT OF A JOLTING NATURE ON THE HUMAN BODY. (O Viliyanii Na Organizm Cheloveka uglovykh Peremeschenii Tolchkoobraznogo Khuraktera) Gigena i Sanitariya (USSR) 26:46-51 Trans.: (Office of Tech. Serv., Washington, D.C.) 61-28268.

ABSTRACT: Some observations on 10 healthy persons 20 to 22 years indicated that the nature of functional changes in the body depends on the frequency of angular displacements, the number and magnitude of the jolts. Angular displacements with a frequency of 23 minute (0.38 cps) and an amplitude of 6° where the jolts were 13 per minute and an acceleration of 1.5 g acting on the human body for 2 hours originally changes the functional condition of the vestibular apparatus and its excitability. Bradycardia is noted in the cardio-vascular system after the effect of these vibrations. With the increase in the rate of angular displacement from 23 to 48 minute (0.8 cps) keeping other physical factors constant there is an increase in volume of pulmonary ventilation (to 174%) oxygen consumption (162% energy expenditure of the body (177%). Under these conditions which are otherwise the same the increase in the number of jolts per minute with simultaneous altnough slight increase in their magnitude from 1.0 to 2.0 g. Along with the changes mentioned leads to distinct phenomena of cardio-vascular and nervous system excitation.

4,567

Shadee, J. 1936 LES MODIFICATIONS DE L'ACUITE VISUELLE CHEZ LES PILOTES APRES LES VOLS DE CHASSE. (Effects of Speed on Visual Acuity in Air Pilots) Rev. Pol. de la med. aeronautique.) 1, 1936

ABSTRACT: The author divides his material into two age groups. In the older group (29-36) after prolonged flights of 45 minutes to 1½ hours there occurred a diminution of visual acuity persisting for one to two hours. No such diminution was noted after short flights. In the younger group visual acuity was on the contrary, increased following flight, regardless of duration. The changes in visual acuity were insignificant, averaging only about 0.05. The author believes them due to changes in the circulation of the blood occuring in rapid flight at high altitude owing to accelerated changes in direction of flight. These changes are better compensated and disappear sooner in the younger pilots.
ABSTRACT: Journal of Aviation Medicine 7(4) : 217-218, December 1936

4,568

Shalay, K. N., A. S. Gumenyuk, & N. N. Spektor 1956 ZAMECHANIYA K STAT'YE PROFESSORA D. YE. ROZENBLYUM "OB OSNOVNYKH VOPROSAKH V OBLASTI FIZIOLOGII USKORENIY. NOTES TO PROFESSOR D. YE. ROZENBLYUM'S PAPER: "FUNDAMENTAL PROBLEMS IN PHYSIOLOGY OF ACCELERATION"). Voyenno-meditsinskiy Zhurnal (Military Medical Journal). 5:91, 1956. (Translation in USAF Air Intelligence Information Report "Physiology of Acceleration: A Controversy between D. Ye. Rozenblyum and G. L. Komendantov." IR-1407-57. 21 May 1957.)

4,569

Shamburek, R. H. 1963 G FORCES AND YOU.
U.S. Army Aviation Digest 9(11):43-47. Nov. 1963.

ABSTRACT: Accelerative forces during dive bombing runs in the Army JOV-1C aircraft are discussed with particular emphasis on the physiological mechanics and symptoms which the pilot should be familar with. Protective measures against excessive G forces, such as physical fitness, eating a full meal prior to flights, body position muscle tensing, Ml manuaver, and anti-G suits are discussed. OV-1 instructors should particularly emphasis to students that (1) visual symptoms (grayout or blackout) are unreliable and dangerous as measures of acceleration because they are so close to unconsciousness. Except for an accelerometer, better judgements can be made by pressure sensing at seat, load on the arms, and face sagging, and (2) students who blackout at low levels should be checked by a flight surgeon. (CARI).

4,570

Shapland, D. J. 1961 THE DYNAMIC MODEL - AN ENGINEERING APPROACH TO THE PROBLEM OF TOLERANCE TO ABRUPT ACCELERATIONS.
(Paper, Nat'l. Academy of Sciences Symposium on "Impact Acceleration Stress." 27-29 Nov. 1961, Brooks AFB, San Antonio, Texas)

ABSTRACT: The tolerance of the human body to short duration accelerations can be analyzed with the aid of analogous dynamic models, consisting of springmass systems. The basic principles of this technique are discussed in an attempt to clarify this method of investigating the problem. The basic models used are explained, and the methods of application described.

4,571

Shapland, D.J. 1961 THE DYNAMIC MODEL - AN ENGINEERING APPROACH TO THE PROBLEM OF TOLERANCE TO ABRUPT ACCELERATIONS.
(Stanley Aviation Corp., Denver, Colo.) Nov. 1961.

4,572

Shapland, D. J. 1961 QUARTERLY STATUS REPORT #2 ON HUMAN BODY DYNAMICS STUDY
(Stanley Aviation Corp., Denver, Colo.) Rept. No. 787, 6 Oct. 1961

4,573

Shapland, D.J. 1961 THE USE OF MATHEMATICAL MODELS TO INVESTIGATE THE EFFECTS OF PROTECTIVE SUPPORTS ON THE HUMAN BODY DURING ABRUPT ACCELERATIONS. (Stanley Aviation Corp., Denver, Colo.) Rept. No. 781, Sept. 1961.

4,574

Shapland, D. J. 1962 DYNAMIC MODELS FOR DETERMINING HUMAN TOLERANCE TO ABRUPT ACCELERATIONS. (Paper, 33rd Annual Meeting of the Aerospace Medical Assoc., 9-12 April 1962, Atlantic City, N. J.)

ABSTRACT: Spring-mass systems analogous to the human body subjected to short duration accelerations are proposed and criteria suggested that can be applied to the response of these systems to indicate degrees of tolerance of the human body. The basic mathematics governing the motion of linear and non-linear, damped single-degree-of-freedom models is described and the equations of two- and three-degree-of-freedom models developed. Comparison of the solutions with available experimental data enables the dynamic characteristics of the models to be established for the spinal and transverse directions. Analytical solutions are possible for simple acceleration time inputs and complex inputs can be studied using digital computer techniques. A special purpose electronic analog computer that has been developed for rapid evaluation of complex inputs is also described. The dynamic models can be used to predict human tolerance to arbitrary inputs and also to ascertain the influences of seat cushions and restraint system effects Examples of the use of the models are given and their advantages and limitation discussed. (Aerospace Medicine 33(3):368-369, Mar. 1962)

4,575

Shapland, D. J. 1962 A STUDY OF THE DYNAMIC MODEL TECHNIQUE IN THE ANALYSIS OF HUMAN TOLERANCE TO ACCELERATION. (Stanley Aviation Corp, Denver, Colo.) Doc. No. 793, 21 Feb. 1962

4,576

Shaw, C.C. 1954 ON A COMMON DYNAMIC FACTOR IN MOTION SICKNESS
Military Surgeon 114:347-350 Jan.-June 1954

ABSTRACT: Of the six motions of a ship, yaw, sway and surge possess negligible accelerations and contribute to seasickness only when they become synchronized with roll and heave and pitch, either singly or in unison. Linear accelerations of pitch and roll and heave, alone or in combination, may produce motion sickness. Their nauseating and vertiginous effects are compounded by surge, sway and yaw. The total sum of the linear accelerations of pitch, roll and heave resulting from the forces of wind and waves appears to be the basic dynamic cause of motion sickness. In a seaway, heave is the worst malefactor.

Thus, the mechanical or dynamic cause of motion sickness is identical on land, at sea and in the air. It can be simply stated as the sum of linear accelerations and decelerations along and around the longitudinal, lateral and vertical axes. Each of the six degrees of freedom of motion may thereby contribute to motion sickness. However, the linear accelerations of surge, sway and yaw are almost negligible. From the practical viewpoint, motion sickness, when it occurs, is induced by the sum of the linear accelerations of pitch, roll and heave. And the greatest of these in a seaway is heave.

4,577

Shaw, C. C. 1954 ON THE DYNAMICS OF MOTION SICKNESS IN A SEAWAY. Scientific Monthly 78:110-116.

4,578

Shaw, R.F. and N.B. Marple 1961 METHODS FOR DETERMINING BLOOD FLOW THROUGH INTACT VESSELS OF EXPERIMENTAL ANIMALS UNDER CONDITIONS OF GRAVITATIONAL STRESS AND IN EXTRA TERRESTIAL SPACE CAPSULES. (Columbia Univ., College of Physicians and Surgeons; Electronics Research Labs., New York) Status rept. no. P-1/168, Rept. no. CU-1-61-NASA-112-PS/ERL, 1 May 1961

ABSTRACT: The following work is described: (1) technical development of blood flowmeter instrumentation; (2) surgical considerations related to special problems of chronic implantation of flowmeter probes; (3) study of the relationship between levels of blood flow and organ activity.

4,579

Shaw, R.S. & H.E. Savely 1947 ACCELERATION -TIME DIAGRAM FOR CATAPULT EJECTION SEATS. (Aeromedical Lab., Wright-Patterson AFB, Ohio) Memo Rept. TSEAA 695-66D, 11 Feb. 1947.

4,580

Shaw, R.S. 1947 HUMAN TOLERANCE TO ACCELERATION IN DOWNWARD SEAT EJECTION. (AMC, Wright-Patterson AFB, Ohio) Memo Rept. TSEAA 695-74C 12 Dec. 1947.

CONCLUSIONS: In downward seat ejection, velocities of 28.5 feet per second can be safely accomplished using a 24-inch stroke.

The standard safety belt and shoulder harness with the addition of toe straps provide adequate fixation of subjects in this ejection. (DACO)

4,581

Shaw, Lt. R.S. 1947 HUMAN TOLERANCE TO NEGATIVE G OF SHORT DURATION. A.M.C. Memorandum Rept. No. TSEAA-695-74.

4,582

Shaw, R. S. 1948 HUMAN TOLERANCE TO NEGATIVE ACCELERATION OF SHORT DURATION. J. Aviation Med. 19 (1):39-44.

SUMMARY: Experiments have been conducted to determine the tolerance of humans to forces like those which would be experienced in escape from aircraft by downward seat ejection. It has been found that seated human subjects can tolerate considerably more than 3 negative g for periods of time under 0.3 seconds.

4,583

Shaw, R. S. 1948 NEGATIVE ACCELERATION Military Surgeon 102 (6): 483-487.

4,584

Shaw, R.S., J.L. Gamble, P.J. Maher, J.P Henry & O. Gauer 1948 ON THE USE OF VENOUS PRESSURE IN THE HEAD AS A TOLERANCE INDEX OF NEGATIVE G IN HUMANS. Fed. Proceedings, 7:113

ABSTRACT: Injury to animals from negative acceleration of over three seconds'duration first appears as rupture of small vessels about the head; consequently, it was thought that venous pressure in the head might be used as an index of tolerance in humans exposed to negative acceleration on the centrifuge. Four subjects were secured in a seat with an adjustable back mounted on the centrifuge, and venous pressures during negative acceleration were measured with a variable inductance manometer. Venous pressure in the frontal vein of human subjects exposed to negative acceleration was found to vary linearly with the magnitude of the acceleration as though from a simple hydrostatic column based at the heart; they ranged from 80 to 110 mm. Hg. No appreciable movement of the heart was noted in X-rays of the chest taken under negative accelerations of 3 g.; "Red-out" was not observed in this series. Pressures were recorded with subjects in 45-degree and 60-degree backward tilted seats, and compared with those obtained in the standard 10-degree seat tilt. No significant protection against negative acceleration as indicated by venous pressures in the frontal vein resulted from this tilting. Breath holding and straining maneuvers, which increase venous pressure in the resting subject, enhanced the disagreeable subjective sensations, while closing the glottis and attempting inspiration (Müller Maneuver), which decreases venous pressure, resulted in considerable alleviation of symptoms under negative accelerations up to 3 g.

4,585

Shaw, R.S. & J.P Henry 1948 THE PRESSURIZED HELMET AS A NEGATIVE G PROTECTIVE DEVICE. Aero Medical Laboratory Serial No. MCREXD4-74-E, Air Material Command Memo. Rept. TSEAA-695-74E

ABSTRACT: In MR. No. TSEAA-660-100 entitled "Emergency Pressure Suit", dated May 5, 1946, a pressurized helmet is described, and its use as a negative g protective device is suggested. Inasmuch as most of the injury from negative acceleration of several seconds duration is related to over-distension of the blood vessels of the head, it is reasonable that such a helmet applying counter pressure to these vessels would provide some degree of protection. This work was undertaken to determine the amount of protection such a device would afford. This report describes preliminary experiments to evaluate the pressurized helmet as a protective device against negative acceleration. The preliminary experiments suggest that: (a) Pressure breathing with a pressurized helmet does not significantly raise negative g tolerance. (b) The use of the pressurized helmet with the glottis closed raises negative g tolerance by an amount similar to the positive g tolerance increase obtained from the anti-g suit.

4,586

Shaw, R.S. 1948 RUPTURED INTERVERTEBRAL DISC FROM POSITIVE ACCELERATION. J. Aviation Med. 19(4):276-278. Aug. 1948.

SUMMARY:

1. Back injury from positive acceleration is reviewed.
2. A case of proven and a case of probable herinated nucleus pulposus resulting from a dive "pull-out" are reported.
3. A flexed back predisposes an individual to this injury during positive acceleration and should be avoided.

4,587

Shaw, R. S., & J. P. Henry 1948 THE SIGNIFICANCE OF THE VOLUME OF BLOOD CONTAINED IN THE LEGS IN NEGATIVE ACCELERATION. (Engineering Div., Air Materiel Command, Wright-Patterson AFB, Ohio) Memo Rept. No. MCREXD-695-74J. ASTIA AD-55922; 11 May 1948

ABSTRACT: Venous pressure in the forehead was measured in 3 humans exposed to negative acceleration of 2 g. When the circulation in the legs was isolated by means of pneumatic cuffs, the venous pressure in the forehead was about 15 mm. of Hg less than when the blood was allowed to drain from the legs into the trunk. A similar reduction in pressure could be obtained by preventing drainage of blood from the legs by altering their position until they were at right angles to the direction of the centrifugal force. (ASTIA)

4,588

Shaw, R. S., J. P. Henry, J. L. Gamble and O. Gauer 1948 VARIATIONS IN VENOUS PRESSURE UNDER NEGATIVE ACCELERATION. J. Appl. Physiol. 1:441-447.

4,589

Shaw, R. S., J. L. Gamble,J. P. Henry, and O. H. Gauer Jan. 1948 VENOUS PRESSURE IN THE HEAD UNDER NEGATIVE ACCELERATION. Memo Rept. TSEAA-695-74D, 15 Jan. 1948.

4,590

Shaw, R. S., J. L. Gamble, J. P. Henry, & C. Gauer 1948 VENOUS PRESSURE IN THE HEAD UNDER NEGATIVE ACCELERATION. (Aero Medical Lab., Dayton, Ohio) Memo Rept. No. MCREXD4-695-74D, 15 Jan. 1948

ABSTRACT: This report describes venous pressure changes in the heads of human subjects exposed to negative acceleration, and their use in determining negative acceleration tolerance. The report also describes the protection against negative acceleration afforded human subjects by the partial supine position as gauged by venous pressure changes. Through various tests it was concluded that under negative acceleration, venous pressure in the head of the human varies as though from a hydrastatic olumn based in the region of the heart. No significant protection against negative acceleration is obtained from the 45° and 60° backward titled sent.

4,591

Shea, F. 1953 CIR CALLS FOR STRONGER CABINS. Aviation Week, 59(16):98-99. 19 Oct. 1953.

ABSTRACT: In the controversy over forward-facing versus aft-facing seats in transport planes, it is felt that there has not been enough evidence collected by investigators of air crashes to justify one in preference to the other. The crash of a DC-6 at Elizabeth, N.J., on Feb. 11, 1952, is described, and it is stated that the investigators of this accident reported that the casualty rate would have been just as high with aft-facing seats as with the forward-facing seats, which were standard on this plane. However, it is definitely recommended that seats in transports be reinforced for lateral g forces. Present seats are designed to bear only 1 and 1/2 g laterally, and it is recommended that they be strengthened to stand loads as high as 35 g laterally.

4,592

Sheffield, F. C. 1942 "G" MEN OF THE AIR. ON PILOTS FLATTENING OUT: AVOIDING THE PHYSIOLOGICAL ILL EFFECTS OF VIOLENT ACCELERATION Flight 41:134-135, 1942.

4,593

Sheftel, G.A., A. Smirnov, F.I. Shumetev and N.T. Gorchakov 1936 EFFECTS OF PARACHUTE JUMPING ON HUMAN ORGANISM. Sovetskii vrachebny zurnal, (Leningrad) p. 1166-72 Aug 15, 1936

4,594

Shelley, T. 1941 GERMAN-NAVY REPORT ON THE PHYSIOLOGICAL EFFECT OF NIGHT FLYING ON THE EYES. (USN., Office of Chief of Naval Opns., Intelligence Div.) Intelligence Report Serial X2905-S-45, 31 July 1945.

ABSTRACT: Report on the Effect of Vibrations on the Vegetative Nervous System and the Sinew Reflexes. Experiments are carried out to establish the connection between the effect of shock and reflex action. The effect of vertical vibrations on the sinus is noted. Explanatory diagrams are included in this section.

4,595

Shepard, A. B., Jr. 1961 PILOT'S FLIGHT REPORT, INCLUDING IN-FLIGHT FILMS. (Paper, Conference on Results of the First U.S. Manned Suborbital Space Flight, June 6, 1961, NASA, Washington, D.C.). Pp. 109-116

4,596

Shepelin, O. P. 1961 EFFECT OF PULSATING AND STEADY NOISES ON THE ORGANISM UNDER EXPERIMENTAL CONDITIONS
(Trans. of Gigiena i Sanitariya (USSR) 26(3):25-31, 1961)
(Office of Technical Services, Washington, D. C.) 61-28031

4,597

Shepler, H.G., J.D. Hardy, C.F. Gell, & E. Hendler 1954 AIRCRAFT CATAPULT AND ARRESTING; HUMAN LIMITATIONS IN.
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR4, Dec. 29, 1954

ABSTRACT: This is the first progress report on aircraft catapult and arresting and details preliminary considerations concerning linear accelerators and specific requirements of the Navy in relation to existing facilities.

4,598

Shepler, H.G., J.D. Hardy, C.F. Gell, & E. Hendler 1955 AIRCRAFT CATAPULT AND ARRESTING; HUMAN LIMITATIONS IN.
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR5, Jan. 31, 1955

ABSTRACT: This is the second progress report on aircraft catapult and arresting and reviews the capabilities of the human centrifuge at AMAL and the HG-1 catapult facility at the U.S. Naval Base, Philadelphia for simulating catapult launchings and carrier landings.

4,599

Shepler, H.G., J.D. Hardy, C.F. Gell, & E. Hendler 1955 AIRCRAFT CATAPULT AND ARRESTING; HUMAN LIMITATIONS IN.
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR8 Feb. 28, 1955

ABSTRACT: This the third progress report on aircraft and catapult arresting. On the 24th and 25th of January, 1955, conferences were held at AMAL with Lt. Col. J.P. Stapp of the Holloman Air Force Base concerning the capabilities of the deceleration track at Holloman. Further detailed information on the HG-1 catapult with the Aero Medical Equipment Laboratory is presented to supplement the general information of the second progress report.

4,600

Shepler, H.G., J.D. Hardy, C.F. Gell & E. Hendler 1955 AIRCRAFT CATAPULT AND ARRESTING; HUMAN LIMITATIONS IN.
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR9 March 30, 1955

ABSTRACT: This ite fourth progress report on catapult and arresting. A visit was made to the Holloman deceleration track to determine its capabilities for use in simulating catapult and arresting. It was decided that probably only the decelerations simulating arrested landings could be carried out on the Holloman

track. The Naval Ordnance Test Station was visited to determine the capabilities of its track facilities. It was concluded that the Naval Ordnance Research Track is capable of providing necessary facilities for any contemplated test performance during acceleration and deceleration that had been proposed at conferences by Bureau of Aeronautics representatives.

4,601

Shepler, H.G J.D. Hardy, C.F. Gell, & E. Hendler 1955 AIRCRAFT CATAPULT AND ARRESTING; HUMAN LIMITATIONS IN.
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR10 May 24, 1955

ABSTRACT: This is the fifth and final progress report on aircraft catapult and arresting. Recommendations based upon the study of available linear accelerating devices are made as follows: (1) that initial studies be carried out at the Naval Ordnance Test Station, China Lake, California, (2) that studies be carried out in collaboration with the Aeromedical Field Laboratory, Holloman Air Force Base, New Mexico, and (3) that should tests in aircraft be indicated from the initial study, such tests should be scheduled at the Naval Air Test Center, Patuxent River, Maryland or the Naval Air Test Station, Lakehurst, New Jersey with the assistance of AMAL personnel as desired. A brief outline of the problems relating to performance testing under acceleration is also included in this report.

4,602

Shepler, H. G., C. F. Gell, E. Hendler, J. D. Hardy 1955 HUMAN LIMITATIONS IN AIRCRAFT CATAPULT AND ARRESTING. PHASE I. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 318; TED ADC AE-6304; TED ADC AE-1407; 31 Dec. 1955

ABSTRACT: Analysis of the problem was first made in terms of the required activity of the pilot during take-off and landing procedures. The question was then put as to whether the pilot could maintain control of the aircraft during acceleration at 10 G during a 250-300 foot stroke. If not, how long after the end of acceleration would it be before the pilot could take control? The following laboratories and tracks were visited to study the capabilities and availability for tests of performance degradation due to acceleration: (1) Human Centrifuge - AMAL; (2) HG 1 Catapult - AMEL; (3) Ejection Seat Tower - AMEL; (4) XC-7 Steam Catapult - Patuxent, Md.; (5) High Speed Research Track - Holloman AFB, N. Mex.; (6) High Speed Research Track - Naval Ordnance Test Station, China Lake, Calif. It was concluded that the facilities at Holloman AFB and Naval Ordnance Test Station were suitable for initial studies but the cost of operation of these tracks is very high. At present there exists no facility for a thorough study of the linear acceleration and deceleration problems in the range of acceleration patterns encountered in catapult launchings and arrested landings. However, thorough studies might be made at the Ships Installations Facility at Lakehurst, providing facilities for human experimentation were available.

4,603

Shevi, I. and N.G. Kuz'mina. 1956 IZMENENIIA V KLETKAKH NEKOTORYHH ORGANOV KHOLODNOKROVNYKH ZHIVOTNYHH POD DEISTVIEM VIBRATSII. (Changes in the cells of some organs of cold-blooded animals under the effect of vibration) Gig. san. 21:37-40

4,604

Shipler, H. G. 1958 PILOT PERFORMANCE AND TOLERANCE STUDIES OF ORBITAL RE-ENTRY ACCELERATION. (U. S. Naval Air Development Center, Johns ville, Pa.) TED ADC AE1412, MA-8. 19 Sept. 1958.

4,605

Shirley, R. E. 1957 STANDARDS FOR ACCELERATION.
In: Symposium: Physical Standards and Selection, Randolph Air Force Base, Texas Pp. 135-139, ASTIA AD-144 144.

ABSTRACT: The effects of application of g-force are briefly discussed. The method of determination of g tolerance using a centrifuge is described. At the present time it is noted that few Air Force personnel are g intolerant or susceptible. It is also noted that the mood of the patient or experimental subject is important in production and maintenance of g tolerance. It is strongly suggested that this, or some similar test be included in the examination of pilot trainees so that subjects who do not possess a physiological adaptation to increased intrathoracic pressure may be tested on the centrifuge for g tolerance before a large amount of training time and money have been invested in these personnel.

4,606

Shirley, T. 1960 MEN OF SPACE.
(Philadelphia; Chilton Co., Book Division, 1960)

4,607

Shternfel'd, A. 1959 OT ISKUSSTRENNYKH SPUTNIKOV K MEKHPLANETNYM POLETAM (FROM MAN-MADE SATELLITES TO INTERPLANETARY FLIGHTS) Gosudarstvennoye Izdatel'stvo Fiziko-Matematicheskoy Literatury (Moscow), 1959 (Aerospace Technical Intelligence Ctr., Wright-Patterson AFB, Ohio) Trans. No. MCL-1301, 18 Sept. 1961. ASTIA AD 264 626

ABSTRACT: The launching of an automatically controlled rocket to Venus will enable scientists to obtain valuable scientific data. But much more data will be supplied by flights around Venus, especially the flight of a manned rocket.

At a definite trajectory the cosmic rocket after flying around the celestial body will automatically return to the point of take-off, traveling on inertia without any fuel consumption. That is why flights of people around Venus will be easier and sooner than the flight with landing on the surface of Venus with return to Earth. But the flight around Venus is a considerably more difficult problem than the flight around the Moon. In the latter case, the rocket is preferably in the terrestrial field of gravitation. Having overtaken the Moon, it will come back to Earth. But when a cosmic rocket will fly in the direction of Venus then at a relatively short distance from the Earth it will fall into the field of gravitation of the Sun thus fully subjecting the movement of the rocket to gravitation.

4,608

Shternfeld, Ari. 1959 MAN IN COSMIC SPACE
Soviet Space Science (New York: Basic Books, 1959) Pp. 163-189

ABSTRACT: Presents an excellent, simplified discussion of work and life under conditions of weightlessness. Defines G-force for the layman.

4,609

Shternfel'd, Ari 1959 SOVIET SPACE SCIENCE.
Trans. of mono. Iskusstvennyye Sputniki, 2nd ed., Moscow, Nov. 1957
(New York: Basic Books, Inc.) Pp. 163-189

4,610

Shternfel'd, A. 1961 TWENTY-FOUR HOURS IN SPACE OPENS THE WAY TO THE PLANETS
Tekhnika molodezhi 1961(11):14-15

ABSTRACT: The author discusses space flights which could be completed in 25 hrs., 18 mins., the duration of German Titov's space flight. The author states the launching and descent time and speed. Although Titov suffered no ill effects of weightlessness, artificial gravity could be produced for future cosmonauts. The author states that it would be possible to fly to the moon in 25 hrs. The author compares a 25 hr. and 5-day flight to the moon. (CARI)

4,611

Shuvatvo, L. P. 1961 MICROAPPARATUS FOR THE REGISTRATION OF CERTAIN PHYSIOLOGICAL FUNCTIONS BY RADIO
(Trans. of mono Mikroapparatura dlya Tegistratsii po Radio Nekotorykh Fiziologicheskikh Funktsii, Moscow, 1959.)
(Office of Technical Services, Washington, D.C.) 61-27396

4,612

Siegel, M. 1951 ANALYTICAL AND TEST INVESTIGATION OF TYPE HG MARK I CATAPULT PERFORMANCE CHARACTERISTICS (Naval Aircraft Factory, Philadelphia, Pa.) 19 April 1951, Rept. no. M-5038, ASTIA AD-102 385

ABSTRACT: The purposes of this test and analytical investigation are as follows (1) Experimentally determine the performance characteristics and optimum conditions of operation of the HG-1 Catapult. (2) To investigate both experimentally and analytically the processes involved in the launching cycle so as to evaluate the practicability of conforming with the original catapult design specifications. Predict the extent of improvement which may be obtained through further catapult modifications. In the HG-1 system control of acceleration by means of regulating oil back pressure has been shown to be very sensitive to the regulating valve poppet opening velocity. It was found that for full stroke operation at any launching condition there is one acceleration build up rate which will give relatively smooth acceleration characteristics. Flexibility of ram and hunching car structure was found to superimpose a high frequency vibratory acceleration about the average values. The probable effect of these vibratory accelerations on test specimens, and suggestions for mitigating the superimposed vibratory accelerations in future catapult designs are described in the conclusion section of this report.

4,613

Sieger, W. J., & E. H. Copeland 1961 UNIFORMITY IN SHOCK TESTING
In 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D. C. (Mt. Prospect, Ill.: Institute of Environmenta Sciences, P. O. Box 191) pp. 291-298

4,614

Siegfried, M. 1957 BIBLIOGRAPHY OF RESEARCH REPORTS ISSUED BY THE BIOPHYSICS BRANCH (Wright Air Development Center, Aero Medical Lab., Wright-Patterson AFB, Ohio) Jan. 1957
ASTIA AD 126 361

ABSTRACT: This bibliography has been compiled to tabulate those publications including technical reports, technical notes, memorandum reports, and papaers which are considered to be of lasting interest in the fields of research being

conducted in the Biophysics Branch of the Aero Medical Laboratory, Directorate of Research, Wright Air Development Center.

This material, divided by Section according to the type of work conducted and covering the areas of acceleration, anthropology, bioelectronics, escape, and stress and fatigue, lists only those articles now published. Because the Stress and Fatigue Section is just newly formed, only papers in this area are listed in the present edition.

4,615

Sieker, H.O. 1952 DEVICES FOR PROTECTION AGAINST NEGATIVE ACCELERATION. PART I. ACCELERATION STUDIES. (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TR 52-87, ASTIA AD 142 259.

ABSTRACT: Previous experimental work has shown that negative acceleration is tolerable within certain physiological limits. This report summarizes studies in which human subjects were exposed to negative acceleration with and without protection. The tolerance limits for negative acceleration in unprotected subjects in the upright seated position was found to be 2.5 g. The acceleration was limited to this level by the subjects' discomfort and the bradycardia noted in theelectrocardiogram. At 3 g in addition to marked discomfort, conjunctival hemorrhage and cardiac asystoles were noted. When the subject in the upright position was protected by means of counter-pressure about the head and neck, the tolerance to negative acceleration was increased to 5 g. The tolerance limit for negative acceleration was found to be 4 g in the negative g aspect of the USAF prone position bed. (Author)

4,616

Sieker, H. O. 1961 EFFECT OF ACCELERATION ON THE HEART. (In Gauer, O. H. and G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine). (Boston: Little, Brown, and Co., 1961). Pp. 52-60

4,617

Siffre, M. 1951 TRAUMATISMES ET PARACHUTAGES (TRAUMATISM AND PARACHUTE JUMPING)
Revue du Corps de Sante Militaire, Paris 7:121-130, 1951

4,618

Sifuentes, S. S. 1958 SEAT BACK-PASSENGER-IMPACT ABSORPTION CHARACTERISTICS DEVELOPMENTAL TEST MODEL 22. (Convair, San Diego, Calif.) Rept. #SL58-177, 16 June 1958

4,619

Sillevaerts, C. 1935 NOTES SUR LA PATHOLOGIE SPECIALE DE L'AVIATEUR (Notes on Diseases Peculiar to the Aviator) Mém. Acad. Méd. Belg. (Brussels) 25(4): 1-95

4,620

Silliphant, W. M. & V. A. Stembridge 1958 AVIATION PATHOLOGY: THE ROLE OF THE PATHOLOGIST IN AIRCRAFT ACCIDENT FATALITIES. U.S. Armed Forces Med. J. 9:207-233, February 1958.

4,621

Silverman, A.J., et al. PSYCHOPHYSIOLOGIC CORRELATES OF VASCULAR RESPONSES. I. AFFECT, RESPONSE TO THE HUMAN CENTRIFUGE AND CATECHOL AMINE LEVELS. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio)

SUMMARY: Inter and intra-individual variations in G-tolerance have long been an enigma. Since black-out represents the point of cardiovascular decompensation where there is insufficient blood pressure to perfuse the retina, the human centrifuge is an excellent way to study response variations to massive hypotensive stresses. From anecdotal evidence, and previous work suggesting relationship of blood pressure responses, and differential catechol amine release in association with specific affects (anger and anxiety), it was postulated that the same relationships might account for differences in G-tolerance. Black-out levels on six subjects were thus obtained and urinary bioassays done for adrenaline and noradrenaline; while a focused psychiatric interview determined the presence and intensity of anxiety and agression. Results indicated that during the control period, adrenaline was highest in the low G group, and noradrenaline highest in the high G group. Both catechol amines increased during the stress period, as expected, but the above relationships held. Noradrenaline increased progressively in higher G subjects. Low G subjects revealed prominent anxiety. Middle G subjects showed moderate anxiety and agression. In further experiments when there was a shift in affect, G-tolerance also changed in the predicted direction. (DACO)

4,622

Silverman, A. J., S. I. Cohen, G. D. Zuidema, and C. S. Lazar 1957 PREDICTION OF PHYSIOLOGIC STRESS TOLERANCE BY PROJECTIVE TESTS. THE FOCUSED THEMATIC TEST. J. Project. Techn. 21:189-193.

4,623

Silverman, A. J., S. I. Cohen, & G. D. Zuidema 1957 PSYCHOPHYSIOLOGIC INVESTIGATIONS IN CARDIOVASCULAR STRESS. Amer. J. Psychiatry 113(8):691-693

SUMMARY: Anecdetal material led us to the observation that subject s variation in blackout level seemed correlated with their affect state, and that psychological differences appeared to exist between low "g" and high "g" tolerance subjects. It seemed most likely that these variations were ultimately due to different degrees of efficiency of the compensatory blood pressure response to the cardiovascular stress. - - - The decision was made to study aggression and its handling rather than the entire personality. It soon became apparent that high "g" subject seemed more outgoing and aggressive than low "g" subjects.

In preliminary testing 13 protocols were prepared, consisting of 6 low "g" and 7 high "g" subjects previously tested on the centrifuge. These protocols were presented independently to 2 clinical psychologists who - - - properly placed 12/13 of the subjects. In addition, 33 further subjects were tested. The authors attempted to place these subjects in their appropriate "g" tolerance categories on the basis of the projective test. Using the criteria on a 6 point scale, a numerical score was obtained. Figure I illustrates that the subjects were placed in their appropriate categories with a high degree of success.
In most instances the test was not administered on the same day as the centrifuge ride. Thus, what was being assessed by the projective test was the usual way the subject handled or expressed aggression. When the test is given close to the time of the actual centrifuge stress, it is assessing the subject's affective state, at the appropriate time, and its accuracy in predicting "black-out" levels increases.

Double-blind cross validation studies now under way are taking this into account and suggest that the 92% accuracy of prediction will be maintained. (DACO)

4,624

Silverman, A. J., S. I. Cohen, & G. D. Zuidema 1957 PSYCHOSOMATIC FACTORS IN "BLACKOUT" (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TR
See also J. Nervous & Mental Disease 125(1):64-68 (F)
NOTE: Reel 7, Flash 7, Item 54

SUMMARY: 1) On the basis of observation of behavior and interviews, a psychosomatic factor appeared to be identified in tolerance to G-forces. 2) Aggressive feelings appeared related to increased tolerance, while anxiety was associated with lower black-out levels. 3) The possible relationship of these affects to adrenaline noradrenaline levels and hence to G-tolerance is discussed. (AUTHOR)

4,625

Silverman, A. J., S. I. Cohen, & G. D. Zuidema 1957 PSYCHOSOMATIC FACTORS IN "BLACKOUT" J. Nervous & Mental Disease 125(1):64-68
NOTE: Reel 7, Flash 7, Item 54
See also (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR

SUMMARY: 1) On the basis of observation of behavior and interviews, a psychosomatic factor appeared to be identified in tolerance to G-forces. 2) Aggressive feelings appeared related to increased tolerance, while anxiety was associated with lower black-out levels. 3) The possible relationship of these affects to adrenaline noradrenaline levels and hence to G-tolerance is discussed. (AUTHOR)

4,626

Silverman, A.J., S.I. Cohen, G.D. Zuidema & L.L. Vickery 1958 PSYCHOLOGIC BIOLECTRIC ASSESSMENT OF G-SUIT PROTECTION. (USAF, Wright Air Dev. Div., Wright-Patterson AFB, Ohio) WADC TN 56-400, ASTIA AD 97278.
NOTE: CARI P&S 2.15

ABSTRACT: Performance of a psychomotor task and arousal as measured by GSR were assessed on six subjects who were centrifuged at 3 g for ten rides, while protected and again while unprotected by an anti-g suit. Results suggested less arousal and better sustained performance when protected by the suit.

4,627

Silverman, A.J., S.I. Cohen, and B. Shmavonian 1959 SELECTION TECHNIQUES FOR SPACE CREWS (Duke U. School of Medicine, Durham, N.C.) Contract AF 49(638) 354); AFOSR TN 59-145, 29 Mar 1961, ASTIA AD-253 128

ABSTRACT: Accurate selection techniques depend in part upon accurate identification of the presumptive stresses. The impact upon each individual of these various forces varies considerable depending upon the meaning these stresses have for him, due to personality differences and variations in the psychophysiological state of the moment. Thus, crew selection will involve such problems as: (a) Determination of the personality types most suited to the mission in general, as well as the specific jobs they would be expected to carry out. (b) The motivations and other psychological characteristics such as judgement, which might be expected to lead to the highest performance capability of the individuals. (c) The conscious and unconscious attitudes which might be detrimental to individual and group functioning and methods to avoid these attitudes from occurring or interfering with the person's functional capacity. (d) A delineation of the specific psychophysiological responsitivity to various aspects of the mission, determined in part by (a), (b), and (c). Psychological test techniques have been able to discriminate high and low resistance to g forces, as well as high and low cardiac output subjects, and discrimination of ulcer and non-ulcer patients.

4,628

Silverman, A.J., S.I. Cohen & B. Shmavonian 1959 SELECTION TECHNIQUES FOR SPACE CREWS. (Paper, Regional Research Meeting of the American Psychiatric Association December 1-3, 1958, Miami, Fla.) ASTIA AD-253 128

4,629

Silvette, H. & S.W. Britton 1948 ACCELERATORY EFFECTS ON RENAL FUNCTION Am. J. Physiol, 155:195-202 , Nov. 1948.

4,630

Silvette, H. & S.W. Britton 1948 SLIDE RULE FOR DETERMINATION OF "G" J. Aviation Med. 19:297, Aug. 1948.

4,631

Simmonds, W. J. 1943 PROBLEMS OF ACCELERATION Med. J. Aust. 2:127-129, 1943.

4,632

Simmons, C.F. 1950 WINDBLAST PROTECTIVE VISOR ASSEMBLIES FOR USE WITH HELMETS AND OXYGEN MASKS. USAF Technical Report 6037, Sept. 1950. ASTIA ATI 87407

ABSTRACT: Problems incident to the development of wind blast head-protection equipment for use by aircrew men during seat ejection were studied. The equipment was tested by using both live subjects and dummies ejected from airplanes flying at speeds up to 485 mph. Tests were also made with wooden model heads using an altitude chamber to produce air blast in excess of 500 mph. It was determined that a modified P-1 helmet and a modified A-13A oxygen mask plus a visor mechanism will remain on the wearer at 485 mph.

4,633

Simon, A.W. 1959 THE CALCULATION OF THE VELOCITY AND THE ACCELERATION OF THE ROCKET SLED FROM THE TIME-SPACE DATA BY THE METHOD OF LEAST-SQUARES POLYNOMINALS. (Air Force Missile Development Center, Holloman AFB, New Mex.) Rept. No. AFMDC TN-59-5, April 1959. ASTIA 211 524.

ABSTRACT: A method of calculating the velocity and acceleration of the center of gravity of the rocket sled from measured time vs distance travelled on the Holloman track is presented. The least-squares method is used to reduce the residual errors in measurement and to provide a most probable solution. (Author)

4,634

Simon, A.W. 1962 A THEORETICAL STUDY OF THE EFFECT OF ACCELERATION AND DECELERATION ON THE HUMAN BODY.
(Air Force Office of Scientific Research, Holloman AFB, New Mex.)
Working Paper DRA-62-4, July 1962.

4,635

Simon, G. B. 1959 MEASURING INTELLECTUAL ABILITY IN MAN UNDER HIGH ACCELERATION. In Proceedings of the Pilot Clinic on the Instrumentation Requirements for Human Comfort and Survival in Space Flight, 26-27 Oct. 1959, Fier, New York Pp. 106-116

4,636

Simon, G. B. 1961 THE SIMULATOR AS A HUMAN FACTORS RESEARCH TOOL FOR MANNED SPACE FLIGHT.
(Institute of the Aerospace Sciences, New York, N. Y.)
Paper 61 196 1890, June 1961

ABSTRACT: This paper discusses the simulator as a human factors research tool for manned space flight. Some of the research that needs to be done with man in a simulation facility is indicated and the need for such research is clarified. Some of the characteristics of the simulation facility are described with a discussion of state-of-the- art limitations.

4,637

Simons, A.K. 1951 TRACTOR RIDE RESEARCH
Paper: Society of Auto. Engineers National Tractor Meeting, 10-13 Sept. 1951
S.A.E. Preprint 653
See also: Society of Automobile Engineers Transactions, April 1952, Pp. 357-364

ABSTRACT: It cannot be over emphasized that the job the tractor must do, the position of the seat on the tractor, and the posture of the body in the seat will all affect tractor seat suspension design. One scientific approach to the problem is to (1) record the absolute tractor motion in all 3 directions simultaneously while the field operation is in progress, (2) subsequently analyze those records in the light of human tolerances and (3) design the seat suspension to isolate against the objectionable part of this motion. The use of such electronic equipment opens up new fields of investigation to the suspension engineer and the medical profession to determine physical and human responses to all conditions of motion. The challenge is to the seating engineer to try to devise a seat suspension that will do as good a job in isolating vibration and supporting his body as do his own legs without that unfortunate adjunct of becoming fatigued.

4,638

Simons, A.K. 1952 TRACTOR RIDE RESEARCH.
SAE Transactions, 6:357-364

ABSTRACT: The results of these studies revealed: a) the test course ride typified plowing and discing operations, b) the predominance of all motion was near the natural frequency of the tractor in the vertical and transverse directions, c) the accelerations were consistantly beyond Jacklin's disturbing comfort level in the vertical and transverse directions and occasionally in the longitudinal direction, d) the need for reducing transverse and vertical vibrations appeared to be mutually desirable.

4,639

Simons, A.K., A.O. Radke & W.C. Oswald 1956 A STUDY OF "TRUCK RIDE" CHARACTERISTICS OF STANDARD CUSHION VS. SUSPENSION TYPE SEATS IN MILITARY VEHICLES
(Detroit Arsenal and Aberdeen Proving Ground) Contract No. DA-11-022-ORD-1999; ORD Project TT1-696; DA Project 5T7201001; Sub-Directive 60405330-11-80802. Rept. No. 118, 16 March 1956.

ABSTRACT: The purpose of this study was to electronically record and compare the "truck ride" (1-8 cps) felt by the truck driver in a standard seat cushion assembly and suspension seats installed in a rubber-tired military truck and driven over permanent test courses at the Aberdeen Proving Ground.

Truck acceleration levels in the vertical, transverse and longitudinal directions were found to exceed the "intolerable" and "uncomfortable" limits suggested by vibration table studies in Europe and the U.S.A. The standard driver's cushion seat amplified vertical basic truck motions (1½-6 cps), transmitting an average of 124% of the vehicle vibration intensity to the driver's belt on the Belgian block and staggered bump courses. The assistant driver's seat averaged 139% transmission. The suspension seats attenuated the basic truck motions (1½-6 cps) to the extent of transmitting an average of 80% of the truck vibration intensity to the driver's belt for suspension A (69% for suspension B), over the same test courses. These field test results correlate with performances determined in laboratory vibration table studies of man on the standard and suspension type seats. This correlation is important because laboratory vibration table studies are easier to make and are subject to greater experimental controls.

Laboratory vibration studies on man in a rigid seat were made (0-6 cps) which show the different responses of man's head, neck and belt and the gross effects of variation in muscle tension.

Some theories are presented on man's expenditure of energy in holding onto steering wheel and pushing into back cushion to reduce the amplifying effect of conventional cushions. The serious lack of data throughout the world on man's short and long term reaction to vibrations in the 1-8 cps range is emphasized.

4,640

Simons, D.G. 1949 USE OF V-2 ROCKET TO CONVEY PRIMATE TO UPPER ATMOSPHERE. (Air Material Command, Wright-Patterson AFB, Ohio) Rept. No. TR-5821. May 1949.

ABSTRACT: The report describes the techniques and devices developed to protect a monkey during flight in the nose-section of a V-2 rocket. Results obtained from 2 separate flights are discussed. Each time the properly supported animal (rhesus monkey) was enclosed in a pressurized capsule containing a 24-hr oxygen supply and apparatus for carbon dioxide and water vapor absorption. Also, provisions for recording respiration and the electrocardiogram on a Cook recorder during the flight were included. The experiments are referred to as Project Albert I- included in Blossom III fired on June 11, 1948, and Project Albert II- included in Blossom IVB, fired on 6/14/49. After installation of Albert I, 9 lbs anaesthetized, indication of neither heart action nor respiration could be obtained, due either to death of the monkey or to failure of the electrocardiographic apparatus. The rocket attained 37 miles altitude, and separation of the nose occurred as scheduled, but the parachute system failed, causing destruction upon impact. Albert II, 6½ lbs., also anaesthetized, reached 85 miles altitude, but again parachute failure killed the animal upon impact. However, the animal was still alive and apparently well throughout the 340 secs. flight. Barring parachute failure, animal recovery was considered likely. During 10 to 15 secs [illegible] acceleration at 5.5 G, the per-minute decreases in heart rate and respiration were 190 to 110 and 90 to 60, respectively. The free-fall condition, lasting several minutes, was characterized by gradual decrease in pulse rate from 190 to 180 and respiratory rate from 65 to 60, suggesting a calming effect of a gravity-free environment rather than cardio-acceleration, as anticipated.

4,641

Simons, D. G. & J. P. Henry May 1950 ELECTROENCEPHALOGRAPHIC CHANGES OCCURRING DURING NEGATIVE ACCELERATION. HEADWARD CENTRIFUGAL FORCE. (AMC, Wright-Patterson AFB, Ohio) AF-TR-5966, May.1950 ASTIA AD-76873

ABSTRACT: Three rabbits were subjected to negative acceleration in experiments similar to those conducted in this laboratory by Gamble, et al., J. Appl. Physiol. 2:133, 1949. It was proved that the abnormal brain waves reported by those authors were not respiratory artefacts. They only developed after accelerations sufficiently severe to cause ischemic cerebral hypoxia secondary to disturbance of the cardio-vascular system. The experiments thus confirmed the theory that cerebral dysfunction occurring during negative acceleration may be due to disturbance of the cardiovascular system.

4,642

Simons, D. G. 1958 AREAS OF CURRENT SPACE MEDICAL RESEARCH In Alperin, M., M. Stern, & H. Wooster, eds. Vistas in Astronautics: Proceedings of the First Annual AFOSR Astronautics Symposium (New York: Pergamon Press, 1958) pp. 299-303, Part 6, Human Factors

ABSTRACT: Effects of heavy-ray particles, the design of sealed cabins, the effects of weightlessness, and the problems of reentry into the atmosphere are briefly discussed.

4,643

Simons, D.G. 1958 SPACE MEDICINE - THE HUMAN BODY IN SPACE. In Ten Steps Into Space, The Franklin Institute, Philadelphia, Pa., Monograph No. 6, pp. 161-178, Dec. 1958.

4,644

Simons, J.C. & M.S. Gardner 1963 WEIGHTLESS MAN: A SURVEY OF SENSATIONS AND PERFORMANCE WHILE FREE-FLOATING. (6570th Aerospace Medical Research Labs., Aerospace Medical Division, AFSC, Wright-Patterson AFB, Ohio) Report No. AMRL-TDR-62-114, March 1963. ASTIA DDC 410767.

ABSTRACT: The effect of surface-free behavior on work performance in space has been investigated to determine what techniques should be developed to aid the orbital workers. While they performed gross motor activities under weightless conditions, subjects reported their sensory and performance experiences during Keplerian parabalas in a C-131 B aircraft in both lighted and dark cabin conditions. Their experiences were categorized into sensation influences upon orientation and body motion influences upon body attitude and position control. Unique

examples of short-term weightless behaviors were found and their causes are briefly discussed. Potential applications of these weightless responses to hardware development and to crew training and selection are discussed, and significant areas for future research are proposed.

4,645

Simpson, J. D. 1941 MEDICINE OF FLYING J. Roy. Nav. Med. Serv. 27: 249-258.

4,646

Singer, E. and G.J. Peters 1961 SYSTEMS ANALYSIS OF A LAUNCH PHASE PRECISION TRACKING SYSTEM
(ITI Federal Laboratories, Air Force Missile Test Center (ARDCO, Patrick Air Force Base, Florida) (LAPTAR) Contract No. AF 08(606)-4008 ASTIA AD 254103

ABSTRACT: The preliminary design of a multistatic radar system called LAPTAR which will perform high accuracy measurements of missile position, velocity, and acceleration from launch to 20,000 ft. is presented. Factors leading to the proposed design, a description of the system, and an analysis of system performance are included.

Consideration of possible geometries and radar site locations led to the selection of an ellipsoidal or range-sum measurement system with three fixed receiver stations situated near the boundaries of Cape Canaveral, and a mobile transmitter-receiver near the launch pad. Accuracy requirements called for use of phase coherent techniques and a cooperative missile-borne beacon. The beacon transponds an X-band carrier with three modulation frequencies to provide unambiguous velocity and range measurements. Phase coherence is maintained with a closed loop time multiplexing subsystem.

The error analysis shows that LAPTAR is the most accurate radar system yet devised within the present state-of-the-art. Indications are that the system will provide real-time and post analysis information under all environmental circumstances, independent of any outside system, and that under most conditions the key accuracy specification will be met.

4,647

Singer, S. F. 1960 SYMPOSIUM ON SPACE MEDICINE. USAF School of Aviation Medicine, (Brooks AF Base, Texas) Jan. 1960.

4,648

Sinnamon, E.G. & W.S. Krew 1962 BIBLIOGRAPHY OF AVIATION MEDICAL ACCELERATION LABORATORY PUBLICATIONS, 1950-1960 (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-6211 Sept. 27, 1962

ABSTRACT: A bibliography with abstracts and indices is presented which covers all of the published work of the Aviation Medical Acceleration Laboratory during its first decade, 1950-1960. The primary facility at this laboratory is the 50-foot radius human centrifuge with its gimbal-mounted gondola This device is capable of producing acceleration levels up to 40G and with computer control can realistically simulate flight profiles of air and space vehicles. The subject matter covered by the publications includes aviation and space medicine, the effects of acceleration on the animal and human organism, human performance under acceleration stress, dynamic stimulation of aircraft and space vehicles, biochemistry, physiology, psychology, and engineering. Included are formal reports, progress reports and articles which appeared in the open literature. The material is coded and grouped under subject headings and indexed by author, title and report number or journal citation. ASTIA numbers are given for all reports available under that system.

4,649

Sipple, W.C., C.H. Fugitt, W.B. Wentz & C.F. Gell 1954 DEVELOPMENT OF SCINTILLATION COUNTING TECHNIQUES FOR USE IN ACCELERATION STRESS STUDIES. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5411 30 July 1954. ASTIA AD 39 396

ABSTRACT: A description is made of the special laboratory facilities and instrumentation programs which were evolved for the satisfactory utilization of radioisotopes in connection with studies peculiar to acceleration physiology. A special instrumentation program has been completed whereby scintillation counting of weak gamma emitters <u>in situ</u> is now possible on subjects during their exposure to acceleration stress on the human centrifuge.

4,650

Sipple, W. C., & B. D. Polis 1959 A PHYSIOLOGICAL END POINT FOR THE STUDY OF THE TOLERANCE OF SMALL MAMMALS TO HIGH ACCELERATION STRESS. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5906; ASTIA AD-226 560; 17 June 1959

ABSTRACT: By means of a transistor amplifier mounted before the slip rings of an animal centrifuge it was possible to obtain recordings of the EKG of rats under acceleration stress. With this information a physiological end point for the tolerance of the rat to 20G (positive acceleration) was defined as the time to reduce the heart rate of the animal from an initial state ranging from seven to nine beats per second to a final moribund state of 2 beats per second. The instrumentation and techniques employed permit the option of recovering the animal alive after approaching the limit of tolerance to acceleration. (AUTHOR)

4,651

Sipple, W. C., & B. D. Polis 1961 THE ELECTROCARDIOGRAM AS AN INDICATOR OF ACCELERATION STRESS. IRE Trans. on Bio-Medical Electronics, BME-8(3):189-191, July 1961.

ABSTRACT: By means of a transistor amplifier mounted before the slip rings of an animal centrifuge it was possible to obtain recordings of the electrocardiogram of rats under acceleration stress. With this information, a physiological end point for the tolerance of the rat to 20 g (positive acceleration) was defined as the time to reduce the heart rate of the animal from an initial state ranging from seven to nine beats per second to a final moribund state of 2 beats per second. The instrumentation and techniques employed permit the option of recovering the animal alive after approaching the limit of tolerance to acceleration. (AUTHORS)

4,652

Sipple, W. C. et al 1961 MINIATURIZED PHYSIOLOGICAL TELEMETRY SYSTEMS Aerospace Medicine 32(3):247, March 1961.

ABSTRACT: Two types of miniaturized systems for telemetry of physiological signals have been developed, permitting acquisition of data from subjects unencumbered by wiring to recording equipment. In both systems the transmitters are worn by the subject in a helmet or pocket package, with the receivers and recording equipment being located remotely. The first system is for short range applications, with advantages of small size and weight. In the second system the desired signals are converted to frequency modulated subcarriers, multiplexed and fed to a long range F.M. transmitter, requiring discrimination at the recording station. Each of the two systems has its particular advantages determined by the conditions of use and number of channels of information required.

4,653

Sipple, W.C., & B.D. Polis 1961 A PHYSIOLOGICAL END POINT FOR THE STUDY OF THE TOLERANCE OF SMALL MAMMALS TO HIGH ACCELERATION STRESS, USING A TRANSISTORIZED AMPLIFIER FOR THE MEASUREMENT OF THE ELECTROCARDIOGRAM. I.R.E. Trans. Med. Elect., BME-8, No. 8: 189-191, July 1961.

ABSTRACT: By means of a transistor amplifier mounted before the slip rings of an animal centrifuge, it was possible to obtain recordings of the "EKG" of rats under acceleration stress. With this information, a physiological end point for the tolerance of the rat to 20 G (positive acceleration) was defined as the time to reduce the heart rate of the animal from an initial state ranging from seven to nine beats per second to a final moribund state of 2 beats per second. The instrumentation and techniques employed permit the option of recovering the animal alive after approaching the limit of tolerance to acceleration.

4,654

Sirotinin, N. N. 1961 EFFECT OF [illegible] FORCES ON THE ORGANISM AT EARLY STAGES OF ONTOGENESIS. [illegible] Eksperimental'noy Terapii (Moscow) 5(5).1) 13. [illegible]

ABSTRACT The author describes experiments conducted on newborn and adult mice, rats, rabbits, cats, dogs, and guinea pigs to determine their tolerance to radial acceleration. Results of these experiments showed that immature mice, rats, rabbits, kittens, and puppies possess considerably greater resistance to radial acceleration than adult animals. Guinea pigs are more developed at birth than other animals and, therefore manifest almost the same resistance to radial acceleration as adult guinea pigs.
It appears that the increased resistance of newborn animals to radial acceleration is linked with decreased reactivity of their organisms. The mechanisms associated with decreased reactivity require further study. (CARI)

4,655

Sisakyan, N. M. 1960 BIOLOGICAL OBSERVATIONS OF ANIMALS CARRIED BY ROCKETS. Academy of Sciences of the USSR 30(11):15-24

ABSTRACT: A paper presented by N. M. Sisakyan at a conference of the USSR Academy of Sciences, which reports the experimental results of biological observations of animals during vertical rocket flights to altitudes of up to 450 km and during their safe return to earth.

4,656

Sisakyan, N.M. 1961 BIOLOGY AND COSMIC FLIGHTS
Dept. of Commerce, Washington, D.C. JPRS Trans. No. 9469, June 19, 1961
Original Source: Priroda (Nature) (Moscow) (1): 7-16, Jan. 1961

ABSTRACT: Soviet accomplishments in space biology in terms of space flights to date are summarized, and the problems to be resolved for successful manned cosmic flights are discussed. Vertical rocket flights carrying animals to 450 km altitude solved certain problems of assuring safety and special recovery under special flight conditions. The effects of acceleration and deceleration were manifested in the elevation of blood pressure, an increase in pulse frequency and certain changes in the electrocardiogram; during weightlessness these changes gradually decreased and approached the original level. After 5 to 6 minutes or at the end of the weightless period, the indices of the main physiological functions returned to the original level. The physiological information obtained by telemetry is still not completely processed; preliminary data testifies that changes in the physiological indices did not exceed changes observed during training.

4,657

Sisakyan, N.M. 1961 BIOLOGIIA I KOSMICHESKIE POLETY (BIOLOGY AND SPACE FLIGHT) Priroda (1): 7-16, 1961
See also: "Soviet Literature on Life Support Systems", Air Information Division, Wright-Patterson AFB, Ohio. AID Report 61-59 April 28, 1961 ASTIA AD 256 235

ABSTRACT: Soviet experiments with animal-bearing rockets show that at heights of 78-85 km and speeds of 2,000 km/hr or at 39-46 and 4,100 km/hr catapulting is the reliable emergency escape method and causes no great functional disturbances in the animal. It has also been found that 3-10 minutes of weightlessness causes no great functional lesions to the animals cardiovascular or respiratory system. Experiments indicate that the body can more easily withstand the transition from acceleration to weightlessness than the reverse. No changes, genetic or otherwise, have so far been noted in the bacteria and phages contained in the second Soviet space ship. (CARI)

4,658

Sisakyan, N. M. 1961 BIOLOGICAL PROBLEMS OF SPACE FLIGHTS. GENERAL MEETING OF THE ACADEMY OF SCIENCES USSR.
(Abstract trans. of Akademiya Nauk SSSR, Vestnik, 31(6):31-40, 1961)
(Office of Technical Services, Washington, D.C.) 61-28484

4,659

Sisakyan, N. M. 1961 BIOLOGICHESKIE PROBLEMY KOSMICHESKIKH POLETOV (BIOLOGICAL PROBLEMS OF SPACE FLIGHTS) Vestnik Akademii nauk SSSR (Moska) 31(6): 31-40, June 1961
German Translation: Sowjetwissenschaft, Naturwissenschaftliche Beitrage (Berlin) 1961(12):1243-1253, Dec. 1961

ABSTRACT: The development of space biology may be divided into five stages: (1) basic work preparatory to biological experiments with high-altitude rockets, (2) animal experiments with high-altitude rockets, (3) animal experiments on artificial satellites with the vital data sent by way of radiotelemetry, (4) biological experiments in space ships with re-entry and landing, and (5) flight of man in space. On the basis of the experimental conclusions it was safe to assume that short space flights below the radiation belt under conditions similar to Sputniks II, III, IV, and V are not dangerous to man with regard to cosmic radiation. Selection of Soviet cosmonauts was done from volunteers. The training included the study of principles of rocket flight, space ship construction, special problems of astronomy, geophysics, space biology and medicine, flight training, reading of maps of the landing area, and instruction on aircraft and radio controls. Other topics mentioned are the flight of Vostok, problem areas of space flight, environmental extremes in space, and biological bases for safety of space flight. (J. Aerospace Medicine 33(8):1029, Aug. 1962)

4,660

Sisakyan, N. M. [illegible] MAIN PROBLEMS OF SPACE BIOLOGY
[illegible] Biologii (USSR) 22(5):325-332, 1961
(Translations Research Services, New York, N. Y.)
Jan. 23, 1961 JPRS: 12097

ABSTRACT: Three basic problems are discussed: (1) the effect of extremal factors of cosmic space upon living earth organisms; (2) the biological bases for safeguarding space flights and life on the planets; and the forms and conditions of extra-terrestrial life.

4,661

Sisakyan, N.M. 1961 MAN AND SPACE
Pravda, 27 Mar. 1961. P. 4, Cols. 1-3.

ABSTRACT: On the average the dogs in flight required one and one-half hours to recover from stresses experienced during launching, after which time their pulse rate, breathing, and blood returned to nearly pre-flight levels.

4,662

Sisakyan, N. 1961 MAN AND SPACE.
Pravda 85(15575):6, 26 March 1961
(Aerospace Technical Intelligence Ctr., Wright-Patterson AFB, Ohio, Trans. No. MCL-1149, 27 July 1961) ASTIA AD-261 823

ABSTRACT: Soviet science and technology never ceases to amaze mankind with its ever increasing achievements in the study of space. On March 25 the fifth sputnik weighing an impressive 4695 kilograms and carrying a four-legged cosmonaut -- the dog Zvezdochka -- and other biological specimens, was launched from the Soviet Union and returned again, on the same day, to a pre-selected landing site, by a command from the ground.

The attention of the entire world is attracted to the flights of Soviet space ships, the outstanding results of our scientists when investigating outer space. This Soviet and world interest is due mainly to the fact that each such flight enriches science with new important facts on the rules that govern the influence of space conditions on living organisms, gives valuable information on the operation of the multitude of complex research instruments, automatic devices and the equipment of the spaceship. We are acquiring ever newer information on the unknown depths of space. Finally, we are getting a clear concept of the increasing power of our rocket systems, capable of sending increasingly heavier ships into space with unfailing accuracy.

The recent successes in sending and recovering living organisms has yet another important fundamental significance. With each flight the moment approaches when man will be a passenger on the spaceship. This will be a new historic landmark in the development of science.

4,663

Sisakyan, N. 1961 MANNED SPACE FLIGHT PROBLEMS DESCRIBED
FBIS, USSR & East Europe, Nr. 145, July 28, 1961

ABSTRACT: Successful completion of a series of experiments with satellite ships made it possible to start preparing for man's flight into space. Results of research have shown that the limits of endurance could be considerably expanded, provided one makes intelligent use of the organism itself, and even more so of the proper technical means. The state of weightlessness is considered one of the characteristic factors of space flight. Experiments carried out on animals which were returned to earth proved that their 24-hour period in a state of weightlessness had no negative effect on their main functions. When a very careful analysis was carried out, some slight changes in the activity of the blood circulation apparatus had been discovered. (CARI)

4,664

Sisakian, N. M., O. G. Gazenko, & A. M. Genin 1961 NEKOTORYE PROBLEMY KOSMICHESKOI BIOLOGII (SOME PROBLEMS OF SPACE BIOLOGY) Zhurnal obshchei biologii (Moskva) 22(5):325-332, Sept.-Oct. 1961
English Translation: (Office of Technical Services, U. S. Dept. Commerce) U. S. Joint Pub. Research Serv., Washington, No. 12097 (CSO:6503-N) Jan. 23, 1962

ABSTRACT: The field of space biology is reviewed in regard to three basic problems. (1) the effects of extreme conditions of space on terrestrial organisms, (2) the biological bases for support of space flights and life on other planets, and (3) extraterrestrial forms and conditions of life. Suggestions for partial or complete regenerative cycles in space ships include: regenerative cycle of water by physical or physico-chemical methods, oxygen regeneration by electrolysis of water or biochemical conversions by means of anaerobic bacteria, and food regeneration by chemical synthesis of basic biochemicals with subsequent biosynthesis. A more feasible method seems to be utilization of photosynthetic processes of unicellular algal suspensions. Speculations on exobiology discuss hypotheses of the ecosphere of the sun, and interstellar migration of microorganisms in light of some suggestive findings concerning the composition of meteorites. (Aerospace Medicine 33(8):1029-1030, Aug. 1962)

4,665

Sisakyan, N. 1961 THE ROAD TO THE STARS
USSR, June 1961, p. 10

ABSTRACT: A good deal is known today about the hazards in space against which an astronaut must be safe-guarded. Cosmic radiation is the most threatening. A second group of hazards that needed study included noise, vibration, initial acceleration at blast-off, and weightlessness in orbital flight. Noise and vibration are only present during blast-off. It has been established that acceleration

is best endured when the forces act in the direction: chest-back, or back-chest, and also from left to right and from right to left. It follows that an astronaut should be in a reclining position when a ship goes into orbit and on re-entry into the denser layers of the atmosphere. During the state of weightlessness, the astronaut finds himself undergoing certain physiological changes. Most investigators maintain that the human body can adapt itself to weightlessness. An essential role is played by visual analysis which makes the needed corrections in behavior and movements. (CARI)

4,666

Sisakyan, N., V. Parin, V. Chernigovskiy & V. Yazdovskiy 1961 SPACE BIOLOGY MEETING
FBIS USSR & East Europe, Nr. 192, Oct 4, 1961

ABSTRACT: This is a report on the general meeting of the biology department of the U.S.S.R. Academy of Sciences and of the papers presented at that meeting. The authors stress the fact that all the studies of outer space conducted by Soviet scientists have been for peaceful purposes exclusively. They also state that the young science of space biology gives rise to its own specific methods of research, differing basically from conventional ones. These are methods of biological radiotelemetry and new techniques of experimentation, automatically affected by special instruments according to a predetermined program. The report furnished certain data obtained by Soviet scientists and lists some of the problems to be solved by space biology such as weightlessness and radiation effects. A new science, exobiology, examines the pecularities of extraterrestrial forms of life on the planets of the solar system. The author of another paper found that the physiological, biochemical, morphological, and immunological changes registered in experimental objects after space flights, proved to be of reversible nature. They did not show specific effects of cosmic radiation, weightlessness, and g-forces. The best explanation is that these changes were the organisms' generalized reaction to a complex irritant. (CARI)

4,667

Sisakyan, N. 1962 BIOLOGY AND THE CONQUEST OF SPACE
Trans. of Aviatsiya i Kosmonavtika (USSR) 44(2):24-30, 1962.
(Joint Publications Research Service, New York, N. Y.)
May 10, 1962 JPRS: 13708

4,668

Sisakyan, N. M. and V. I. Yazdovskii eds. 1962 METHODS AND TECHNIQUES OF BIOMEDICAL CONTROL IN SPACE FLIGHT.
Abstract trans. of mono. Pervye Kosmicheskie Polety Cheloveka (First Space Flights of Man) Moscow, 1962, p. 167-174.
(Office of Technical Services, Washington, D. C.)
Dec. 19, 1962 63-15322

4,669

Sisakyan, N.M. & V.I. Yazdovskiy 1962 METHODS AND TECHNIQUES OF BIOMEDICAL CONTROL IN SPACE FLIGHT
(Aerospace Information Division, Washington, D.C.) AID Report No. 62-201, Dec. 19, 1962. ASTIA AD 294 573
Original Source: Pervyye Kosmicheskiye Polety Cheloveka (First Space Flights of Man) Moskva, Izd-vo AN SSSR, pp. 167-174

ABSTRACT: Physiological measurements performed on Vostoks I and II included electrocardiography (with two sets of leads), pneomography, and registration of pulse rate. In addition, kinetocardiography was performed on Vostok II. The pulse rate was monitored continuously by means of a cardiophone which transformed the R peaks of electrocardiographs into rectilinear pulses of 0.1 to 0.2 sec duration. These were modulated by an auditory frequency of 3 kc and were transmitted continuously by a signal transmitter on a frequency of 19.95 mc. Other measurements were transmitted periodically. During reentry all physiological parameters were registered by means of a self-contained onboard system. After ejection of the cosmonaut, registration was carried on by means of a self-contained device located on his person. Transmitted data on pulse frequency was recorded on undulating and on magnetic tapes. (Author)

4,670

Sisakyan, N. M. and V. I. Yazdovskii, eds. 1962 PHYSIOLOGICAL RESPONSES OF COSMONAUTS DURING SPACE FLIGHT.
Abstract trans. of mono. Pervye Kosmicheskie Polety Cheloveka (First Space Flights of Man) Moscow, 1962, p. 176-198.
(Office of Technical Services, Washington, D.C.)
Dec. 19, 1962 63-15321

4,671

Sisakyan, N.M. & V.I. Yazdovskiy, eds. 1962 PHYSIOLOGICAL RESPONSES OF COSMONAUTS DURING SPACE FLIGHT
Aerospace Information Division, Library of Congress AID Report 62-202, December 19, 1962 ASTIA AD 294 572
Original Source: Pervyye kosmicheskiye polety cheloveka (First Space Flights of Man) Moskva, Izd-vo AN SSSR, 1962, 176-198

ABSTRACT: This publication presents a detailed report of the physiological responses of Yu. A. Gagarin and G.S. Titov to space flight. The record of changes in pulse rate and respiration rate during acceleration and weightlessness are presented.

4,672

Sisakyan, N.M., V.V. Parin et al. 1962 PROBLEMS OF SPACE BIOLOGY AND PHYSIOLOGY (U.S. Department of Commerce, Office of Technical Services, Joint Publications Research Service) JPRS: 16, 083 7 Nov. 1962 ASTIA AD 299 909
Original Source: Izvestiya Akademii Nauk SSSR. Seriya Biologicheskaya (Moscow) No. 2: 153-162. 1962.

ABSTRACT: The achievements of modern sci[illegible]ring, particularly the outstanding progress of astronautics [illegible] to a new branch of knowledge, space biology. The [illegible] characteristics of space biology, which distinguishes it appreciabl[illegible] biological d[illegible]s created long ago, is the interpenetration and in[illegible]t connection [illegible] fields of nautral and technical sciences. The second characteristics of space biology is its youth in connection with which th[illegible] of its tasks, [illegible] f future research, is considerably more extensive [illegible] what has been [illegible] despite its youth, space biology has created and is continu[illegible] methods of investigation, which are fundamentally [illegible] primary laboratory or field biology methods.

At the present time, it would be difficult to present the scientific problems constituting the content of space biolgoy with adequate completeness; however, three main problems appear to us sufficiently well defined: 1. study of the effect of extreme space factors on living organisms of the earth. 2. study and development of the biologycal basis of provision for space flights and for life on planets. 3. study of the forms and conditions of life outside the earth.

4,673

Sisakyan, N.M. & V.I. Yazdovskiy 1962 RESULTS OF POSTFLIGHT MEDICAL EXAMINATIONS OF G.S. TITOV
Aerospace Information Division, Washington, D.C. AID Report No. 62-204 Dec. 19, 1962 ASTIA AD 294 571
Original Source: Pervyye Kosmicheskiye Polety Cheloveka (First Space Flights of Man) Moskva, Izd-vo AN SSSR pp. 125-153

4,674

Sitchov, A. & J. Ivanov 1938 THE EFFECT OF ACCELERATIONS ON THE ORGANISM OF ANIMALS AND HUMAN BEINGS Vo. Sanit. Dyelo 2:79.

4,675

Ojoberg, A.A. 1931 EXPERIMENTELLE STUDIEN UBER DEN AUSLÖSUNGMECHANISMUS DER SEEKRANKHEIT (Experimental Studies Concerning the Release Mechanism of Seasickness)
Acta Oto-Laryngologica (Stockholm) Supp. 14: 1

4,676

Slager, U.T. 1962 SPACE MEDICINE
(Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1962)
Library of Congress Catalog Card No. 62-12491

ABSTRACT: Contents include papers on the following subjects: "The Concept of Space Flight"; "Development of the Space Vehicle"; "The Concept of Space Medicine" "Pressure and Oxygen in the Upper Atmosphere and Space"; "Meteoritic Material in the Upper Atmosphere and Space"; "Experimental Space Simulation"; "The Biological Effects of Low Pressure"; "The Temperature During Flight in the Atmosphere"; "The Temperature During Orbital Flight"; "Experimental Space Simulation"; "The Biological Effects of Temperature Variations"; "Radiation in Space"; "Experimental Space Simulation"; "Interaction of Electromagnetic Radiations With Matter"; "The Biological Effects of Non-Ionizing Radiation"; "Ionizing Radiations in Space"; "Experimental Space Simulation"; "Mode of Action of Ionizing Radiations"; "The Biological Effects of Ionizing Radiation"; "Dynamics of Space Flight"; "Experimental Simulation of Space Flight Accelerations"; "The Biological Effects of Acceleration"; "The Dynamics of Weightlessness"; "The Experimental Simulation of Weightlessness"; "The Biological Effects of Weightlessness"; "Noise and Vibration in Space Flight"; "Experimental Space Simulation"; "The Biological Effects of Sound and Vibration"; "Metabolic Requirements in Space", "Experimental Space Simulation"; "The Biological Effects of Life Support Systems Imbalance"; "Life-Support Systems"; "Ionizing Radiation"; "Particulate Matter"; "Toxic Chemical Compounds"; "Psychological Stress in Space"; "Experimental Space Simulation"; "Psychological Effects of Space Flight"; "The Space Environment"; and "Biology of Far Space".

4,677

Slater, A. E. 1957 MEDICAL AND BIOLOGICAL PROBLEMS
In Bates, D. R., ed., Space Research and Exploration
(London: Eyre, 1957) pp. 165-181

4,678

Slater, E.T.O., A.E. Slater & H.E. Ross 1950 SYMPOSIUM OF MEDICAL PROBLEMS ASSOCIATED WITH SPACE FLIGHT
Brit. Interplanetary Soc. J. 9(1): 14-37 Jan. 1950

ABSTRACT: Three papers are presented: "Psychological Problems of Space-Flight" by E.T.O. Slater; "Balancing Mechanisms of Inner Ear" by A.E. Slater; and "Lunar Spacesuit" by H.E. Ross.

4,679

Slayton, D.K. & A.B. Shepard 1961 ASTRONAUTS DISCUSS MERCURY TRAINING
Aviation Week & Space Technol., 74(25):67, 71, 73-75, 77, 79

ABSTRACT: This article written by two astronauts describes the training program for Project Mercury. Various methods were used to simulate flight stresses. A weightless state was produced for 15-30 seconds in the interior of an aircraft. A human centrifuge was used to produce high acceleration and high altitude. A special chamber producing temperatures of 250° was used in training for working under heat loads. Survival training on water included exercises in distilling water and learning methods of sun protection. The overall psychological effect of the training period was to instill confidence in the astronauts.

4,680

Slayton, D. K. 1961 PILOT TRAINING AND PREFLIGHT PREPARATION.
(Paper, Conference on Results of the First U.S. Manned Suborbital Space Flight, June 6, 1961, NASA, Washington, D.C.)

4,681

Sloane, M. 1963 TEST SETUP AND PROCEDURE TO DETERMINE THE EFFECT OF SEQUENTIAL EXPOSURE TO ACCELERATION AND THE GASEOUS ENVIRONMENT OF THE SPACE CAPSULE UPON THE PHYSIOLOGIC ADAPTATION OF MAN.
(U. S. Naval Air Material Center, Philadelphia, Pa.) NAEC-ACEL-504 18 June 1963. DDC AD 409 463.

ABSTRACT: Procedures and engineering support are discussed for conducting a human study on the physiological effects of 100% oxygen and 5 psia when imposed under conditions of acceleration combined with steady state confinement. Special measures were necessary to insure continuity of environment since the acceleration and confinement capabilities were located at two different Naval activities.

4,682

Slonim, A. R. MEASUREMENT OF BIOCHEMICAL CHANGES IN BODY FLUIDS (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) Proj. 7220, RPO - 805

ABSTRACT: This task covers the search for a biochemical assay method to be applied to subjects exposed to various acceleration patterns. The work entails a study of the level of the sympathomimetic hormones (epinephrine/norepinephrine) in the plasma rather than the urine of a centrifuge subject. Such catechol amines are believed to be the responsive agents in an individual's tolerance to acceleration.

4,683

Slonim, A. R. 1960 EFFECT OF ACCELERATION ON BLOOD CREATINE, CREATININE AND INORGANIC PHOSPHOROUS IN MAN. J. Appl. Physiol. 15(2):271-274, March 1960

ABSTRACT: Ten healthy male subjects were centrifuged front to back at 6 G for 3 minutes, with head and trunk inclined 25 degrees forward in the direction of acceleration. Average control values of blood creatine, creatinine, and inorganic phosphorus were almost identical to those found immediately after exposure to the acceleration. Relatively large differences (test minus control) in some individuals were not significant. Acceleration of the magnitude and/or duration used in this study does not appear to be comparable to the effects of vigorous exercise on the phosphocreatine system of man. (AUTHOR)

4,684

Slonim, A. R. 1961 EFFECTS OF RELATIVELY HIGH ACCELERATIONS ON SOME BIOLOGICAL SYSTEMS. J. Appl. Physiol. 16(2):221-225, March 1961

ABSTRACT: Fasting male subjects were exposed to forward accelerations (12-degree back angle) at fatiguing levels varying both in amplitude and duration, nonfatiguing levels and mock runs, and to treadmill exercise. The following analyses were made: plasma bicarbonate, blood glucose, phosphorous and creatinine, urine creatinine, urine volume, urinalysis, and an estimate of creatinine clearance. The only consistent change noted after fatiguing accelerations was a small rise in blood creatinine ($P < 0.05$). Exercise, however, resulted in a marked ($P < 0.01$) decrease in bicarbonate, rise in blood creatinine, and drop in clearance. Accelerations in comparison to exercise showed little effect on either muscular or renal activity. No correlation was found between any of the biochemical measurements and acceleration intensity nor were there any differences noted between real and mock accelerations, indicating that none of these tests could index the severity of accelerative stress. The fatigue associated with high accelerations is not easily explainable in terms of increased muscular activity. (AUTHOR)

4,685

Slowik, J. and W. Weir 1963 INVESTIGATION OF CREW ESCAPE SYSTEM SURFACE IMPACT TECHNIQUES FOR ADVANCED AEROSPACE VEHICLES (Flight Dynamics Laboratory, Aeronautical Systems Division, Air Force Systems Command, Wright-Patterson AFB, Ohio) Proj. No. 1362, May 15, 1963 ASD-TDR-63-173.

ABSTRACT: This report describes the results of a four-part study related to the parachute landing impacts of a manned capsule. A survey of literature with the objective of establishing human tolerance to rapidly applied acceleration, revealed a substantial discrepancy among the data published by investigators in this area. The tolerance limits published in HIAD were accepted as the parametric limits for the present study, pending the completion of advanced studies in this area. Analyses of typical parachute landings revealed that horizontal velocities of up to 56 fps and vertical velocities of up to 33 fps are possible. Secondary impacts resulting from toppling are likely. Active and passive attenuation methods were quantitatively evaluated in an effort to determine an optimum attenuator. From the results of this evaluation, it was recommended that an active type system be developed to negate the horizontal velocity and that a conventional passive type system be employed to alleviate the vertical impact. A study of experimental techniques indicated that part-scale model testing is feasible and advantageous for a program in which prototype attenuators are validated. Methodologies were derived for dynamic scaling of the results obtained from small model experiments to permit prediction of full-size model performance.

4,686

Slye, R. E. 1961 VELOCITY REQUIREMENTS FOR ABORT FROM THE BOOST TRAJECTORY OF A MANNED LUNAR MISSION. (National Aeronautics and Space Administration, Washington, D. C.) Technical Note D-1038; ASTIA AD-260 178; July 1961

ABSTRACT: An investigation is made of the abort velocity requirements associated with failure of a propulsion system for a manned lunar mission. Two cases are considered: abort at less than satellite speed, which results in maximum decelerations in the following entry, and abort at greater than satellite speed with immediate return to earth. The velocity requirements associated with the latter problem are found to be substantial (several thousand feet per second) and are found to be even more severe if boost trajectories which lead to burnout at high altitudes or large flight-path angles are used. The velocity requirements associated with abort at less than satellite speed are found to be less severe than those for abort at greater than satellite speed except for non-lifting vehicles. It is found that abort rockets sufficient for abort at greater than satellite speed can be used to reduce maximum decelerations in entries following an abort at lower speeds. This reduction is accomplished by use of the abort rockets to decrease entry angle immediately prior to entry into the atmosphere. (AUTHOR)

4,687

Smedal, H.A., & A.P. Webster 1949 SAFE PARACHUTE DESCENT - AN UNSOLVED PROBLEM. J. Aviation Med. 20(6):443-447

4,688

Smedal, H. A., B. Y. Creer, & R. C. Wingrove 1960 THE ABILITY OF PILOTS TO PERFORM A CONTROL TASK IN VARIOUS SUSTAINED ACCELERATION FIELDS. (Paper, 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960) Aerospace Med. 31(11):901-906

ABSTRACT: An investigation has been made attempting to establish the ability of pilots to perform a control task in various sustained acceleration fields typical of those which might be encountered by a forward facing pilot flying an entry vehicle. For this program a special restraint system was developed in an attempt to maximize the accelerations in which the pilot could operate. The experiment was accomplished utilizing a flight simulator setup involving a centrifuge. A detailed description of the restraint system will be presented as it relates to protection against the various acceleration vectors. The effects caused by acceleration on the circulatory, respiratory and visual systems will be discussed in relation to the pilot's tracking ability. It is believed that the information which has been obtained will be of considerable value in the design of atmosphere entry vehicles.

4,689

Smedal, H.A. G.R. Holden, and J.R. Smith, Jr. 1960 A FLIGHT EVALUATION OF AN AIRBORNE PHYSIOLOGICAL INSTRUMENTATION SYSTEM, INCLUDING PRELIMINARY RESULTS UNDER CONDITIONS OF VARYING ACCELERATIONS. (Ames Research Center, Moffett Field, Calif.) NASA Technical Note D-351, Dec. 1960. NASA N62-70925 ASTIA AD 247 141

ABSTRACT: An instrumentation system has been designed at the Ames Research Center to measure the pilot's electrocardiogram, pulse rate, respiration rate, and blood pressure during control studies in flight and in motion simulators. Preliminary evaluation of this system in a T-33 aircraft demonstrated its reliability. Interesting preliminary observations were made as to the effect of subgravity conditions on pulse rate and blood pressures.

4,690

Smedal, H.A., B.Y. Creer, & R.C. Wingrove 1960 PHYSIOLOGICAL EFFECTS OF ACCELERATION OBSERVED DURING A CENTRIFUGE STUDY OF PILOT PERFORMANCE (Ames Research Center, Moffett Field, Calif.) NASA Technical Note D-345, Dec. 1960, NASA N62-70919

ABSTRACT: An investigation has been made in an attempt to establish meaningful human tolerance to acceleration boundaries typical of those which might be encountered by a forward facing pilot flying an atmosphere entry vehicle. The experiment was accomplished utilizing the Johnsville Centrifuge as a flight simulator and operated as a closed loop system, with a representative control problem. The physiological effects of these accelerations on the circulatory, respiratory, and visual systems are discussed.

4,691

Smedal, H. A., G. W. Stinnett, & R. C. Innis 1960 A RESTRAINT SYSTEM ENABLING PILOT CONTROL UNDER MODERATELY HIGH ACCELERATION IN A VARIED ACCELERATION FIELD. (National Aeronautics and Space Administration, Washington, D. C.) NASA Technical Note D-91; ASTIA AD-236 603; May 1960

ABSTRACT: A restraint system is described which was used in a joint centrifuge program by the Ames Research Center of the National Aeronautics and Space Administration and the Aviation Medical Acceleration Laboratory of the Naval Air Development Center. The program was designed to study the ability of a pilot in a forward-facing position to control an entry vehicle which employed lift. The pilot was required to carry out a relatively complex tracking problem on a flight simulator which involved the centrifuge operated as a closed loop system. Dynamics typical of an entry vehicle were used and the pilot was subjected to varied acceleration-time profiles with relatively high accelerations, up to 7g, from various directions for approximately 2 to 5 minutes duration. In order to conduct these tests, it was necessary to design a special restraint system. This system combined the use of a modified NASA posterior mold or couch with an anterior restraint made from nylon straps and nylon netting. A special support for the head and face was also incorporated in the restraint system. The use of this restraint system permitted a thorough study of some of the control problems of entry vehicles. (AUTHOR)

4,692

Smedal, H.A., H.C. Vykukal, R.P. Gallant, & G.W. Stinnett 1961 CREW PHYSICAL SUPPORT AND RESTRAINT IN ADVANCED MANNED FLIGHT SYSTEMS. American Rocket Society J. 31(11):1544-1548, Nov. 1961.

ABSTRACT: A new concept in physical support and restraint for pilot and crews of motion flight simulators or advanced manned flight vehicles has been described. The principle of a wear-in restraint which is easily secured to or released from the support structure, which is part of the vehicle, is the basic concept in this support and restraint system. Its capability as a functional support

and restraint for vehicle control studies during sustained accelerations has been established by its use in 3 human centrifuge programs. Its capability for tolerance to impact accelerations is unproven. Further improvements and testing is required in order to qualify it as an omnidirectional support and restraint system adequate for sustained and impact accelerations of high magnitude. (Authors)

4,693

Smedal, Harald A. and C. Dewey Havill 1962 DEVELOPMENT AND USE OF MARK SENSE RECORD CARDS FOR RECORDING MEDICAL DATA ON PILOTS SUBJECTED TO ACCELERATION STRESS. Aerospace Medicine 33(10):1187-1192 Oct. 1962.

ABSTRACT: This report presents the design format of two machine record cards of the mark sense card type which have been developed for use in connection with recording medical data on test pilots who are subjected to various acceleration stresses. One is a series card used to record subjective data from pilots after a single or a series of runs on a motion simulator during which acceleration stress is encountered. The other is a history card intended for use once a year at the time of the pilot's annual physical examination. The history card is intended to provide information regarding accumulative effects of repeated acceleration stress on the pilot. The series card has been used during one centrifuge program conducted by the NASA, Ames Research Center at the Naval Air Development Johnsville, Penn., during March, April, and May of 1961 and has proved very successful. Although the population group was small and so not ideally suited for mark sense card data acquisition some valuable accurate subjective information was obtained, particularly in regard to vision. This information would not have been obtained by simply keeping a log.

4,694

Smedal, H. A., T. A. Rogers, & T. D. Duane 1962 SOME EFFECTS OF ACCELERATION ON CERTAIN PHYSIOLOGIC FUNCTIONS OBSERVED DURING A CENTRIFUGE STUDY OF PILOT PERFORMANCE. (Paper, 33rd Annual Meeting, Aerospace Medical Assoc., 9-12 April 1962, Atlantic City, N. J.)

ABSTRACT: As a part of a continuing study into the effects of acceleration on pilot performance, this report will present additional physiological data concerning the effects of acceleration on man. 22 test pilots were subjected to sustained acceleration as high as 14 g EBI, 10 g EBO and 9 g EBD. Some observations as to meaningful tolerance levels to acceleration as well as the effect such acceleration have on the visual, cardiovascular and respiratory systems will be reported. These observations will include a statistical evaluation of the subjective symptoms reported by the pilots during and after the centrifuge runs. The

objective finding concerning the function of the respiratory system such as tidal and minute volumes, vital capacities, and other pulmonary function indices will be described. Pulse rate change and variations in blood pressure during acceleration will also be reported. Some problems that arise in the visual system will be brought out. (Aerospace Medicine 33(3):351-352, Mar. 1962)

4,695

Smedal, Harald A., Terence A. Rogers, Thomas D. Duane, George R. Holden & Joseph R. Smith 1963 THE PHYSIOLOGICAL LIMITATIONS OF PERFORMANCE DURING ACCELERATION
Aerospace Medicine 34(1): 48-55, Jan. 1963

ABSTRACT: The present report is concerned with the principal findings with respect to visual and cardiovascular dunctions, and some extensions of our previously reported respiratory data.

Experienced test pilots have performed sophisticated tracking tasks under acceleration and their performances were evaluated. Concurrent physiological experiments have been conducted in an effort to correlate psychomotor performance with changes in physiological functions. The experiments have been chiefly concerned with three organ systems most acutely affected by acceleration stress, namely visual, circulatory, and respiratory.

A particularly important aspect of this program is that the development of a suitable restraint system has permitted the study of pilots under acceleration in the EBO vector as well as in the EBI vector, the latter having been used for almost all previous experiments in the field. From the very beginning, it was clear there are interesting differences between the effects of EBI and EBO acceleration, and much of the subsequent work comprises a systematic comparison of the changes in various functions during acceleration in these two vectors.

4,696

Smirnov, N. I. and V.L. Ruban 1949 DEPENDENCE OF THE VELOCITY OF DROPS ON THE VELOCITY OF THE MEDIUM
Zhurnal Prikladnoi Khimii, USSR, Vol. 22, 1949, No. 11, pp. 1211-1213
R.A.E. Translation No. 371.

4,697

Smith, A. C. 1952 AUTOMOBILE CRASH SAFETY RESEARCH.
(Cornell Aeronautical Laboratory, Inc. Buffalo, N. Y.)
Report No. YB-846-D-1, 21 October 1952

Abstract: This report contains results of a 3 phase research program in crash safety. The time-motion characteristics of the occupants of an automobile during crash decelerations were experimentally obtained to establish the probable hit zones, velocity of impact and the attitude and angle of the body at the instant of impact. A study of methods of reducing the damage incurred by an automobile in a crsh showed "Royalite" a synththetic plastic, impact resist. material. Passenger protection discussed, padding characteristics, chest protection device for steering wheel.

4,698

Smith, A.H., C.M. Winget and C.F. Kelly 1959 PHYSIOLOGICAL EFFECTS OF ARTIFICIAL ALTERATIONS IN WEIGHT. Naval Research Reviews 16-24, April 1959

4,699

Smith, A. M. O. and C. F. Lombard 1951 THE EFFECT OF ELASTICITY UPON THE PRESSURES WITHIN A LIQUID FILLED TUBE WHEN SUBJECTED TO FLUCTUATING FORCES.
(Office of Naval Research, Washington, D. C.)
January 1951 Contract N6ori77

SUMMARY: In order to better understand the recorded blood pressures of animals exposed to the fluctuating accelerations of the Epicyclic centrifuge, a theoretical analysis is presented so that the nature of the dynamic responses can be envisioned.

No summary is possible since this is a highly mathematical and theoretical treatise.

4,700

Smith, B. J., ed. 1958 HUMAN CONTROL DYNAMICS IN AIR AND SPACE CRAFT.
(Proceedings of 2nd Annual Human Factors Discussion Group, 11th Annual International Air Safety Seminar, Nov.1958)

4,701

Smith, C. P., Jr. 1952 THE PHYSICAL RECOVERY OF INSTRUMENTS AND DATA FROM A ROCKET FLIGHT. In White, C. S., & O. O. Benson, Jr., eds., Physics and Medicine of the Upper Atmosphere, A Study of the Aeropause (Albuquerque, N. Mex.: Univ. of New Mexico Press, 1952) pp. 441-446

4,702

Smith, E.W. 1959 DEVELOPMENT OF ZERO ALTITUDE ESCAPE SYSTEM FOR SUPERSONIC AIRPLANES. (North American Aviation, Columbus, Ohio), Report no. 59H-215 (Paper, Aero Medical Assoc., 30th Annual Meeting, April 27-29, 1959)

ABSTRACT: In recent years considerable attention has been focused on supersonic flight regimes and the need for escape systems capable of meeting the maximum speeds which these airplanes fly. It is somewhat surprising to know that in current century series aircraft the egress emergencies are still predominantly in the medium to low subsonic speed ranges at low altitudes with a very small percentage of the emergency escapes being required in the high performance areas. On the basis of probability alone the need for a supersonic ejection system has not been demonstrated by the current operational statistics. Without belaboring the point the current state-of-the-art knowledge makes possible the proper coverage of supersonic escape regimes without undue compromise to the most necessary low altitude low speed regime. The North American Aviation Company is satisfied that a supersonic ejection seat system is not only feasible but is now in an advanced state of development and is expected to be completely qualified, for the A3J-1, Navy attack airplane by the end of the year, 1959.

4,703

Smith, E.W. 1959 THE DEVELOPMENT OF A ZERO ALTITUDE ESCAPE SYSTEM FOR SUPERSONIC AIRPLANES. (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, 27-29 April 1959.)

ABSTRACT: A zero level-supersonic escape system presents formidable problems not encountered in the subsonic system. These are: (1) heavier structure capable of withstanding 2,500 psf impact pressure, (2) control of drag-weight ratio at high speeds, (3) automatic retention and release of arms, legs, and torso, (4) control of seat-man attitude during high speed ejection to insure transverse G loading, (5) variable parachute opening time delay system acting as a function of dynamic pressure and altitude to activate short time delays at low speed-low-level and longer time delays at high speed. Physiologic design allowable used were: 35 G transverse 20 G positive and 10 G negative. Due to the constraints of space and weight, a simplified 'box kite' collapsible fin system was utilized together with a drogue parachute. A lift plate on the seat bottom acts to cancel negative lift forces at the 17° ejection angle to gain altitude at higher speeds. Stability in pitch and yaw at high speeds

controlled by dynamically balancing the reaction of the fins, lift plate, head plate area, and rocket thrust. Positive (rearward) pitching is achieved at high speed in this manner and, at low speeds by rocket thrust moments. Fast drogue deployment is utilized to "catch" positive pitching overshoots at low speeds where significant aerodynamic forces are not present. System was developed for the Navy A3J Vigilante attack aircraft. (J. Aviation Med. 30(3):204, March 1959)

4,704

Smith, F.K. n.d. CENTRIFUGE METHODS AND TECHNIQUES IN THE U.S. NAVY. (U.S. Naval Air Development Ctr., Aviation Medical Acceleration Lab., Johnsville, Pa.)

ABSTRACT: The human centrifuge at the Naval Air Development Center, Johnsville, Pa. has a welded steel arm, 50 ft in length, which rotates in a horizontal plane. At the end of the arm an oblate spheroid aluminum gondola, 10 ft in diam by 70 inches in width, is mounted in a double gimbal system. The arm can accelerate to 173 miles per hr at the gondola center, producing a radial acceleration of 40 G in 7 sec. The double gimbal system can continuously position the subject with respect to the direction of the resultant acceleration vector. The outer (roll) gimbal is limited to 90° of travel. The inner (pitch) gimbal can make complete rotations. Angular accelerations can reach 10 rad/sec^2 and angular velocities can reach 2.8 rad/sec. With this power capability and with proper control the 3 linear acceleration components of flight can generally be simulated continuously. The angular accelerations of the centrifuge with only three degrees of freedom of control in general cannot match those of flight.

4,705

Smith, G.B., Jr., and L.E. Lamb 1959 VECTORCARDIOGRAPHY IN AEROSPACE FLIGHT-APPLICATIONS AND RATIONALE. In: L.E. Lamb, Ed., The First International Symposium on Cardiology in Aviation. (School of Aviation Medicine, Brooks AFB, Texas, 12-13 November 1959) ASTIA AD-244389, pp. 37-48.

ABSTRACT: The vectorcardiogram offers three distinct advantages over the conventional electrocardiogram:

1. It enables relatively undistorted representation of the electrical forces of the heart. (The validity of this statement depends on the reference system used.) Thus, the true magnitude and direction of the spatial vectors are available.
2. The loop or spatial pathway described by the vectorcardiogram provides a measurement that is not available in the routine electrocardiogram. This may be plotted along a time base as in the linear vectorcardiogram.
3. The use of a cathode ray oscilloscope rather than a direct writing instrument allows greater accuracy in presentation of rapid or minute changes in electrical forces.

The applications of vectorcardiography in assessing the pilots cardiovascular system and in monitoring cardiovascular function during flight have

been discussed. For fundamental reasons outlined in the report this technique promises to have even wider applications to aviation cardiology in the future.

4,706

Smith, G.B., Jr., S.J. Gerathewohl et al. 1962 BIOASTRONAUTICS (National Aeronautics and Space Administration, Washington, D.C.) NASA-SP-18, NASA N63-11508

ABSTRACT: This publication contains papers presented at Session L of the NASA-University Conference on the Science and Technology of Space Exploration, at Chicago, Illinois on November 1-3, 1962. The following papers are presented: "Environmental Biology" by G.B. Smith, Jr. (NASA. Manned Spacecraft Center); "Physiological and Behavioral Sciences" by S.J Gerathewohl and B.E. Germandt (NASA. Ames Research Center); "Bioengineering" by Richard S. Johnston (NASA. Manned Spacecraft Center); "Exobiology" by R.S. Young (NASA. Ames Research Center).

4,707

Smith, G.B. 1962 ENVIRONMENTAL [illegible]
In: Proceedings of the [illegible] Conference on the Sciences and Technology of Space Exploration, I: [illegible] (Washington, D.C.: National Aeronautics and Space Administration, Dec. 1962) NASA SP-18

ABSTRACT: Environmental factors in space flight and their effects on man are discussed as they relate to promoting and maintaining are included: (1) biodynamics, involving noise and vibrations, sustained accelerations and impacts, and the effects of weightlessness; (2) radiations from the sun, the stars, the Van Allen belt, and nuclear-reactor propulsion or power systems; (3) life support, consisting of providing food, water, oxygen, etc.; and (4) medical selection and maintenance. The National Aeronautics and Space Administration has used the skills of various federal agencies, the academic world, and industry, as well as its own centers in these endeavors.

4,708

Smith, H. P. R. et.al. DISCUSSION ON THE ROLE OF NERVOUS SYSTEM IN ADAPTATION TO HIGH PERFORMANCE FLYING
Proc. Roy. Soc. Med. 48:868-877, Nov. 1955

ABSTRACT: Disorientation under instrument flight conditions is probably the most common cause of fatal accidents not due primarily to mechanical failure. Flight experience indicates a division into two methods of

causation. The first is due to either inadequate or misleading data making computation difficult, or indeed impossible. The solution of this is probably possible with the application of existing knowledge and techniques in the design of indicators and certain sounds. The second method of causation is due to environmental factors, the most upsetting being vibrations of very low frequency and large amplitude such as occur in the application of alternating positive and negative g to the man either through aircraft control effects or such as occur in high-speed flight in turbulent air. It is possible for an unacclimatized man to be disorientated with after effects lasting for twenty-four hours by a flight of only thirty minutes under these conditions. (J. of Aviation Medicine 29(9):689, Sept. 1958)

4,709

Smith, H. 1951 CRASHWORTHINESS
The Tech. Instructor 6:3-6, June 1951

4,710

Smith, P. 1942-43 PARADOCTORS
Med. Economics 20(12):37-43. 1942-43

4,711

Smith, P.K. 1943 EFFECT OF BENZEDRINE ON SWING SICKNESS (School of Aviation Medicine, USAF, Randolph AFB, Texas) Rept. No. 113-1, August 1943

4,712

Smith, P.K. 1943 EFFECT OF HYOSCINE (SCAPOLAMINE) ON SWING SICKNESS (School of Aviation Medicine, USAF Randolph AFB, Texas) Rept. No. 111-2, April 1943.

4,713

Smith, P.K. 1943 EFFECT OF THIAMINE CHLORIDE ON SWING SICKNESS (School of Aviation Medicine, Randolph AFB, Texas) Report 142-1, Aug. 1943.

4,714

Smith, P.K. 1943 EFFECT OF V-5 ON SWING SICKNESS (School of Aviation Medicine, USAF Randolph AFB, Texas) Rept. No. 132-1, April 1943

4,715

Smith, P.K. 1944 THE EFFECTIVENESS OF SOME MOTION SICKNESS REMEDIES IN PREVENTING AIRSICKNESS IN NAVIGATION STUDENTS. (School of Aviation Medicine, USAF Randolph AFB, Texas) Rept. No. 261-1, June 1944.

4,716

Smith, P.K. 1945 ATTEMPTS TO FIND A REMEDY SUPERIOR TO HYOSCINE FOR MOTION SICKNESS (School of Aviation Medicine, USAF Randolph AFB, Texas) Rept. No. 333-1, August 1945

4,717

Smith, P.K. 1945 EFFECT OF PYRIDOXINE HYDROCHLORIDE ON SWING SICKNESS (School of Aviation Medicine, USAF Randolph AFB, Texas) Rept. No. 333-2, August 1945

ABSTRACT: Pyridoxine hydrochloride given either in doses of 100 mgm. or 200 mgm. given on the average of approximately 1 hour before swinging produced no appreciable decrease in the incidence of swing sickness.

4,718

Smith, P.K. 1945 EFFECTS OF SWING SICKNESS AND SIDE EFFECTS OF SOME ATROPINE-LIKE DRUGS (School of Aviation Medicine, USAF Randolph AFB, Texas) Rept. No. 297-1, January 1945

4,719

Smith, P.K. 1945 USE OF HYOSCINE HYDROBROMIDE FOR THE PREVENTION OF AIRSICKNESS IN FLEXIBLE GUNNERY STUDENTS (School of Aviation Medicine, USAF Randolph AFB, Texas) Rept. No. 261-3, December 1945

4,720

Smith, P.K. 1946 PRESENT STATUS OF DRUGS FOR USE IN MOTION SICKNESS WITH PARTICULAR REFERENCE TO AIRSICKNESS (School of Aviation Medicine, USAF Randolph AFB, Texas) Rept. No. 468-1, June 1946

4,721

Smith, P.K. 1948 TREATMENT OF AIRSICKNESS WITH DRUGS. Am. J. Med., 4:649

4,722

Smith, R.W., & J.W. Altman 1961 SPACE PSYCHOLOGY: SOME CONSIDERATION IN THE STUDY OF ASTRONAUTS' BEHAVIOR. (American Institute for Research, Pittsburg, Pa.) April 1961.

ABSTRACT: The following environmental factors and their potential implications for human behavior are discussed: altered atmospheric characteristics, high gravitational loads, weightlessness, temperature, radiation, noise and vibration, isolation and confinement, sexual deprivation, time, and encounters with alien factors.

4,723

Smith, W. G. 1958 TESTING TOMORROW'S SPACE PIONEERS. Science Digest 43(3):10-16, March 1958

ABSTRACT: A popularized account of the numerous and often grueling tests men now are undergoing in order to prepare for human flight into space: research in space medicine, increasingly long periods of time spent in simulated space flight conditions, studies in the effect of weightlessness on the human body, and so forth, is presented here. Partially solved and as yet unsolved problems are discussed.

4,724

Snell Memorial Foundation 1957 COMPARATIVE IMPACT PERFORMANCE TESTS, SPORTS TYPE PROTECTIVE HEADGEAR. (Snell Memorial Foundation, a trusteeship of the San Francisco Region, Sports Car Club of America) 18 May 1957

4,725

Snively, G.G. & C.O. Chichester 1959 STUDIES IN HEAD PROTECTION Sports Car 16:37. Dec. 1959.

4,726

Snively, G. G. 1961 IMPACT ATTENUATION IN PROTECTION AGAINST CONCUSSION. (Snell Memorial Foundation, Inc., San Francisco, Calif.) Sept. 1961

4,727

Snively, G. G. and C. O. Chichester 1961 IMPACT SURVIVAL LEVELS OF HEAD ACCELERATION IN MAN
Aerospace Medicine 32(4):316-320, April, 1961.

SUMMARY: Studies based upon actual field data suggest that in the design of protective headgear unique emphasis must be placed upon the effects of sharply localized force loading.

Analysis of accident data in the light of experimentally derived force-deflection curves of helmet liners has been used to obtain the G loading of the human head.

Survival limits of localized head acceleration of brief duration in man have been shown to exceed 450 G.

Preliminary observations on experimental and prototype helmets suggest that protection against impact energy levels far higher than currently considered in helmet design can quite feasibly be attained.

4,728

Snively, G.G. & C.O. Chichester 1962 EVALUATION AND DESIGN CRITERIA OF PROTECTIVE HEADGEAR. In M.K. Cragun, ed., The Fifth Stapp Automotive Crash and Field Demonstration Conference, Sept. 14-16, 1961 Pp. 182-190

4,729

Snively, G. G. and C. O. Chichester 1962 SAFETY IN RACING, PART II (Personnel Restraining Sys ems in Automotive Safety, work supported in part by Research Grant no. AC-51 of the U. S. Public Health Service. May 1962)

4,730

Snyder, F.W. 1962 EFFECTS OF LOW FREQUENCY VERTICAL VIBRATION ON HUMAN PERFORMANCE. (Paper, Meeting of Aero Medical Association, Atlantic City, April 9-12, 1962)

ABSTRACT: This program was initiated in 1959 under contract with office of Naval Research. A laboratory facility designed for human experimentation is used. Seventeen subjects participated in the first experiment establishing judged vibration severity levels identified as definitely perceptive, mildly annoying, extremely annoying, and alarming. Sinusoidal vibration frequencies ranged from 1-27 cps. Acceleration ranged from 0.01 g at 1 cps to 1.5 g at 20 cps. Performance of six to nine subjects was measured for continuous tracking and discrete tasks during vibration. Highlight results are; performance is degraded on some tasks but not on others; subjects are not always aware of performance degradation; some correlation exists between affected body region and vibration frequency; distraction irritation in nose region occurs above 12-14 cps; visual degradation is greatest in the range 12-23 cps.

4,731

Snyder, R.G. 1959 BRACING MAN FOR SPACE FLIGHT. (Paper, American Anthropological Assoc. and Sociedad Mexicana de Antropologia, Mexico City, Dec. 1959)

ABSTRACT: The author of this paper discusses a frequently encountered aspect of abrupt deceleration which occurs in the field of aviation--that of the vertebral injury. Vertebral fractures are of particular concern due to the increasing incidence of this type of injury resulting from high impact situations. A major explanation for the increasing incidence of vertebral injuries appears to be due to the increase in the vertical component of deceleration force diagrams. Present restraint systems do not give adequate support because they are basically designed for lineal deceleration protection only. Recognition of this point is observed in the recent modification of the shoulder harness inertial reel locking device in fighter type aircraft. The proposed bracing restraint is designed to keep the back in optimal position for high deceleration loads. Use of a bracing restraint would tend to keep the back in optimal position for such loads. In regard to comfort it is believed that if this support were properly fitted and snugged, it would provide the pilot with support which he does not have at present. The most important consideration in such a system is the degree of additional protection which could be obtained. In instances of abrupt deceleration while wearing such a device, the force normally borne by the lumbar area of the vertebral column would be partially absorbed by the bracing system.

4,732

Snyder, R.G. 1959 A NEW APPROACH TO THE PROBLEM OF INCREASING HUMAN TOLERANCE TO HIGH DECELERATION FORCES.
Journal of the Arizona Academy of Science 1(2):68-71

SUMMARY: Preliminary design and theory of a full back brace restraint system intended for wear under flight clothing by pilots of high performance aircraft is briefly described. It is hypothesized that such a protective device might not only decrease physical fatigue on long flights, but due to its individual support characteristics might offer a method of substantially increasing human tolerance to abrupt multi-directional deceleration forces. Such a system might have an immediate usefulness in reduction of the present high incidence of vertebral fractures incurred by pilots of high performance aircraft, and might be utilized by personnel of space vehicles. (Author)

4,733

Snyder, R. G. 1961 MANNED SPACE FLIGHT VEHICLES AND THE PHYSICAL ANTHROPOLOGIST
Am. J. Phys. Anthropol. 19(2):185-193, June 1961.

ABSTRACT: Anthropometrics and biomechanics have already helped to elucidate problems in aeronautical science. Future problems of interest include hypersonic escape, space capsule environments, seating and restraint, weightlessness, human tolerance to various physical forces, criteria of physique, recycling of wastes in nutrients, radiation effects and a vast array of other biological and cultured relationships. The author briefly outlines the role of physical anthropology in some of these areas. Regarding the problem of restraint, a complete outline of requirements for a minimum restraint system is given. Feeding, walking, and medical problems are discussed in conjunction with the weightless condition. In conclusion it appears that physical anthropology, having the most comprehensive range of knowledge of man, will contribute much to future research in aerospace medicine.

4,734

Snyder, R. G. 1962 A CASE OF SURVIVAL OF EXTREME VERTICAL IMPACT IN SEATED POSITION. (Civil Aeromedical Research Institute, Federal Aviation Agency, Oklahoma City, Oklahoma) CARI Rept. 62-19, Oct. 1962

ABSTRACT: Physical, biophysical, and medical data are presented concerning the case of a 20-year-old male of excellent physical condition who jumped from the Golden Gate Bridge in San Francisco, surviving for ten days a free-fall deceleration in the seated position (buttocks to head) of a calculated 4128 g for .0023 secs. Specific trauma resulting from this impact indicates that this may closely approach the extreme human survival tolerance(s) to impact in this position, and that while distribution of forces through support of the upper torso may greatly minimize injury to the skeletal system, protection of internal organs will present a much more difficult problem. (AUTHOR)

4,735

Snyder, R. G. 1962 HUMAN SURVIVAL OF EXTREME VERTICAL DECELERATION IN FREE-FALL. (Paper, 33rd Annual Meeting of the Aerospace Medical Assoc., 9-12 April 1962, Atlantic City, N. J.)

ABSTRACT: Most studies concerned with human tolerance to abrupt impact forces have of necessity been confined to aspects of the body's lower limits, with an end-point often being that of subjective pain or below that level at which non-reversible trauma may occur. As a result little is known about the higher ranges of human impact survivability or variability. In this investigation information concerning vertical impacts received in accidental, suicidal, or homicidal free-falls was obtained during the past year on 2000 individuals who survived falls greater than ten feet. These included both sexes and ranged from infancy to 91 years in age. In addition, data have been obtained on fatal falls for the same period. Of the survivable falls, 100 cases were selected for intensive study in which most variable were known or could be determined accurately. In each case the exact distance of the fall, body position upon impact, material impacted, and resulting deformation were known, allowing bio-physical calculations of velocity and impact forces to be made. Complete medical histories and roentgenograms were obtained on each subject and the injuries correlated with the directions, magnitude, and distribution of force at impact. These data indicate that under certain conditions the human body can survive considerably higher impact forces than previously reported. Although impact tolerance variability was evident, some factors were found which appear to increase the human impact survival limit.
(Aerospace Medicine 33(3):369-370, Mar. 1962)

4,736

Snyder, R. G. 1963 HUMAN SURVABILITY OF EXTREME IMPACTS IN FREE-FALL (Civil Aeromedical Research Institute, Federal Aviation Agency, Oklahoma City, Oklahoma) CARI Report 63-15.

ABSTRACT: Human deceleration tolerances beyond the limits imposed by voluntary experimental methods were studied by means of intensive case histories of 137 individuals who have survived extremely abrupt impacts in accidental, suicidal, and homicidal free-falls. Fall distances ranged up to 275' and calculated velocities up to 116 ft/sec(79 mph). Physical and biological data are presented on both sexes with an age range of 1½ to 91 years, and with impacts occurring in all body axis orientations. A detailed analysis of factors found to affect survivability in free-falls collected in the past two years, demonstrate that humans have survived impact forces considerably greater than those previously believed tolerable. (CARI)

4,737

Snyder, R. G. 1963 HUMAN TOLERANCES TO EXTREME IMPACTS IN FREE-FALL (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., May 2, 1963)

SUMMARY: Physical and biological data have been presented on 137 of 168 cases of individuals who have survived extremely abrupt impacts in free-falls. Fall distances ranged up to 275' and calculated velocities up to 116 ft/sec (79 mph). This population included both sexes with an age range of 1½ to 91 years. A detailed analysis of factors found to affect survivability in free-fall impacts was presented.
It has been shown that humans have survived impact forces considerably greater than those previously believed tolerable. It is suggested that muscular relaxation (as in intoxication or paranoid schizophrenia) may play an important role in reducing trauma in some cases. These data also indicate that, as the duration of impact is decreased below .0006 seconds and zero time is approached body tissues may not respond as expected and survival of impact forces of normally fatal magnitude may be increased. (AUTHOR)

4,738

Snyder, R. G. 1963 HUMAN TOLERANCES TO EXTREME IMPACTS IN FREE-FALL Aerospace Medicine 34(8)695-709.

SUMMARY: Physical and biological data have been presented on 137 of 168 cases of individuals who have survived extremely abrupt impacts in free-falls. Fall distances ranged up to 275' and calculated velocities up to 116 ft./sec. (79 mph). This pupulation included both sexes with an age range of 1½ to 91 years. A detailed analysis of factors found to affect survivability in free-fall impacts were presented.

It has been shown that humans have survived impact forces considerably greater than those previously believed tolerable. It is suggested that muscular relaxation (as in intoxication or paranoid schizophrenia) may play an important role in reducing trauma in some cases. These data also indicate that, as the duration of impact is decreased below .0006 seconds and zero time is approached, body tissues may not respond as expected and survival of impact forces of normally fatal magnitude may be increased.

4,739

Snyder, R.G. 1963 INFANTICIDE AND AURORA 7: AEROMEDICAL ANTHROPOLOGICAL RESEARCH IN EXTREME HUMAN DECELERATION. (Paper, presented at annual meeting, American Association of Physical Anthropologists, University of Colorado, Boulder, Colo., 4 May 1963)

ABSTRACT: Current scientific knowledge of human physical, physiological, and psychological responses to extreme impact forces is primarily restricted to non-reversible injury thresholds experimentally induced with voluntary

subjects. A new approach, based upon two-year's nation-wide investigation of selected cases of survived accidental, suicidal, and homicidal free-falls, has provided considerable information concerning human tolerances to high impact forces up to terminal velocity. These data indicate that under certain conditions, man may survive deceleration forces many times higher than previously considered possible. Implications for manned space flight are considered. (Author)

4,740

Snyder, R.Z. 1961 A3J-1 SPIN SIMULATION PROGRAM ON THE NAVY HUMAN CENTRIFUGE. (Aviation Medical Acceleration Lab., Johnsville, Pa.) NADC-MA 6104, 17 March 1961. ASTIA AD 256 260.

ABSTRACT: The Navy acceptance tests for the A3J-1 include a spin test of five turns before starting recovery. Pilot ability to recover the aircraft while subjected to spin type acceleration loads was evaluated through the operation of the human centrifuge, so as to simulate an A3J-1 spin of eleven turns, with either steady or osciliatory loading during either normal or inverted spins. It was found that the pilots were capable of performing the required recovery procedures while exposed to the various predicted loads.

4,741

Snyder, R.Z. 1960 NONDESTRUCTIVE TESTING OF THE AVIATION MEDICAL ACCELERATION LABORATORY HUMAN CENTRIFUGE
(U.S. Naval Air Development Center, Johnsville, Pa.) (Minutes of 11th Annual Conference on Nondestructive Testing, Sept. 13-15, 1960)

ABSTRACT: The purpose of this paper is to present information pertinent to stress monitoring problems connected with nondestructive testing of the 50-ft. human centrifuge. A description of the centrifuge and its equipment is given along with detailed specifications concerning structure and performance. The present system of stress testing is examined and the centrifuge modification program is discussed in relation to future stress testing requirements. Recommendations are solicited on the problem of developing an adequate method to stress monitor centrifuge programs on the present centrifuge and on the development of a stress analysis program that can be incorporated into plans and design of the new centrifuge.

4,742

Sochring, K 1945 LIST OF PUBLICATIONS AVAILABLE AT THE LIBRARY OF THE GERMAN AEROMEDICAL RESEARCH INSTITUTE. (Buecherei des Luftfahrtmedizinischen Forschungsinstitut des Reichsluftfahrtministeriums)
ASTIA ATI-59256, June 1945

ABSTRACT: A list of publications available at the Library of the German Aeromedical Research Institute is presented. The list includes periodicals dealing with general medical, physiological, aero-medical, and other scientific topics; also textbooks and treatises on physics, chemistry, physiology, physiological chemistry, hygiene, internal medicine, and aeromedicine, on the physiology of high altitudes, as well as books on miscellaneous subjects. A number of books listed are the property of the members of the Research Institute.

4,743

Sohn, R. L. 1960 VEHICLE DESIGN FOR LUNAR LANDING
(Space Technology Labs., Inc., Los Angeles, Calif.)
Rept. No. STL/TR-60-0000-09169; 20 May 1960

ABSTRACT: Impact conditions to be encountered during a landing on the surface of the moon will be determined by uncertainties in launch and midcourse trajectory guidance accuracies, retro-rocket performance, terminal guidance, and retro-rocket orientation. For semi-soft landings, in which no attempt is made to remove residual velocities and altitudes after retro-firing, impact velocities can reach several hundred ft/sec. Further, the direction of impact will not be known, so that an omni-directional impact structure is required. For full soft landings, velocities can be reduced to less than 50 ft/sec.

4,744

Sokolov, V.A. 1961 STAGES ON A GREAT ROAD
(Air Information Division, Wright-Patterson AFB, Ohio) AID Rept. No. 61-156
ASTIA AD 269 794
Original Source: Nauka i zizhn' April 1961. Pp. 5, 8ff.

4,745

Solley, C. M. 1960 INFLUENCE OF HEAD TILT, BODY TILT, AND PRACTICE ON REDUCTION OF ERROR IN PERCEPTION OF THE POSTURAL VERTICAL.
J. gen. Psychol. 62(First Half):69-74, Jan. 1960.

ABSTRACT: The effects of head tilt, body tilt, and practice, and the interactions of these variables on the decrease in error in perception of the postural body-vertical were investigated. Twenty-four male students participated; six were assigned to each of four experimental conditons: two body

tilt (30 degrees right or 30 degrees left) and two head tilt (30 degrees right or 30 degrees left). A given S was always tilted in one direction with one direction of head tilt; his task was to return himself to true vertical on each of 30 trials. Average error for blocks of five trials was computed per S; these data were examined by an analysis of variance. The results were discussed in light of other findings in the area. (Tufts)

4,746

Solliday, R. E. 1961 EVALUATION OF PROJECT MERCURY SIMULATOR. (Naval Air Test Center, Patuxent River, Md.) Proj. TED PTR RAAD-3058, FT 2123-68, Rept. No. 1, 21 Feb. 1961

4,747

Sommer, A. V. 1952 THE PILOT IS THE LIMIT. Aero Digest 65:17-25. Dec. 1952.

4,748

Sommer, J. 1939 ZUR FRAGE DER EINWIRKUNG VON MECHANISCHEN SCHWINGUNGEN AUF DEN EIGENREFLEXAPPARAT DES MENSCHEN (On the Question of the Effect of Mechanical Vibrations Upon the Individual Reflex Apparatus of Man) Luftfahrtmedizin 4: 292.

4,749

Sorin, A.B. 1957 THE RELATIVE CRASH PROTECTIVE QUALITIES AND DEFICIENCIES OF THE MIL-S-7877 PASSENGER SEATS IN FORWARD AND AFT FACING POSITIONS (Paper, American Medical Association Convention, May 7, 1957)

4,750

Sorin, B. A. 1955 THE RELATIVE CRASH PROTECTIVE QUALITIES AND DEFICIENCIES OF MIL-S-7877 PASSENGER SEATS IN FORWARD AND AFT FACING POSITIONS. (BuAer, Flight Safety Foundation, Inc.)

4,751

Sosnow, M. & E. Ross 1961 ELECTRODES FOR RECORDING PRIMARY BIOELECTRICAL SIGNALS
(USAF Biomedical Lab., Wright-Patterson AFB, Ohio)
Contract AF 33(616) 7304, Proj. 7222, Task 71751, ASD TR 61 437, Sept. 1961.

ABSTRACT: This report summarizes electroding practices in the biological sciences. The literature concerning major problems associated with physiological electroding techniques in common use is reviewed. Primary areas of interest and discussion are 1) general electrode problems; 2) methods of minimizing these problems; and 3) specific applications to bioelectric measurements such as electroencephalography, electrocardiography, GSR, electromyography, and electrical optokinetics. (Tufts)

4,752

Soule, H. A. and O. Seidman 1942 INFLUENCE OF LOADING CONDITION ON PILOTING TECHNIQUE FOR SPIN RECOVERY FOR PURSUIT AIRPLANES. (National Advisory Committee for Aeronautics, Washington, D. C.) NACA RB, June 1942.

4,753

Space Technology Labs. 1962 PERVYI V MIRE GRUPPOVOI POLET V KOSMICHESKOE PROSTRANSTVO (OSNOVNYE ITOGI) (The World's First Tandem Flight in Space (Basic Results)
(Space Technology Labs., Inc., Redondo Beach, Calif.)
Transl. from Pravda (Moscow) P. 1-3, Oct. 22, 1962,
Rept. 9990-6333-KU-000 STL-TRANS-70 N63-18841

ABSTRACT: The objectives, spacecraft design, guidance and measurement systems, radio and T.V. communications systems, biomedical studies, and the parameters for the accomplishment of the first Soviet tandem flight in space--Vostok 3 and Vostok 4--are given. The technological and organization probiems confronted and solved in preparation for such a flight are discussed, including: (a) devising a complex of ground support, data processing, and recovery systems; (b) organization and operation of simultaneous flight command, guidance, and ground control systems; and (c) organization of radiation and medical control systems to check on the astronauts' conditions. The astronauts' duties during flight were: (1) to communicate with ground stations and the other satellite via radio; (2) to conduct regular psychological, physiological, and vestibular tests, besides the normal medical tests; (3) to conduct observations of the other ship, the earth , elestial bodies, and other phenomena, and to evaluate the manual controls; (4) to make motion pictures inside the capsule and through portholes; (5) to evaluate the experiences related to the state of "free-floating", and (6) to conduct biological experiments, such as regulating atmospheric conditions in the capsule and performing normal body functions. (N63-18841)

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Spatz, H. 1950 BRAIN INJURIES IN AVIATION.
German Aviation Medicine, World War II (Dept. Air Force, 1950) I, 616-640.

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Specht, H. 1952 TOXICOLOGY OF TRAVEL IN THE AEROPAUSE
In White, C. S., & O. O. Benson, Jr., eds., Physics and Medicine of the Upper Atmosphere, A Study of the Aeropause (Albuquerque, N. Mex.: Univ. of New Mexico Press, 1952) pp. 171-181

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Spector, M. 1959 DIZZINESS IN RELATION TO ORGAN SYSTEM.
Eye Ear Nose Monthly 38:1030-5, December 1959

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Spector, M. 1961 POSITIONAL NYSTAGMUS AND VERTIGO.
In. J. Int. Coll. Surg. 36:359-363, Sept. 1961.

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Spector, W. S., Ed. 1956 HANDBOOK OF BIOLOGICAL DATA.
WADC Tech. Rept. 56-273, October 1956. ASTIA AD 110 501

ABSTRACT: This report presents tabular data and certain graphs, charts and diagrams in the broad areas of plant, animal, and pre-clinical medical sciences. The principal factors in selecting table subjects and data were their basic importance or wide general interest, and adaptability to tabular presentation. The report, as presented, represents a condensation and abridgment of some 20,000 pages.

The tables are arranged under the following categories: (I) Biochemical and Biophysical Characteristics; (II) Genetics, Cytogenetics, and Reproduction; (III) Development and Morphology; (IV) Nutrition, Digestion, and Metabolism; (V) Respiration and Circulation; (VI) Other Physiological Activities and Performances; (VII) Biologically Active Compounds; (VIII) Environment and Survival; (IX) Symbiosis and Parasitism; and (X) Ecology and Biogeography. In every category some tables will be of interest to all biologists generally, and some tables will be of interest to those in major branches of biology.

Material in this Handbook, like that in the previous reports are unique in the high degree of authoritativeness sought for the data. These tables, like those in the previous reports, are also unusual in their treatment of the well-known phenomenon of biological variability. Quantitative data are supplemented with such essential information as units, methods, and conditions of measurement, conversion factors, glossaries, and taxonomy lists. An Appendix and an unusually complete Index are included.

4,759

Spells, K.E. 1959 A DISCUSSION OF SOME ASPECTS ON THE THEORY OF THE SEMICIRCULAR CANAL (Flying Personnel Research Committee (Gt. Brit.) Rept. No. FPRC 1095; Aug. 1959, ASTIA AD-237 775

ABSTRACT: An attempt is made to derive equations for the motion of the cupula from first principles, and to indicate the nature of the assumption required to reduce these equations ot the equation given by van Egmond et al (J. Physiol. 110: 1, 1949). Also an attempt has been made to allow for the effect of leakage of endolymph between the cupula and the walls of the ampulla. (Author)

4,760

Spells, K.E. 1961 CALCULATIONS FOR THE DESIGN OF LARGE SCALE WORKING MODELS OF THE SEMI-CIRCULAR CANAL
(R.A.F. Institute of Aviation Medicine, Farnborough, Hants.) I.A.M. Scientific Memorandum No. 34, February, 1961

ABSTRACT: Equations representing general relationships to be satisfied between linear dimensions and other parameters are given for the construction of models dynamically similar to the semi-circular canal as contemplated in the theory of Steinhausen and others. The equations are transformed for the case when a piston in a cylinder replaces the cupula-ampulla, and numerical calculations are provided for a 16" model.

4,761

Sperry, E.G., H.P. Nielsen, I.M. Barash 1955 DOWNWARD EJECTIONS AT HIGH SPEEDS AND HIGH ALTITUDES. J. Aviation Med. 26(5):356-372

SUMMARY AND CONCLUSION: The instances of delayed separation from the seat in which the subject was thrown from the seat by the recovery parachute warrant discussion. In each case the subjects were in the seat for approximately ten seconds following ejection. They were experienced parachutists and had each made at least one previous ejection test. They were instructed shortly before take off to open manually the lap belt at the first opportunity, it being assumed that they could never beat the automatic function of the belt release. In each case, interrogation disclosed that they had maintained an alert and observing mind. This was proved by checking their description of events against the photographic results. However, there was apparently no sense of time, in that each man had no idea that ten seconds had elapsed. When thrown from the seat, they were just beginning to take corrective action. This may explain reports of fatal emergency ejections in which apparently successful ejections have been completed at moderate altitudes, but with no subsequent attempt to clear the seat or pull the rip cord.

4,762

Spezia, Emil 1962 ROLE OF PILOT FACTORS IN ARMY FIXED WING ACCIDNETS (Army Board for Aviation Accident Research, Fort Rucker, Ala.) Rept. No. HF 1-62, ASTIA AD-293 805,

4,763

Spiegel, E.A. & T.D. Demetriades 1922 BEITRAGE ZUM STUDIUM VEGETATIVEN NERVENSYSTEMS. III. MITTEILUNG. DER EINFLUSS DES VESTIBULARAPPARATES AUF DAS GEFASZSYSTEM (Contribution to the Study of the Vegetative Nervous System. III. Report. The Influence of the Vestibular Apparatus Upon the Vessel System)
Archiv für die Gesamte Psychologie (Leipzig) 196: 185-199

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Spiegel, E. A., M. J. Oppenheimer, G. C. Henry, & H. T. Wycis 1944 EXPERIMENTAL PRODUCTION OF MOTION SICKNESS. War Med. 6:283-290

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Spiegel, E. A., M. Spiegel-Adolph, H. T. Wycis and M. Marks 1947 CEREBRAL CONCUSSION AND CONVULSIVE REACTIVITY. A. Res. Nerv. & Ment. Dis. Proc., 26:84.

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Spiegel, E. A., M. Spiegel-Adolph, H. T. Wycis, M. Marks and A. J. Lee. 1947 SUBCORTICAL CHANGES IN CEREBRAL CONCUSSION. J. Nerv. & Ment. Dis. 106:359.

4,767

Spindler, T.F. & R.W. Hohl 1953 G x TIME FLIGHT PATTERNS IN THE NAVAL AIR TRAINING COMMAND. PHASE I: ACROBATIC AND GUNNERY MANEUVERS IN BASIC TRAINING AS FLOWN IN INSTRUCTORS BASIC TRAINING UNIT. (U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.) Research Report No. NM 001 059.27.01, 7 Aug. 1953. ASTIA AD 21051

ABSTRACT: The acceleration patterns in Acrobatic and Gunnery flights at the Instructors Basic Training Unit, NAS, Pensacola, Florida, have been determined using Hathaway Recording Linear Accelerometers.

The magnitude and duration of the G forces in these Acrobatic and Gunnery maneuvers (as flown in the Instructors Basic Training Unit) frequently exceeded the blackout threshold values as determined on the human centrifuge.

This is a reasonable explanation for the high incidence of G symptoms in certain phases of Basic Flight Training. These factors and their significance in Naval Air Training have been discussed.

4,768

Spindler, T.F. 1953 G x TIME FLIGHT PATTERNS IN THE NAVAL AIR TRAINING COMMAND PHASE II AND III: ACROBATIC AND GUNNERY MANEUVERS IN BASIC TRAINING AS FLOWN BY FLIGHT STUDENTS. (U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.) Research Report No. NM 001 059.27.02, 28 Aug. 1953. ASTIA AD 21030

ABSTRACT: The acceleration patterns in acrobatics and gunnery flights by students in the Nava' Air Basic Training Command have been determined using recording accelerometers.

These student G x time patterns were higher in acrobatics than the instructors patterns, (previously determined in a similar study), and, also, had much more variation particularly between the average and the high G recorded in each maneuvers.

The use of recording linear accelerometers in training aircraft would bring instances of excessive G to the instructors attention immediately and would also provide graphic acceleration patterns, for each maneuver, fcr use in post flight discussions.
The use of recording linear accelerometers in training aircraft would bring instances of excessive G to the instructors attention immediately and would also provide graphic acceleration patterns, for each maneuver, for use in post flight discussions.

The sue of anti-G suits would raise the tolerance of practically all flight personnel sufficiently to eliminate blackout and consciousness in the Basic Training Command. This protection would increase pilot efficiency and would also contribute materially to flight safety.

Due to the high level of positive accelerative forces, now known to be present in acrobatic and gunnery flights in the Basic Training Command, it is suggested that reconsideration be given the possibility of utilizing the standard Navy anti-blackout suit in the Basic Training Command.

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Spratt, H.G.M. 1957 TRANSDUCER CHARACTERISTICS: MEASUREMENT OF DISPLACEMENT, VELOCITY, ACCELERATION. Elect. and Radio Eng. 34:2-8, Jan. 1957

4,770

Squires, R.D. & E. Hendler 1959 NADC BIOLOGICAL INSTRUMENTATION SYMPOSIUM OF 10 DEC. 1958
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR81, April 6, 1959

ABSTRACT: This report presents the results of a symposium held at AMAL to ascertain the existing capability for estimating any change in measurable physiological variables occurring in pilots while flying air or space craft. The minutes of the meeting are included as an enclosure. Some of the physiological measurements that might be made are respiration, blood pressure, ECG, EEG, and some of the environmental measurements are pilot body temperature, inside pressure suit temperatures, cabin temperature and pressure, and radiation exposure. The final size and weight of the entire instrument package, including power supply and tape recorder and excluding telemetering equipment, must be kept at an absolute minimum, e.g., to be able to fit into a Martin Baker ejection seat.

4,771

Squires, R.D. 1959 NADC BIOLOGICAL INSTRUMENTATION SYMPOSIUM OF 10 DEC 1958
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR89 June 8, 1959

ABSTRACT: This is the second report concerning bioinstrumentation and gives details of immediate and long term aims of the project. An airborne instrument package is being designed which will include the following: physiological parameters (EKG, systolic blood pressure, blood oxygen saturation, respiratory rate and minute volume, galvanic skin resistance) and environmental parameters (oxygen supply pressure, oxygen flow rate, suit pressure and temperature, cabin pressure and temperature, relative humidity, pressure suit and cabin and TV monitoring of pilot and instrument panel). In addition, a ground control and data processing installation will be designed and constructed.

4,772

Squires, R. D. et al 1961 THE REMOTE MONITORING OF PHYSIOLOGICAL DATA FROM PERSONNEL IN FLIGHT.
Aerospace Medicine 32(3):248, March 1961.

ABSTRACT: The text of the presentation will be based on the technical and physiological data obtained from studies done at the Aviation Medical Acceleration Laboratory during the past two years. The discussion will attempt to describe a workable total system concept for remote monitoring of physiological data compatible with our experience and the present state of the art. Included will be a discussion of the various physiological transducers tried at the Aviation Medical Acceleration Laboratory.

4,773

Stacy, R. W., D. T. Williams, R. E. Worden, & R. O. McMorris 1955 ESSENTIALS OF BIOLOGICAL AND MEDICAL PHYSICS, (New York: McGraw-Hill Book Co., Inc., 1955)

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Stahle, J. 1958 ELECTRONYSTAGMOGRAPHY IN THE CALORIC AND ROTARY TESTS A CLINICAL STUDY. Acta Oto-laryngol. suppl. 137

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Stanbridge, R.H. 1934 AIR SICKNESS. Air Travel, (Lond.), 1:21-27

4,776

Stanley Aviation Corporation 1960 FOOTBALL, HUMAN FACTORS, AND THE B-58 (Machine Design, News Report-July 7, 1960)

ABSTRACT: After being awarded an Air Force contract to build escape capsules for Convair's three-man B-58 Hustler, Stanley Aviation Corporation conducted several acceleration tests using football players from Colorado University. Accelerometers mounted on their shoulder pads recorded the startling information that they had absorbed from three to five times as much shock as the Air Force believed feasible.

Because of these tests, crew members of combat aircraft will again enjoy the freedom of "shirtsleeve" flight. The escape capsule for the B-58 not only eliminates the need for clumsy pressure suits but promises crewmen infinitely safer separation from a stricken aircraft at any speed and altitude.

An assortment of gas-initiated devices controls the ejection sequence. Leg and torso positioning, door closure, pressurization, and rocket powered departure from the aircraft occur in a matter of a few seconds (the capsule's three doors rotate closed within 1 second).

If the pilot chooses, he can fly the aircraft after encapsulation--the control stick is inside the capsule and essential flight instruments are visible through a window.

If the capsule should land in water, an immersion valve releases pressurized air to inflate flotation balloons attached to the ends of four outrigger booms. The crew member can safely stay afloat in Beaufort Scale 5 seas (19-24 mph) for at least 72 hours.

The capsule, by specification, will have an over-all reliability of at least 97 percent at an 80 percent confidence level.)

4,777

Stanley Aviation Corp. 1960 REVISED GROUND LANDING SYSTEM FOR THE PROJECT MERCURY CAPSULE (Proposal, Stanley Aviation Corporation, Denver, Colo.) No. 756, Sept. 1960.

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Stanley Aviation Corp. 1962 A STUDY OF THE DYNAMIC MODEL TECHNIQUE IN THE ANALYSIS OF HUMAN TOLERANCE TO ACCELERATION. (Stanley Aviation Corporation, Denver, Colo.) No. 793, Feb. 21, 1962.

4,779

Stapp, J.P. 1948 ANALYSIS OF INJURIES SUSTAINED AND EVALUATION OF PROTECTIVE EQUIPMENT USED BY PILOT IN TF 80-C, no. 48-358 MAJOR ACCIDENT OF 8 SEPTEMBER 1948. (Engr. Div., USAF Air Materiel Command, Muroc AFB, Calif.) Memo. Report MBEC-1303, 22 Nov. 1948.

4,780

Stapp, J.P. 1948 PROBLEMS OF HUMAN ENGINEERING IN REGARD TO SUDDEN DECELERATIVE FORCES ON MAN. Mil. Surgeon 103(2):99-102, Aug. 1948.

ABSTRACT: The article points out some of the problems, methods, and viewpoints of human engineering applied to the field of linear decelerative forces of rapid onset, brief duration, and high magnitude and their effect on the living human body.

4,781

Stapp, J.P. 1949 HUMAN EXPOSURES TO LINEAR DECELERATION. PART I. PRELIMINARY SURVEY OF AFT-FACING SEATED POSITION (Wright Air Development Center, Wright-Patterson AFB, Ohio) AF Technical Report 5915, June 1949. ASTIA ATI 71065

ABSTRACT: A linear decelerator was used to expose three young healthy males to decelerations from back to chest in the seated position. Two series of decelerations at approximately 5 g increments up to 30 g's were carried out with initial rates of change of deceleration at 500 and 1000 g's per second. Total duration of exposures ranged from .15 to .42 seconds. Subjective accounts of the experiences of each individual are given and oscillographic records of the decelerations on the chest, on the helmet, and on the seat discussed. No more than mild discomfort or injury was experienced. Ultimate decelerations voluntarily tolerable to the subjects used was not reached, since the tests

were halted to improve the mechanical reliability of the decelerator.

4,782

Stapp, J. P. 1951 HUMAN EXPOSURE TO LINEAR DECELERATIVE FORCES IN THE BACKWARD FACING SEATED POSITIONS
Mil. Surgeon 109: 106-108, Aug. 1951

4,783

Stapp, J.P. 1951 HUMAN EXPOSURES TO LINEAR DECELERATION PART II. THE FORWARD-FACING POSITION AND THE DEVELOPMENT OF A CRASH HARNESS (Wright Air Development Center, Aero Medical Lab., Wright-Patterson AFB, Ohio) AF TR No. 5915, Part 2, Dec. 1951. ASTIA ATI 136452

ABSTRACT: Fifty-three experiments are reported in which twelve healthy male human volunteers were exposed to linear decelerations at right angles to the long axis of the body. In fifty-one experiments the subject sat facing forward on the decelerator. For comparison the subject was seated facing backward in two cases. The range of deceleration from 10 g at 575 g per second rate of change of deceleration to 38.6 g at 1370 g per second was explored by a series of six deceleration configurations increasing by about 5 g increments. A second group of six runs provided a range of deceleration of 14.0 g at 281 g per second to 45.4 g at 493 g per second. Duration of deceleration ranged from .15 to .35 seconds for all experiments. Measurement of harness loading during deceleration by means of bonded strain gauge tensiometers attached to a symmetrical half of the harness allowed comparison of loadings for three harness configurations, and served as a check on accelerometer data in twenty-two experiments. The weight of the subject multiplied by the deceleration at the chest was compared with the total loading of the harness measured simultaneously by the tensiometers, with good agreement. The limited number of channels confined measurements during a run to physical factors, so that physiological and clinical data consisted of such measurements before and after runs as electrocardiogram, x-rays when indicated, ophthalmoscopic examination, testing of reflexes, urinalysis and dye excretion tests, pulse respiration, temperature and blood pressure, and detailed interrogation for subjective data. In all cases where subjects were adequately restrained, findings were essentially negative below the level of 30 g, with due allowance for mild abrasions, contusions, and transient effects due to excitement and exertion. At 30 to 35 g plateau, slight signs of shock such as palor, sweating, falling blood pressure and rising pulse were occasionally present with rate of change of deceleration above 1000 g per second. In two runs above 38 g at more than 1300 g per second rate of change of deceleration, definite shock levels of blood pressure, pulse, and respiration occurred, with near syncope in one case and with two brief episodes of syncope in the other. At the same 38 g level but with rate of change of 330 g per second, and at 45.4 g at 493 g per second, blood pressures were elevated and pulse and

respiration increased to exertion levels but there was no sign of shock. Venous pressure in the veinules of the eyes evidently exceeded 80 mm. Hg. in this last run since mild retinal hemorrhage and bulbar conjunctival petechiae were produced.
Subjectively, limits of voluntary tolerance were approached at 17.0 g at 1000 g per second rate of onset with the standard Air Force harness configuration, at 38.0 g at 1350 g per second with the inverted V leg strap added to the shoulder straps and lap belt assembly, and at about 46.0 g with rate of change of deceleration of about 500 g per second, using the latter configuration. Much higher levels can be survived. although reversible injurious effects may intervene. Of eight harness configurations tested, including the standard AF design, the minimum modification to provide adequate restraint up to the maximum exposure to deceleration in this series of experiments is the addition of the inverted V leg strap. The principles of crash harness design and requirements for adequate protection are discussed.

4,784

Stapp, J. P. 1951 HUMAN TOLERANCE TO DECELERATION---SUMMARY OF 166 RUNS. J. Aviation Med. 22(1):42-45; 85. Feb., 1951.

ABSTRACT: Backward facing seat tests were conducted on five young males in 19 tests, covering the range of 10 to 35 average applied g deceleration by 5 g increments, with durations between 0.42 and 0.11 seconds, in two series of rate of changes of deceleration slopes, one of 500 g per second, the other at 1,000-1,200 gps. The maximum was 35.4 g average applied deceleration applied for 0.16 secs, at a rate of change of 1,200 g per second. Measured on the chest accelerometer, peaks of 57 g for 0.02 secs duration occurred, with forces exceeding 8,800 lbs. or 34.5 psi on the impinging back area. In none of these experiments have there been other than mild degrees of injury. It is concluded that an airline passenger could sustain up to 35 g in the rear-ward facing position.

A series of 36 experiments were run with the subject in the forward facing position. Runs started at 10 g average applied acceleration for .36 seconds to 40 g for .12 secs, in 5 g increments, at 1,200 g per sec. Except for two minor injuries no irreversible physiological changes were noted. Tests were made with various harness configurations. The main findings were: (1) that 40 g at 1200 gps for .12 seconds can be endured with adequate restraint; (2) the present USAF harness cannot be endured above 17 g; (3) addition of a V-leg strap to the present harness extends its range to 25-30 g.; (4) if the straps from the waist down are tighter than the shoulder straps it is subjectively less irritating; (5) that strengthening of aircraft seats and enclosures of cockpits is justified and overdue in view of the strength and g tolerance of the body. (CARI)

4,785

Stapp, J. P. 1952 HUMAN AND CHIMPANZEE TOLERANCE TO LINEAR DECELERATIVE FORCE. (Paper presented at Conference on "Problems of Emergency Escape in High-Speed Flight", 29-30 Sept. 1952, at Wright Air Development Ctr., Wright-Patterson AFB, Ohio) ASTIA AD-14 351

CONCLUSIONS:

1. Chimpanzee subjects have sustained exposure to linear decelerations of 65.5 g at 1400 g per second rate of onset, with peak values exceeding 100.0 g's during abrupt stops, with the subjects seated facing forward, seated facing backward, lying on one side transversely facing the rear, and supine head first, and have incurred no irreversible injuries.
2. Chimpanzee subjects have sustained without injury exposure to linear decelerations of 51.0 g at 900 g per second rate of onset in the supine feet first position, corresponding to parachute opening shock, and to 47.0 g at 1170 g per second rate of onset in the sidewise seated position.
3. Human volunteer subjects have sustained exposure to 45.4 g at 493 g per second rate of onset of deceleration, and up to 38.6 g at 1370 g per second rate of onset of deceleration in the forward facing seated position, and up to 35.0 g at 1150 g per second rate of onset in the backward facing seated position without exceeding the limits of voluntary tolerance.
4. Tolerance to decelerative force is higher when the force is applied to solid structures such as the pelvic and pectoral girdles. Signs of cardiovascular shock are manifested at 28 g and 1060 g per second rate of onset when large decelerative forces are localized on the abdomen by a lap belt.
5. The combined effect of deceleration plateau and rate of onset of deceleration results in manifestations of shock at lower plateau values as the rate of onset increases, f or values above 35.0 g and 1100 g per second rate of onset.
6. The minimum modification of the existing USAF standard lap belt and shoulder harness for adequate protection up to 45.0 g and 36 psi consists in adding the inverted -V leg strap and using No. 13 nylon in place of No. 8 nylon in the shoulder straps.
7. No evidence of cumulative effects due to repeated exposures to decelerative forces has been found in any of the twelve subjects, one of whom sustained 26 exposures in a period of 50 months.

4,786

Stapp, J. P. 1953 TOLERANCE TO ABRUPT DECELERATION (AGARD Medical Panel, London, September, 1953)

4,787

Stapp, J. P. 1953 TOLERANCE TO ABRUPT DECELERATION (Research and Development Board, Dept. of Defense, Washington, D. C. Shock and Vibration Bulletin No. 19, Feb. 1953.

4,788

Stapp, J.P. 1953 CRASH PROTECTION IN AIR TRANSPORTS. Aeronaut. Eng. Rev., 12(4):71-78.

ABSTRACT: In 1947, tubular steel sled slipper with one to four solid fuel rockets for propulsion was mounted on a standard gage track. Peak decelerations exceeding 100 g would thus be reproduced. Parachute dummies, chimpanzees, and human subjects were used in these experiments. Later a standard ejection seat catapult was developed which was suspended from a monorail. The carriage was decelerated by impinging against a lead cone at the end of the rail. With anesthetized pigs as subjects, motion pictures, instrument readings, and autopsy data provided the bases for analysis. Time-displacement data for human subjects are given in the paper. It was found that humans show the most severe transient physiological effects when subjected to a rate of change of deceleration of 1,370 g per sec. and a peak acceleration of 38.6 g. Protection of human occupants is limited by such factors as dynamic stress limitations of the aircraft, relative positions of seats, specifications of life belts, and sex and age factors.

4,789

Stapp, J.P., & H P. Nielsen 1953 PROPOSED TESTS FOR ESCAPE FROM VERY HIGH VELOCITY AIRCRAFT. (Holloman Air Development Center, Holloman AFB, New Mex.) ASTIA AD 26 626

SUMMARY: The hazards faced by crew members when they escape from high-speed aircraft at high altitudes are described. At 15,000 ft. problems arise from the low temperature, low atmospheric pressure, tumbling and spinning, wind blast, and deceleration. The literature concerning the effect of such factors on human physiology is reviewed. In the study of the effects of deceleration on the human body, a highspeed sled,track, and water braking system are considered.

4,790

Stapp, J. P. & W. C. Blount 1953 HOLLOMAN AFB SHORT TRACK FACILITY. (Aero. Medical Field Laboratory, Holloman Air Development Center, New Mexico)

ABSTRACT: The Short Track Facility has proven to be a versatile testing device which can be operated and maintained at a modest cost. The water brake with its adjustable orifices permits establishing the desired deceleration pattern with accuracy to within plus or minus 5%. Thus far, established parameters of 90 g at 12,000 g per second and 5 g at 100 g per second have been attained. Future testing with the air gun is expected to enable the maximum values to be increased.

This preliminary study has four objectives: To determine the feasibility of employing lead cones as a braking device, to test the water inertia braking system and establish repeatability curves for that system, to determine the effect of impact forces upon the spinal column in the intact subject for various directions of orientation, to determine any adverse physiological or psychological effects that may be incurred by human subjects during low impact deceleration runs.
It should be noted that no effort has been made to arrive at any technical conclusions as too few tests were conducted to offer statistical evidence.

Continued research in decelerations above 100 g will be accomplished for all directions of subject orientation. (Authors)

4,791

Stapp, J. P. 1954 ROCKET SLEDS AS BIOLOGICAL TEST VEHICLES. (Paper presented before the American Rocket Society, El Paso, Tex., Sept. 1954).

4,792

Stapp, J. P. 1954 WHOOOOOOOOSH, - ARTICLE ON TOLERANCES TO DECELERATION, WINDBLAST AND TUMBLING, Flying Safety J., June 1954 10(6):2-7.

ABSTRACT: The author recalls his experiences as a subject in a rocket sled experiment on maximum tolerance of transversal acceleration at Holloman Aero Medical Field Laboratory. A short biography of the author is included.

4,793

Stapp, J. P. 1954 TRACK-TESTING THE BRAIN OF THE WEAPONS SYSTEMS. (Paper, a ditto copy) (Aero Medical Field Laboratory, Holloman Air Development Center, New Mexico).

ABSTRACT: The author briefly summarizes the deceleration tests run at Edwards AFB and Holloman AFB to determine human tolerance to crash type decelerations. Supplemental charts summarize the number of animal, dummy and human tests run on each of 4 tracks, and show human tolerance limit indicated by these tests. (CARI)

4,794

Stapp, J. P. 1955 EFFECTS OF MECHANICAL FORCE ON LIVING TISSUES. I. ABRUPT DECELERATION AND WINDBLAST.
J. Aviation Med. 26(4):268-287.

SUMMARY: Human experiments on a rocket propelled linear decelerator sled capable of higher than 25 g decelerations for longer than one second durations have determined parameters for limits of reversible incapacitation of volunteer human subjects. These limits of human tolerance relate to decelerations experienced during escape from high performance aircraft by means of an ejection seat during wind drag deceleration at high ram pressures encountered in supersonic flight.

A simultaneous study of windblast effect due to impingement of ram pressure against the exposed body of the subject indicates that 7.7 pounds per square inch, or 1,108 pounds per square foot of ram wind pressure has no significant effect on a subject whose head is shielded by a complete enclosure, and whose head and extremities are restrained against flailing. Indications are that decelerations exceeding one second for higher than 25 g can be a limiting factor requiring modification of the deceleration reaction of seat and occupant to supersonic ram pressures. On the basis of these and previously reported human experiments it is postulated that a refractory period of one-tenth seconds with respect to hydraulic displacement effects within the body determines very high impact tolerance.
In this range tissues fail in the same manner as inert materials by exceeding physical characteristics of tensile, compression or shear strength. Beyond this range, tolerance to mechanical forces is determined by reaction to hydraulic displacement of fluids. Hydraulic pressure rupture of blood vessels and pressure damage to cell membranes set the limit to tolerance. Hydraulic pressure values, on the other hand, tolerable to living tissues but lasting more than three seconds can produce a secondary hypoxia due to circulatory stasis. Such hypoxia in nervous tissue can reach a duration limit for uninjured survival. These responses represent a continuous spectrum of reaction to mechanical force related to rate of application, magnitude of force, duration of application, and its direction.

4,795

Stapp, J. P. 1955 TAPE RECORDING OF SPEECH AT TEXAS TECH., LUBBOCK, TEXAS.

4,796

Stapp, J. P. 1956 BIODYNAMICS OF HUMAN FACTORS IN AVIATION.
Rocket sled tests on 5,000 foot track. Project 7850.

4,797

Stapp, J. P. 1955 TOLERANCE TO ABRUPT DECELERATION
In Collected Papers on Aviation Medicine
(London: Butterworths Sci. Pub., 1955) AGARDograph No. 6, pp. 122-139

1.--On the basis of experimental exposure of human, chimpanzee and hog subjects to abrupt decelerative forces by means of linear decelerations, it has been established that tolerance limits for human subjects approximate 50 g peaks at 500 g per second rate of onset for 0.25 second duration, provided restraints are adequate and impinge on solid structures of the shoulders and hips, or against the back surface of the body.
2.--Adequately restrained chimpanzees and hogs exposed to abrupt deceleration sustained peaks of 80 g or more with minimal reversible injuries in all body orientations, and survived peaks of more than 200 g in the forward facing seated position.
3.--The rate of change of deceleration, the body area impinged upon and the configuration of the webbing or bulk-head restraints are the limiting factors to tolerance and survival of exposure to linear decelerative forces.
(Author)

4,798

Stapp, J. P. 1956 BIODYNAMICS OF HUMAN FACTORS IN AVIATION. MISSILE TEST DATA AND INSTRUMENTAL REQUIREMENTS, PROJECT 7850.
(Holloman AFB, New Mexico) 15 October 1956.

ABSTRACT: A group of problems have arisen in the Field of Aviation Medicine concerning the effects of mechanical force on living tissues. The title Biodynamics of Human Factors in Aviation covers this special area of research in Aviation Medicine.

A short history of research in human tolerance to crash type forces includes that research done by Germany before World War II. The history follows research through that done recently with the high performance rocket sled.

4,799

Stapp, J.P. & S.T. Lewis 1956 CRITERIA FOR CRASH PROTECTION IN ARMED FORCES GROUND VEHICLES. (Holloman AFB, New Mex.) HADC TN, April 1956

ABSTRACT: An evaluation of the problem of crash protection for ground vehicle occupants involved in accidents is presented. Modification of ground vehicles in order to improve their crash protection characteristics is recommended. Specifications for lap belts and lap belt installations are described and the use of these belts on a trial basis with the Office of Ground Safety as the monitoring agency is recommended. This report will assist in solving the problem of reducing injuries to occupants of vehicles involved in accidents.

4,800

Stapp, J.P. and C.D. Hughes 1956 EFFECTS OF MECHANICAL FORCE ON LIVING TISSUES. II. SUPERSONIC DECELERATION AND WINDBLAST. (Paper, 1956 Meeting of Aero Medical Association, Chicago, Ill., April 16-18)

ABSTRACT: Anesthetized chimpanzee subjects were exposed to accelerations exceeding 25 g lasting for two seconds or more with no injury except in experiments where an axillary belt restricted the chest. During deceleration, abrupt impingement of straps against the chest elevated intrathoracic pressure in those cases where the axillary belt pressure prevented displacement. This pressure was transmitted hydrostatically to the subject's head resulting in facial edema and ocular hemorrhage. The onset of windblast in not less than 50 milliseconds to more than 2800 pounds per square foot was sustained without injury as long as the subject's head was enclosed in a wind-proof helmet and head and extremities from supersonic aircraft in flight are discussed.
(J. Aviation Med. 27(1):172-173, April 1956)

4,801

Stapp, J. P., and C. D. Hughes, 1956. EFFECTS OF MECHANICAL FORCE ON LIVING TISSUES. II. SUPERSONIC DECELERATION AND WINDBLAST. J. Aviat. Med. 27(5):407-413.

SUMMARY: Previously reported experiments have demonstrated that the maximum velocity of Mach.9 attainable with 4,500-pound thrust, five second duration rockets within the 3,500 track length was below the threshold for windblast effects. A new 1,400 pound sled propelled by up to 9 each 1.8 second duration 7,800 pound thrust rockets, and having ejection catapult actuated canopy for jettisoning in 50 milliseconds at maximum speed was developed and used in the experiments reported. Velocities of up to Mach 1.3 (1,461 feet per second) were attained in eleven progressively higher speed experiments.

Anesthetized chimpanzee subjects were exposed to accelerations exceeding 28 G during 1.8 seconds or more. The onset of windblast in not less than 50 milliseconds to more than 2800 pounds per square foot was sustained without injury so long as the subject's head was enclosed in a wind proof helmet and head and extremities were adequately secured. Application of these findings to methods of escape from supersonic aircraft in flight are discussed.

4,802

Stapp, J. P. 1956 HUMAN REQUIREMENTS FOR ESCAPE FROM HIGH PERFORMANCE AIRCRAFT (Aero. Medical Field Laboratory, Hollman AFB, New Mexico)

ABSTRACT: Minimum requirements for escape from such aircraft during inflight emergencies include: (1) Effectiveness in accomplishing escape under all conditions of flight, (2) keeping the factors imposed by the escape process within limits of human tolerance, (3) making the least demands on the operator by automatic sequencing of all steps in the process,

and (4) the maintenance of, or emergency replacement of a viable environment during transition from aircraft to earth.

Accompanying charts show USAF operational experience with ejection escape systems (Aug. 1949 - Mar. 1956), air speed relationship to injury, safe ejection by type aircraft, ejection accelerations, and human tolerance to linear deceleration. (CARI)

4,803

Stapp, J.P. 1956 MEASUREMENT FOR SURVIVAL
Ordnance 40(216):975-979, May-June 1956.
(Paper, presented before the American Ordnance Association, Watervliet Arsenal, Watervliet, New York, Jan. 1956.

ABSTRACT: The propulsion, braking, and instrumentation systems of several high speed linear decelerators designed for the investigation of problems of tolerance to forces incurred in aircraft crashes and during ejection from high-speed aircraft are described. The decelerators include (1) a rocket-propelled sled braked by pressurized gripping units, on which tolerance limits for primates have been established for avarious body positions, and harness configurations developed; (2) a monorail suspended decelerator braked by collision, on which high tolerance limits to impacts of high rate of onset and short duration have been established for hogs, and the comparative vulnerability of body parts to impingement by simulated cockpit components evaluated; and (3) a high performance rocket sled with water brakes, in which human velocities up to 632 mph have been obtained.

4,804

Stapp, J.P., R.J. Heymans, & R.M. Stanley 1956 PROGRESS IS STEADY TOWARD SOLUTION OF ACUTE PILOT-ESCAPE PROBLEMS. SAE J. 64(13):44-48, Dec. 1956

ABSTRACT: Considerations of importance in the development of pilot escape devices from disabled aircraft at high speeds and altitudes include the possibility of incapacitation resulting from fear, injury, hypoxia, or tumbling; the necessity for a high escape velocity to avoid collision with aircraft parts and the possibility of attendant spinal injury; the effects of air blast and acceleration; the necessity for oxygen and perhaps pressure during descent; the danger of injury during parachuting either from enemy action or from impact; and the problem of the storage of survival equipment. It is suggested that a capsule or pod-type ejection device would provide protection against most dangers, but would present serious engineering difficulties, require a greater escape acceleration, and be more susceptible to survivable battle damage (with the necessity for a further escape system).

4,805

Stapp, J.P. and S.T. Lewis 1956 EFFECTS OF MECHANICAL FORCE ON LIVING TISSUES. IV. TIME MOTION STUDIES ON ESCAPE FROM AIR TRANSPORT FOLLOWING EXPOSURE TO CRASH FORCES.
(Paper, 1956 Meeting of Aero Medical Association, Chicago, Ill., April 16-18)

ABSTRACT: Human volunteers were subjected to decelerations of 6 g and 12 g in an aft facing and forward facing seated position on the crash restraint demonstrator. This device consists of an aircraft seat mounted on a small platform moving on rails. Abrupt release of stretched shock cords catapults the platform, seat, and occupant about 10 feet along the rails into preset mechanical pinch brakes that stop the motion in less than 2 feet, imparting the desired decelerative force to the subject. Immediately after exposure, each subject released the seat belt manually and proceeded along an aisle from 10 to 50 feet in length to an emergency exit. Time motion studies were made beginning at the instant of seat deceleration to successful completion of exit through a door. High speed motion pictures and electronic timing in addition to accelerometer and strain gauge measurements of decelerative forces were accomplished. Comparison of the reactions of more than twenty subjects are discussed. Recommendations are made regarding seating of transport passengers in relation to escape from survivable crashes. (J. Aviation Med. 27(1):173, April 1956)

4,806

Stapp, J.P. 1956 EFFECTS OF MECHANICAL FORCE ON LIVING TISSUES. IV. TIME MOTION STUDIES ON ESCAPE FROM AIR TRANSPORT FOLLOWING EXPOSURE TO CRASH FORCES. (USAF, Air Development Center, Holloman AFB, N. Mexico)

ABSTRACT: Previously reported experiments in this series demonstrated that the maximum velocity of Mach .9 attainable with 4500 pound thrust five second duration rockets within the 3500 foot track length was below the threshold for windblast effects. A 1400 pound sled propelled by up to 9 each 1.8 second duration 7800 pound thrust rockets, and having ejection catapult actuated canopy for jettisoning in 50 milliseconds at maximum speed was developed and used in the experiments reported. Velocities of up to Mach 1.3 (1461 feet per second) were attained in eleven progressively higher speed experiments.

4,807

Stapp, J.P. 1956 HUMAN FACTORS OF SUPERSONIC ESCAPE
Preprint no. 748 (SAE 1956)

4,808

Stapp, J. P. 1957 HUMAN TOLERANCE TO DECELERATION.
Amer. J. Surg. 93(4):734-740. April 1957.

ABSTRACT: In order to accomplish precisely controlled exposures of living organisms to predetermined configurations of mechanical force with reasonable safety, the chosen instrument has evolved as a rocket or catapult-powered sled, slipper mounted on rails, carrying the subject, recording and transmitting instrumentation and braking devices, which can be accelerated to the required velocity and then decelerated according to plan. It can be concluded from the results that the structural strength of the human body, its energy absorbing characteristics with respect to brief applications of high dynamic loads, its tolerance to abrupt wind blast of nearly explosive violence facilitate salvaging the victims of high speed transportation accidents. The application of this knowledge can lead to a great saving of lives and prevention of disabilities.

4,809

Stapp, John P. 1957 ROLE OF THE AIR FORCE VETERINARIAN IN RESEARCH
(Paper, Veterinary Section Meeting of the Association of Military Surgeons of the United States, Washington, D.C. November 13, 1956.)
(Reprinted from Military Medicine, Vol. 120, No. 3, March, 1957)

ABSTRACT: The objectives of veterinary medicine in Air Force Research are twofold. First is to provide a standby group of qualified staff officers who are capable, in the event of emergency, to serve air commanders and surgeons as technical advisors in certain defensive and protective aspects of nuclear, biological, and chemical warfare. Secondly, veterinarians support Air Force research by providing professional service and assistance for all projects involving foods or animals, and further by having veterinary officers with special qualifications actively participating as research team members on such projects. A discussion is included of the requirements and general areas of interest in which veterinary officers are qualified in veterinary research. Some of the current research projects in which animals are employed as human substitutes are also included.

4,810

Stapp, J. P. 1957 FROM HYPOTHESIS TO REALITY IN SPACE FLIGHT
In Proceedings of the National Symposium on Human Factors in Systems Engineering, Philadelphia, Pennsylvania, December 3-4, 1957.
(Human Factors Society of America, Arlington, Va. & Institute of Radio Engineers, Philadelphia, Penn.) Pp. 82-83, Dec. 1957.

ABSTRACT: This address consisted of some introductory remarks on the unrealities, e.g., flying saucers, versus realities, e.g., Sputnik, in space flight and the showing of the motion picture film of Major D. Simon's balloon flight. (Tufts)

4,811

Stapp, J. P. 1957 HEARINGS BEFORE A SUBCOMMITTEE OF THE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE, HOUSE OF REPRESENTATIVES, 85th CONGRESS, FIRST SESSION ON CRASHWORTHINESS OF AUTOMOBILE SEAT BELTS. #97108, U.S. Government Printing Office, 5-8 August 1957.

See Also U.S. House of Representatives. 1957.

4,812

Stapp, J. P. & S. T. Lewis 1957 HUMAN FACTORS OF CRASH PROTECTION IN AUTOMOBILES. SAE Transactions 65:488-492.

4,813

Stapp, J. P. 1957 HUMAN TOLERANCE FACTORS IN SUPERSONIC ESCAPE. In Problems of Escape from High Performance Aircraft: A Symposium. The Journal of Aviation Medicine 28:77-82, February 1957.

ABSTRACT: The following escape conditions in the supersonic range need to be provided for: (1) Fatal or injurious inadvertent ejections through the canopy with the aircraft standing still, usually with engine idling. (2) Escape from an aircraft on the ground in motion. (3) Low-level ejections at subsonic speeds in flight.

Human tolerance factors in ejection include tumbling and spinning and windblast. Supersonic escape requirements are an important part of the rocket sled technique of investigations.

4,814

Stapp, Col. John P., and Lt. Wilbur C. Blount 1957 EFFECTS OF MECHANICAL FORCE ON LIVING TISSUE III. A COMPRESSED AIR CATAPULT FOR HIGH IMPACT FORCES. J. Aviation Med. 28(13):281-290 (June 1957).

ABSTRACT: The experiments that have been conducted indicate that the short tract facility will provide experimentally controlled G forces within the following parameters: 5 G with an onset of 100 G per second, to 90 G with an onset of 12,000 G per second. Maximum deceleration patterns obtained with ejection seat catapult propulsion indicate that the proposed maximum performance range can be attained with adequate propulsion.

Linear decelerations of 92 G lasting for a period of 0.11 second have been endured by animal subjects orientated with the spinal column parallel to the acceleration vector, without anatomic damage or abnormal clinical neurologic findings. Volunteer human subjects orientated with the vertebral column at 60 degrees to the acceleration vector sustained a deceleration of 10 G, for 0.083 second duration, without any symptoms of physical discomfort.

4,815

Stapp, J. P., & S. T. Lewis 1957 CRASH RESTRAINT DEMONSTRATOR. (Holloman Air Development Center, Holloman AFB, New Mexico) HADC TN 57-9, ASTIA AD 123733, June 1957.

4,816

Stapp, J.P. & S.T. Lewis 1957 EXPERIMENTS CONDUCTED ON A SWING DEVICE FOR DETERMINING HUMAN TOLERANCE TO LAP BELT TYPE DECELERATIONS. (Air Force Missile Development Center, Holloman AFB, New Mexico) AFMDC TN 57-1, ASTIA AD 135 005.

ABSTRACT: Anthropomorphic dummies and human volunteer subjects were decelerated while seated in a swing-seat device, facing forward, and being restrained by lap belts three inches wide. The swing consisted of an aircraft seat, suspended by cables forming a swing-pendulum, which could be raised and dropped through a measured vertical component and arrested by a steel cable. Rate of onset, magnitude, and duration are tabulated for 21 dummy tests and 19 human tests. (Author)

4,817

Stapp, J. P. 1958 HUMAN TOLERANCE TO ACCELERATIONS OF SPACE FLIGHT Physics and Medicine of the Atmosphere and Space. (New York: John Wiley & Son, Inc. 1958).

ABSTRACT: Sustained flight can be accomplished by application of three basic principles of physics: 1. Displacement of the atmosphere by a lighter gas, 2. aerodynamic lift, 3. propulsive force sufficient to overcome the force of gravity.

4,818

Stapp, J. P. & D. L. Enfield 1958 LAP BELTS NEED SOUND DESIGN S.A.E. Journal 66(9):30-31, Part 2.

ABSTRACT: If a lap belt is to restrain a passenger in a manner to prevent bodily injury and limit his deceleration curve to human tolerance level, many human and mechanical factors must be observed. This is the finding of studies in which instrumented vehicles and anthropomorphic dummies were used in simulated collisions wherein the impact speeds and most frequent areas of contact in collision were those obtained from accident statistics supplied by the Office of Ground Safety Headquarters, USAF, and the Automotive Crash Injury Research Department, Cornell University. This paper contains a list of the human factors that must be considered in designing a seat belt. It also lists modifications to be made in car interiors if maximum safety is achieved.

4,819

Stapp, J. P. 1958 CRASH INJURY PREVENTION, Part 1. Cincinnati J. Med. 39(1):1-5.

ABSTRACT: A review of research on human tolerance to crash type forces. Mentions early German tests with swing-type deceleration and U. S. Navy aircraft barrier-crash-force measurements. Outlines some results of USAF experiments with the linear deceleration at Edwards AFB: In all cases where subjects were adequately restrained, findings were essentially negative below the level of 30 g with due allowance for mild abrasions, contusions, and transient effects due to excitement and exertion. At 30 to 35 g plateau, slight signs of shock were occasionally present with rate of change of deceleration above 1000 g per second. In two runs above 38 g at more than 1300 g per second rate of change of deceleration, definite shock levels of blood pressure, pulse, and respiration occurred, with near fainting in one case and with two brief episodes of fainting in the other. At the same 38 g level but with rate of change of 330g per second, and at 45.4g at 493g per second, blood pressures were elevated and pulse and respiration increased to exertion levels but there was no sign of shock. Subjectively, limits of voluntary tolerance were approached at about 46.0g with rate of change of deceleration of about 500g per second. Much higher levels can be survived. Although reversible injurious effects may occur.

Briefly describes USAF automobile-collision research and industry safety developments. Strongly advocates use of safety belts and other safety devices.

4,820

Stapp, J. P., et al. 1958 HUMAN TOLERANCE TO AIRCRAFT SEAT BELT RESTRAINT J. Aviation Med., 29(3):187-196 March 1958.

SUMMARY: Human volunteer subjects were decelerated while restrained by a lap belt three inches in width while seated forward-facing in three experimental devices:

1. An aircraft seat hanging by 20-foot cables forming a swing-pendulum, which could be raised and dropped through a measured vertical component and arrested by a steel cable;
2. A sled, on a 120-foot track propelled by an ejection seat M1-A1 catapult and decelerated by water inertia brakes; and
3. A catapult accelerating a seat by means of ruober shock cords in an 18-foot distance and decelerating it with mechanical frition brakes in thirty inches or less.

Rate of onset, magnitude and duration of force are tabulated for 30 human experiments. Air transport crash protection is discussed as well as tolerance limits tothe application of crash-type mechanical forces of the magnitude investigated by these experiments.

4,821

Stapp, J. P., S. T. Lewis and J. J. Ryan 1958 PRELIMINARY INVESTIGATIONS OF A HYDRAULIC BUMPER AND ROLL-OVER STRUCTURE
(Air Force Missile Development Center, Holloman AFB, N. Mex.)
Rept. no. AFMDC TN-58-5 Feb. 1958 ASTIA AD 135 007

ABSTRACT: Data are presented from experimentation with (1) a bumper capable of absorbing the crash forces generated by the collision between a weapons carrier traveling at speeds up to 40 mph and fixed objects, and (2) a rollbar structure capable of supporting an open-topped vehicle, overturned or rolling over at speeds up to 40 mph. The bumper element consists of 2 closely-fitted telescoping cylinders which on impact, pass a liquid from one to the other through an orifice metered by a pin of variable diameter. The roll-bar structure was formed from an extra -strong steel pipe (2.75 in. od and 1.939 in. id) superstructure attached to the truck frame. Preliminary conclusions were that (1) bumpers for attenuating crash forces and roll-over structures capable of protecting occupants can be successfully constructed, (2) improvements in measuring techniques and parts-construction will improve the development of final designs, and (3) the proposed series of tests would provide sufficient information for the preparation of specifications for the modification of the equipment. (ASTIA)

4,822

Stapp, J. P. 1958 BIODYNAMICS OF MANNED SPACE FLIGHT.
The Human Factor in Space Travel, Air Univ. Quarterly Review 10(2):47-52, Summer 1958

4,823

Stapp, J. P. 1958 ACCELERATIONS OF SPACE FLIGHT
(Paper, American Rocket Society, 13th Annual Meeting, Hotel Statler, New York City, N. Y., Nov. 17-21, 1958) American Rocket Society Paper No. 700-58
See also Report of 3rd European Congress of Aviation Medicine, Jan. 1958

ABSTRACT: Man can endure the accelerations anticipated for attaining orbital or escape velocity by present 3 stage rocket propulsion systems, if he is optimally oriented in the transverse presentation for forces above 4 g and can sustain prolonged exposure to low acceleration required for reentry, but he is scarcely likely to enjoy either of these ordeals, until the design and operation of space vehicles advances to the point of complying with parameters of human effectiveness instead of imposing on survival limits.

4,824

Stapp, J. P. 1958 USAF HIGH ALTITUDE RESEARCH PROGRAM
(Lecture given at Univ. of Minn. Parachute Engineering Course, 18 July 1958)
(Armour Research Foundation of Illinois Institute of Technology).

4,825

Stapp, J.P. 1959 ACCELERATION: HOW GREAT A PROBLEM?
Astronautics 4(2):38-39, 98-100, Feb. 1959.

ABSTRACT: Studies to date indicate that man can tolerate for the necessary durations the acceleration forces anticipated for present 3-stage rocket systems if they do not exceed 10 G and if the subject can be optimally positioned for the ordeal. The transverse position facing the direction of acceleration with trunk bent forward at a 65° angle with respect to the thighs proves best for sustaining such a stress. Immersion in water increases the duration of endurance and mobility of the extremities, but is redundant for present configurations of acceleration that will reach orbiting velocities. A more promising prospect from the standpoint of human effectiveness is found in extremely prolonged accelerations of less than 4 G. Tolerance that is not exceeded by more than one hour of exposure to 3 G attained by gradual onset in both the transverse and positive G orientations offers the possibility of exceeding escape velocity by tenfold. With means of propulsion for space vehicles that will provide continuous accelerations not exceeding 4 G, for durations to attain orbiting or escape velocity, the experience is within the range of physiologic adjustment and does not impose on the capacity for recovery.

4,826

Stapp, J. P. 1959 ESCAPE FROM AIRCRAFT.
In Medical Aspects of Flight Safety AGARDograph 30, Pp. 213-221.
(New York: Pergamon Press, 1959)

ABSTRACT: Combat mission is the primary basis for design requirements; that safety takes precedence over salvage, in terms of keeping the situations of flight requiring salvage to an absolute minimum; and that the salvage operation be as effective as possible over the entire spectrum of accident probabilities.

4,827

Stapp, J.P. 1959 MAN'S MISSION IN SPACE
Astronautics, 4 (11): 28-29, 130-131, Nov. 1959

ABSTRACT: Man's status as he enters into the space age is briefly examined and the problems associated with his requirements for survival in the closed environment of the future spaceship are reviewed. In addition, human tolerance to such space flight conditions as acceleration and radiation are noted.

4,828

Stapp, J. P. 1960 HUMAN TOLERANCE TO ACCELERATIONS OF SPACE FLIGHT. In Physics and Medicine of the Atmosphere and Space (New York: John Wiley & Sons, Inc., 1960)

ABSTRACT: Sustained flight can be accomplished by application of three basic principles of physics: (1) Displacement of the atmosphere by a lighter gas inclosed in a balloon, providing a free lift that is proportional to its relative density and total volume; (2) aerodynamic lift, resulting from unequal displacement of the atmosphere against the upper and lower surfaces of a moving wing, determined by wing configuration, lift-drag ratio, and atmospheric density; (3) propulsive force sufficient to overcome the force of gravity and the inertia of the vehicle.

4,829

Stapp, J. P. 1960 HUMAN FACTORS OF APPLIED SPACE TECHNOLOGY. In (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) PROCEEDINGS OF WADC SPACE TECHNOLOGY LECTURE SERIES, VOLUME 1 TECHNICAL AREAS. WADC TR-59-732; ASTIA AD-235 424; pp. 133-136

ABSTRACT: The compulsive challenge of space exploration offers the prospect of extending the scope of basic research directly to universal dimensions. The entire area from the upper limits of aerodynamic flight to the lower limits of orbital space flight can be investigated by a continuous progression in performance increments from aerodynamic flight. With such an approach, the development of more efficient propulsion systems would provide platforms for testing and developing all components of space weapons and space transports while training numbers of space pilots in real-time flight at comparatively low cost. However, failure to recognize the place of military research and development in the applied technical area could result in wasting the existing resources and capabilities that should be converted from past aircraft technology. (AUTHOR)

4,830

Stapp, J.P. 1961 THE "G" SPECTRUM IN SPACE FLIGHT DYNAMICS. Lectures in Aerospace Medicine, 16-20 Jan. 1961 (Conducted at the School of Aviation Medicine, Brooks AFB, Texas)

ABSTRACT: To attain a circular orbit 200 to 250 kilometers above the earth, an artificial satellite must be accelerated to a velocity approximating 8 kilometers per second before centrifugal force comes into equilibrium with the mass of the satellite along the orbital path. This would require a calculated constant acceleration of 828 g seconds. To reach escape velocity, a velocity of 11 kilometers per second must be attained. 1152 g seconds of calculated constant 1 g acceleration will be needed to attain this velocity.

4,831

Stapp, John P. 1961 ACCELERATION REVIEW (Presented at ARS Space Flight Report to Nation, New York) 9-15 October 1961

4,832

Stapp, J. P. and S. E. Neely 1961 EVALUATION ON HIGH SPEED AND THUNDER-STORM EFFECTS ON EJECTIONS.
Aerospace Medicine 32(3):248, March 1961.

ABSTRACT: Utilizing USAF aircraft accident reports, those accidents involving high speed ejections (both supersonic and over 500 knots) and thunderstorm ejections are analyzed. The influence of high speed and thunderstorm conditions on ejection are evaluated. Five accidents are briefed including a recent multi-jet accident in which both factors were present. Conclusions are drawn concerning the significance of the factors studied.

4,833

Stapp, J. P., & S. E. Neely 1961 EVALUATION OF HIGH SPEED AND THUNDERSTORM EFFECTS ON USAF EJECTIONS. (Data for this study were compiled from the records of the Deputy Inspector General for Safety, USAF, Norton AFB, Calif., 15 Feb. 1961)

4,834

Stapp, J. P. 1961 WORK OF THE UNITED STATES AERONAUTICAL LABORATORY ON THE FORCES SET IN MOTION AND WOUNDS INDUCED BY COLLISIONS.
In Sem. Med. Prof. 37:839-840, Dec. 2, 1961 (France)

4,835

Stapp, J. P. 1961 HUMAN TOLERANCE TO SEVERE, ABRUPT ACCELERATION. (In Gauer, O. H. and G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine) (Boston: Little, Brown, and Co., 1961). p. 165-188.

4,836

Stapp, J. P. 1961 EFFECTS OF LINEAR ACCELERATION.
In Armstrong, H. G., ed., Aerospace Medicine (Baltimore, Md.: Williams & Wilkins Co., 1961)

4,837

Stapp, J. P., S. E. Neely, & A. B. Nutt 1961 CRASH PROTECTION OF AIR TRANSPORT PASSENGERS. (Presented at the Aerospace Medical Association 32nd Annual Meeting, 24-27 April, 1961).

CONCLUSIONS: An analysis of the air transport passenger crash protection problem from the standpoint of accident experience, deceleration experiments with aircraft, seats and human volunteers, points to the design and adoption of aft facing seats using new materials that will conserve weight while providing greater protection from abrupt crash forces. New standards for transport passenger seats and restraints should be established to permit uniform adoption of high strength aft facing seats. (AUTHOR)

4,838

Stapp, J. P. 1961 JOLT EFFECTS OF IMPACT ON MAN.
(Aerospace Medical Div., Brooks AFB, San Antonio, Texas)

(Paper, Symposium on Impact Acceleration Stress, Brooks AFB, Texas 27-29 November 1961)

ABSTRACT: The paper contains reports on several impact, acceleration, and deceleration experiments.

4,839

Stapp, J.P., J.D. Mosely, and C.F. Lombard 1962 "MEGABOOM" LINEAR WINDBLAST TESTS ON SUBJECTS AND PROTECTIVE EQUIPMENT.
(Northrop Space Labs., Hawthorne, Calif.) Contract AF 41(657)405, Proj. 7930, ARL TDR 62-6, July 1962. ASTIA AD 283 803

ABSTRACT: Information is presented on six rocket sled experiments to investigate the effects of supersonic windblast upon personnel and personal protective equipment. Five chimpanzees and one human dummy were used as test subjects. Velocities ranged from 1,330 to 1,922 fps (906.8 to 1,310.4 MPH); stagnation pressures of 18 to 42 pounds per square inch, or loads of 2,500 to 4,000 pounds per square foot. Standard restraints and garments proved inadequate and extensive injuries established the need for improvements. Restraints and garments were progressively improved until protection of the test subject was achieved. Injuries were caused by the subjects being displaced within the restraints, causing high non-uniform forces to act upon the various parts of the subjects' bodies. Other sources of severe injury were the frictional heat on and in the body surface areas and subcutaneous tissues, and by high velocity air penetrating wounds and body apertures. Protection can be achieved by adequate restraints and garments which would render the operational efficiency of the wearer marginal; but with careful development, satisfactory protection with working efficiency probably can be achieved. (Author)

4,840

Stapp, John P. 1962 JOLT EFFECTS OF IMPACT ON MAN
In: Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, pp. 123-130

ABSTRACT: A survey of jolt effects of impact on man indicated that any attempt at stress analysis of man with respect to impact forces must take into account the responses of the body as a whole; the simultaneous responses of different kinds and different states of materials in body structure, such as the pneumatic and hydraulic behavior of gasis and fluids; plastic deformation of soft tissues; and the stretching of the masenteries and ligaments by displacement or organic masses. Since the object of human stress analysis is to determine reversible and irreversible, disabling and fatal criteria of the human structure, it is well to relate measurements to points of structural weakness or load concentration.

4,841

Stapp, J.P. 1962 MEDICAL PROBLEMS OF SPACE FLIGHT
Jour. Mississippi State Med. Assoc., 3 (9): 404-412. Sept. 1962

ABSTRACT: The Mercury space flight program methods for selecting, training, and physiologically adapting the astronaut for space flight are briefly reviewed. Discussion is presented of the preparation for both suborbital and orbital flight, flight observations of astronauts Shepard and Grissom (suborbital flight), and Glenn (orbital flight). Analysis of flight data and postflight examination were found to be normal except for changes comparable to the results of exertion in an athletic event of about the same intensity and duration.

4,842

Stapp, J.P. 1962 AFTER SEAT BELTS...WHAT?
In Cragun, M.K., ed., The Fifth Stapp Automotive Crash and Field Demonstration, Sept. 14-16, 1961, Pp. 259-263

4,843

Stapp, J. P. 1963 LANDING IMPACT STUDIES ON APOLLO CAPSULE. NASA MOTION PICTURE FILM. Presented at Seventh Annual Stapp Car Crash Conference, Sheraton Marina Hotel, Playa del Rey, Calif. 12 November.

4,844

Stark & Roth, tr., J.B. Bateman 1945 REVIEW: CATAPULT SEAT Do 335 (Dornier-Werke G.m.b.H., Friedrichshafen a. B., Div. of Research) Research Rept. 3240, Pages A-17206 to A-17240, 23 May 1944. Translated as Appendix 13 to Lovelace, W.R., E.J. Baldes, & V.J. Wulff, The Ejection Seat for Emergency Escape from High Speed Aircraft, ASTIA ATI No. 7245

SUMMARY: The catapult arrangement was used 200 times in all. No important drawbacks were apparent in these tests. The ejection velocity can be significantly improved by greasing the piston. According to wind tunnel measurements at D W (see Research Report No. 138 and investigations at the Heinkel factory, report No. ENS-88/32) with a total weight of 120 kg. an ejection velocity of about 17 meters per second is necessary in order to insure sufficient clearance of the tail. Such a velocity of ejection requires three compressed air reservoirs each two liters in capacity, a pressure of 120 atmospheres, and a greased piston in the cylinder. In the appendix will be found further theoretical deductions from these experiments made on the ground, from the measurements in the wind tunnel at the Dornier factory and from the measurements made by the Heinkel factory.
The experiments on human subjects showed that the D W catapult device can also be discharged at 120 atmosphere without endangering the person ejected. The subjects found the seat equipped with arm rests, head cushion, and upholstered back to be very comfortable. It is, however, recommended that the pads along the edges of the arm rests should be raised somewhat in order to prevent the arms from being jerked off the rests. The arm rests probably support a considerable fraction of the body weight and thus make possible ejection with the use of such high reservoir pressures. Dr Wiesehofer, D V L, is still carrying out exact investigations. The position of the operating levers with respect to the arm rests is satisfactory. Injury to the forearm and hand was never produced. It would be a good idea to provide a bumper on the arm rest or on the seat in roder to prevent the elbow from jerking back too far when the catapult lever is pulled. From the point of view of its mechanical properties, its mode of action and its physiological effects the D W catapult device fulfills the standards set up. (Author)

4,845

Starkiewicz, W. 1936 L'INFLUENCE DES VOLA ACROBATIQUES AUX PETITES ALTITUDES SUR L'ETAT FONCTIONNEL DE L'OEIL. (Effect of Acrobatic Flights at Slight Altitudes on the Functional Condition of the Eye.) Rev. pol. de la med. aeronautique, 5:86-102

ABSTRACT: A study of visual acuity following acrobatic flights at slight altitudes revealed an increase in visual acuity for reading black signs on a white ground (Landolt tables) in 91.5 per cent of all cases. In general this increase surpasses 0.1. Also an increase in visual acuity in reading white on a black ground (Snellen's tables) was noted in 81 per cent of the cases which did not, however, surpass 0.1.

No significant changes in accommodation were noted. The aviators examined had

not been exposed to anoxemia, which causes diminution of visual acuity, because they had not exceeded an altitude of 3,000 m.

A factor which may play an important part is increased irritability of the cerebral cortex, which is exposed to various influences during flight (noise of the motor, excitement, and vibrations of the plane) These influences affect the optic field of the cerebral cortex, exciting it and creates a visual sensation on the retina. ABSTRACT: (Limited) Journal of Aviat. Med. 8(2):113-114, Ju 1937

4,846

Starks, J. H. 1961 CRASH INJURY WORK OF THE ROAD RESEARCH LABORATORY OF THE UNITED KINGDOM, RESEARCH INTO ROAD SAFETY. (Paris) O.E.E.C. Publications No. 13,717, pp. 35-37

4,847

Starnes, A. H. 1942 FREE-FALL PARACHUTING
Canad. Air Cadet (Oct):14-15. Abstr: Aeronaut. Engng Ref. 1,(Dec.):51. 1942

4,848

Stasevich, R.A. 1947 K VOPROSU O BEZOPASNOSTI EKIPAZHA PRI AVARII (Safety of the Crew in Aircraft Crashes)
Tekhnika vozdushnogo flota 5: 18-23

4,849

Stasevich, R. A., & P. K. Isakov 1956 SKOROSTI, USKORENIIA, PEREGRUZKI (NEKOTORYE VOPROSY FIZIKI I FIZIOLOGII PRIMENITEL'NO K AVIATSII). (SPEED, ACCELERATION, G-FORCES, (SOME PROBLEMS OF PHYSICS AND PHYSIOLOGY APPLICABLE TO AVIATION) (Moskva: Voennoe Izdatel'stvo Ministerstva Oborony Soiuza SSR, 1956)

ABSTRACT: A discussion is presented for popular consumption on the speed of movement, acceleration, g-forces, and their effects on the human organism. The examples used are for the most part from aviation although some are also pertinent to space flight.

4,850

Státni Lékařská Knihova (National Medical Library) 1959 THE ANNUAL OF CZECHOSLOVAK MEDICAL LITERATURE 1957
Praha, Czechoslovakia: Statni Zdravotnicke Nakladatelstvi (Prague 1, Czechoslovakia: State Health Publishing House)

4,851

Státní Lékařská Knihovna (National Medical Library) 1961 THE ANNUAL OF CZECHOSLOVAK MEDICAL LITERATURE 1959
Praha, Czechoslovakia: Statni Zdravotnicke Nakladatelstvi (Prague 1, Czechoslovakia: State Health Publishing House)

4,852

Stauffer, F. R. 1948 FACTORS INFLUENCING THE CONCENTRATION OF THE BLOOD AS SUGGESTED BY FOOT/ARM RATIOS OF HEMATOCRIT AND PLASMA PROTEIN CONCENTRATIONS.
(Office of Naval Research, Washington, D. C.)
October 1948 Contract N6ori77

SUMMARY: Samples of blood were drawn simultaneously from the median arm and dorsal pedal veins of men who had just sat down after at least an hour's ambulatory activity. This blood was analyzed for red cell and plasma protein concentration and foot/arm concentration ratios determined. Some of the men were subjected to 15 seconds of 6 psi pressure to the abdomen, thighs and legs by means of a U. S. Navy Type Z-3 Anti-G suit after sitting down and before samples were taken.

The following conclusions were drawn. Ambulatory activity normally provides a dynamic equilibrium between the filtration from capillaries in the dependent areas and the return of fluid to the blood stream via the lymphaties. Cossation of activity, i.e., by quiet sitting, results in increased concentration of venous blood from the foot compared with that from the arm. Factors

4,853

Stauffer, F. R. and C. Hyman 1948 FLUID SHIFTS DURING EXPOSURE TO ACCELERATIONS: PRELIMINARY STUDY OF THE RAPID LOCAL CHANGES UNDER NEGATIVE G. (University of Southern Calif., School of Medicine, Los Angeles) Contract N6ori77, Task 1, 22 January 1948 See also; Am. J. Physiol. 153:(1):64-70 April, 1948.

ABSTRACT: 1. The increased intravascular pressures developed during exposure to increased acceleration cause a rapid and significant outward filtration of fluid from the circulation. 2. Blood returning from the head end of goats after exposureto negative G shows a short, rapid concentrating phase, followed by a somewhat slower phase of dilution, with respect to both hematocrit and plasma protein concentrations. 3. At peak concentration there is evidence of significant leakage of protein from the circulation, as calculated from the hematocrit and plasma protein values. 4. Several mechanisms involved in the fluid loss and protein leakage are discussed.

4,854

Stauffer, F. R. 1948 THE EFFECT OF AN INVERTED POSTURE UPON THE CONCENTRATION OF RED CELLS AND PLASMA PROTEIN IN THE HUMAN (Office of Naval Research, Washington, D. C.) November, 1948 Contract N6ori77

SUMMARY: Twelve subjects were subjected to thirty minutes of a 45-degree head-down position during which blood was taken from the median arm vein at 5-minute intervals. One sample was also obtained from the external jugular vein. The blood was analyzed for hematocrit and plasma protein content and concentration curves referred to time were drawn. The following conclusions have been made:

The mechanical hydrostatic effects of gravity on the blood in men are essentially the same in the inverted as in the erect position, differing in degree primarily as a result of the lack of compensating mechanisms to oppose the pooling of blood while in the inverted position. The systomic concentration, as measured by the plasma portein content, gradually approaches values 5% above horizontal values during 30 minutes of 45-degree head-down posture, as a result of filtration through the cephalad capillary beds. Red cells appear to be effectively removed from the active circulation during this period of inversion resulting in an erroneously low systemic concentration value when measured by the hematocrit. The return of the body to horizontal is followed by a gradual return to the previous horizontal position concentration values. The dilution appears to proceed at a faster rate than does the concentration.

4,855

Stauffer, F.R. 1949 THE RELATIONSHIP OF EXTERNAL PRESSURIZING SYSTEMS OF ANTI-BLACKOUT SUITS TO THE FORMATION OF EDEMA AND PETECHIAE. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.12-0006.1.1., 5/17/49 ASTIA AD- 71808

ABSTRACT: Proposed improvements in standard U.S. Navy Anti-blackout equipment were investigated and evaluated. Forty-four series of 3 to 11 ten-sec centrifuge runs were made on 23 young male subjects wearing anti-blackout suits of varying pressurizing systems. The suits were analyzed from the standpoint of the incidence of subcutaneous edema and hemorrhages in the trunk and lower extremities. It was found that standard bladder pressure produces extravasation at the bladder borders on the thigh and calves, abdomen, ankles and insteps, and at the lumbo-sacral triangle and adjacent vertebral groove. Experimental suits incorporating flatter bladders with thickened marginal seams and higher pressure capacities, and upward progressive-pressure-application principles, both bladder and capstan, seem desirable.

4,856

Stauffer, F. R., & R. E. Kelley 1949 A DEVICE FOR THE AUTOMATIC CONTROL BY G-FORCE OF THE POSITION OF THE CONTROLLABLE SUPINE SEAT. (School of Aviation Medicine, U. S. Naval Air Station, Pensacola, Fla.) SDC Project 9-U-37a, Project NM 001 059.02.05 (formerly NM 001.010)

4,857

Stauffer, F.R. 1949 FACTORS IN HEMOCONCENTRATION: THE EFFECTS OF CIRCULATORY STAGNATION AND OF ANTI-G SUIT PRESSURE.
(University of Southern Calif., School of Medicine, Los Angeles)
Contract N6ori77, Project Nr 161-014, Task order 1, June 1949
ATI 208 704

ABSTRACT: Serial samples were taken during a 5 minute period from the median veins of 26 men subjected to quiet sitting after ambulatory activity Some were exposed for 15 seconds to anti-G suit pressures of 6 psi applied to the legs or to the legs and abdomen combined.

No significang change in plasma protein concentration was observed.

In all three groups there was a slight but significant decrease in the hematocrit, more so following the application of external pressure.

The mechanisms by which red cells undergo apparent dilution is discussed. Emphasis is placed upon the part played by circulatory stagnation arising from the cessation of ambulatory activity and by the application of external pressure.

4,858

Stauffer, F. R. 1949 THE EFFECT OF THE INVERTED POSTURE IN YOUNG GOATS WITH SPECIAL REFERENCE TO THE INTRAVASCULAR-EXTRAVASCULAR FLUID BALANCE.
(Office of Naval Research, Washington, D. C.)
June 1949 Contract N6ori77

SUMMARY: Six male goats under 2 weeks old were placed in a vertical head-down position for several hours during which time periodic blood samples were obtained from large vessels in the neck.

The difference between simultaneous hematocrits of carotid and jugular blood was not very great.

The difference between simultaneous plasma protein concentrations of carotid and jugular blood was less than the difference between the hematocrits.

The hydrostatic intravascular pressure, increased in the head region, caused a marked passage of fluid outward from the blood as demonstrated by the uniform increase in arterial plasma protein concentration.

On the basis of plasma protein concentration changes, an estimated hematocrit change was calculated as the "expected" hematocrit.

The failure of actual red cell concentration to approximate or surpass this "expected" concentration indicated a fairly extensive packing of red cells trapped in stagnant capillary loops.

The maintained inverted posture caused serious respiratory embarrassment apparently of a combined anoxic-anemic-stagnant anoxia type.

The maintained inverted posture reduced not only the total blood volume but also the effective circulating blood volume, thereby decreasing the margin of safety in blood sampling.

4,859

Stauffer, F. R. 1949 THE EFFECT OF PROLONGED EXPOSURE OF GOATS TO NEGATIVE 2 G RADIAL ACCELERATION WITH SPECIAL REFERENCE TO INTRAVASCULAR-EXTRA-VASCULAR FLUID BALANCE.
(Office of Naval Research, Washington, D. C.)
June 1949 Contract N6ori77

SUMMARY: Seven goats were subjected to negative 2 G on the University of Southern California centrifuge at an effective radius of 18 feet.

The results found suggest that, in general, the effects of negative 2 G are similar to those of negative 1 G differing primarily by being more rapid in their onset and development.

Respiration ceases under these conditions in a matter of minutes, here 20 or less.

Serial artorial blood samples taken during and following centrifugation and analyzed for hematocrit and plasma protein concentration show that a marked loss of fluid from the capillary bed occurs in the stressed end of the animal. This produces a decrease in the total blood volume and a high concentration of the blood remaining.

Larger animals lose appreciable protein through the capillary wall along with the increase in oxtravasation of fluid.

A mechanism for removing red cells from the effective circulation by packing them in stagnant capillaries develops. This removal may terminally by of serious proportions.

Six of the seven animals were spun until one minute after they became apneic. Three died a few minutes after contrifugation ceased. Some of the possible mechanisms of their death and the recovery of the others have been discussed.

4,860

Stauffer, F.R. 1949 FURTHER EVIDENCE OF FLUID TRANSLOCATION DURING VARIED ACCELERATION STRESSES: GROSS PATHOLOGICAL FINDINGS AND WEIGHT CHANGES IN SPECIFIC TISSUES. (University of Southern Calif., School of Medicine, Los Angeles) Contract N6ori77, Project NR 161-014, June 1949

ABSTRACT: Three groups of young goats exposed to: (1) short-duration, high-

magnitude negative G; (2) long-duration, low-magnitude negative G: and (3) a normal unstressed group from the standpoint of gross pathological findings, the percentage of body weight of various organs, and the percentage water content of various tissues.

In general, short-duration high-magnitude G stresses, either positive or negative, produce hamorrhagic changes in the stressed end of animal. Edema and congestion are less prominent and less lasting. Positive G stresses in general produce less intravascular-extravascular changes than negative G stresses of equivalent numerical magnitude.

Long-continued low negative G stresses produce little or no hemorrhage, but a marked increase in filtration with the formation of edema in the stressed end constantly occurs.

Under any form of G there is a tendency for congestion to occur in very vascular tissues which are sideloops of more essential circulating paths.

4,861

Stauffer, F. R., E. L. Beckman, & J. I. Thorn 1949 THE EFFECT OF EXTERNAL FLUID PRESSURE DURING POSITIVE ACCELERATION UPON THE RESPIRATORY RATE, PULSE RATE AND RIGHT INTRA-AURICULAR PRESSURE OF RABBITS. HIGH ACCELERATION STUDY IN ANIMALS. (School of Aviation Medicine & Research, Pensacola, Fla.) Rept. No. 1, Proj. NM 001 048; 25 July 1949 ATI 64956

SUMMARY AND CONCLUSIONS: (1) The comparative effects of water and saturated zinc chloride solutions as protective fluid baths for rabbits have been studied from the standpoint of changes in pulse rate, respiratory rate and right intra-auricular pressure during and after one-minute exposures to high positive (8-12 G) radial acceleration. (2) Water was considerably less effective than a saturated zinc chloride solution in preventing the dependent pooling of blood, but the post-run recovery of animals immersed in water was considerably faster and more complete. (3) During positive acceleration the respiratory rate of rabbits in a water bath decreased slightly. Post-run there was a rapid increase in the respiratory rate usually to levels considerably above that of control rates. When a saturated zinc chloride solution was used as the protecting fluid, respiratory inhibition was much more marked, frequently to the point of apnea. Recovery, when it occurred, was a slow process. (4) During high positive acceleration the pulse rate of rabbits in a water bath was variable, but usually decreased slightly. The post-run recovery to normal rates was almost immediate. When saturated zinc chloride solution was used as a protecting bath, the pulse rate during acceleration fell further and was more irregular. Recovery, post-run, was less satisfactory. (5) the right intra-auricular pressure fell slightly during high positive acceleration in those animals immersed in water. In those immersed in a saturated zinc chloride solution the right intraauricular pressure consistently rose on an average of 40 mm. Hg during high positive acceleration. (6) These findings have been correlated with previous studies of the comparative physiological changes occurring with and without anti-blackout protective devices. (7) The dangers of right heart failure resulting from over-protection against blackout

have been discussed. (8) Anti-blackout protecting devices should be restricted in their functioning to levels of 3 G protection or below until more definite knowledge of the human physiology has been obtained. To this end it would be interesting to know the intracardiac pressure of man during acceleration with and without anti-blackout protection. (AUTHOR)

4,862

Stauffer, F. R., C. Hyman, D. R. Drury, & C. F. Lombard 1949 INTRAVASCULAR-EXTRAVASCULAR FLUID SHIFTS OCCURRING IN YOUNG GOATS FOLLOWING 30-SECOND EXPOSURES TO RADIAL ACCELERATION OF 5 G. (Depts. of Aviation Medicine & Physiology, Univ. of Southern Calif., School of Medicine, Los Angeles, Calif. Contract N6ori77, Project NR 161-014, Task 1, July 1949, ATI-208 702

SUMMARY AND CONCLUSIONS: Some of the mechanisms of intravascular-extravascular fluid exchange have been studied by following the changes in the hematocrit and plasma protein concentrations of young goats subjected to radial acceleration. A total of 32 animals, all under two weeks old, were employed by division into five fairly uniform groups. In these animals blood samples were obtained from the carotid artery, abdominal aorta, jugular vein and inferior vena cava after 30 secs of either positive or negative 5 g. With the onset of radial acceleration an increase in hydrostatic pressure in both the artery and vein of the outward end of the animal, resulted in a marked rise in intracapillary hydrostatic pressure. Single 30-sec. exposures, therefore, caused a rapid outward shift of large quantities of water. This resulted, almost at once, in local (venous) red cell and plasma protein concentrations 10 to 15% above pre-run control values. The subsequent systemic (arterial) concentration increased 3 to 6% within 1½ to 2½ mins. Besides causing hemoconcentration, the outflow of fluid apparently produced a considerable rise in tissue pressure directly outside the blood vessel. Capillary distension to the point of physical rupture was, thereby, largely counteracted. As the accelerating force was removed, the intravascular hydrostatic pressure fell. Since the tissue pressure was still elevated, there developed steep pressure gradient from outside in. It is believed that packed red cells prevented the collapse of the vessels. Consequently, a rapid inward filtration followed. This was observed as a swift post-run dilution, both of venous and, later, arterial blood. Except in cases where considerable plasma protein leakage had taken place during the stress, even the systemic concentrations were back to control levels within 5 mins. An intravascular increase in colloidal osmotic pressure during centrifugation probably played a significant role in this post-run dilution process. The findings indicated that during the short exposures at 5 G a considerable amount of plasma protein passed thru the capillary wall. This leakage was especially marked under positive G. It was further increased under experimental conditions which produced temporary anoxia in those capillary areas subsequently subjected to increased intravascular hydrostatic pressure. The findings indicated further that under short 5 G exposures, especially when positive in direction, reactions frequently took place to remove erythrocytes from the active circulation. This was probably accomplished by the packing of red cells in capillaries thru which concentrated plasma could still pass. Post-run vasoconstriction in the abdomen increased this trapping process regardless of whether the previous stress had been positive or negative. Protein leakage and red cell trapping, therefore, have made it difficult to draw any definite conclusions from

either the hematocrit or plasma protein concentration changes alone. A study of the simultaneous changes of these two variables, however, especially in simultaneous samples from a corresponding artery and vein, has allowed a fairly definite understanding of some of the characteristics of fluid exchange across the capillary wall. Finally, an impaired circulatory flow thru the congested areas was suggested by the relatively long time lag before the systemic concentration curves reached their maxima. (AUTHOR)

4,863

Stauffer, F.R. 1949 THE EFFECT OF HIGH ACCELERATION FORCES UPON CERTAIN PHYSIOLOGICAL FACOTRS OF HUMAN SUBJECTS PLACED IN A MODIFIED SUPINE POSITION (U.S. Naval School of Aviation Medicine and Research, Naval Air Station, Pensacola, Florida) SDC Project 9-U-37a, 13 October 1949, ASTIA ATI 70 [illegible]

ABSTRACT: The effect of acceleration forces up to 12 G resultant for 5-[illegible] sec on the human centrifuge was determined with the human subjects placed in a modified supine position in which the bent knees placed the feet at a level somewhat below that of the rest of the body. During rotation of the centrifuge the seat pivoted so that the G force was supplied to the subject in a direction from chest to back. Consciousness, vision, and voluntary finger movements at highest G obtainable not impared under these conditions. The cardiovascular system according to the heart rate and electrocardiogram, did not show severe enough changes to consider it as one of the importanc facotrs of human tolerance to G force. The practicality of this position for aircraft personnel is discussed and the major items indicating its advantages over all other known anti G protecting devices are presented.

4,864

Stauffer, F. R. & E. O. Errebo-Knudsen 1950 POSITIVE ACCELERATION AND URINE OUTPUT.
J. Av[illegible]ed. 21(6):500-506.

SUMMARY: 1. The effect of positive radial acceleration on the urinary output has been studied in ten men.

2. In water-loaded subjects an exposure to positive 3 g for one minute caused a significant reduction in urinary output and an increase in the specific gravity of the urine.

3. When these water-loaded subjects were exposed to positive 5 g for one minute with antiblackout suit protection, the reduction in urine output was much greater and lasted longer. There was a concomitant greater increase in the specific gravity of the urine.

4. The physiological mechanisms which may be involved have been discussed.

4,865

Stauffer, F. R., & E. O. E. Knudsen 195 POSITIVE ACCELERATION AND URINE OUTPUT. (Naval School of Aviation Medicine, Pensacola, Fla.) Research dept. MR005.15-0001.1.4., 3/24/50
See also J. Avia. Med. 21:500-506; 525, Dec. 1950

ABSTRACT: (1) The effects of positive radial acceleration on the urinary output has been studied in ten men. (2) In water-loaded subjects an exposure to positive 3 G for one minute caused a significant reduction in urinary output and an increase in the specific gravity of the urine. (3) When these water-loaded subjects were exposed to positive 5 G for one minute with anti-blackout suit protection, the reduction in urine output was much greater and lasted longer. There was a concomitant greater increase in the specific gravity of the urine. (4) The physiological mechanisms which may be involved have been discussed. (DACO)

4,866

Stauffer, F.R. 1950 CERTAIN PHYSIOLOGICAL RESPONSES IN MAN CHANGING FROM THE SITTING TO SUPINE POSITION DURING RADIAL ACCELERATION (Naval School of Aviation Medicine, Naval Air Station, Pensacola, Florida) NM 001 059.02.02,9Feb. 1950, ASTIA AD-208 679

ABSTRACT: The back portion of the controllable supine seat, DDC Project 9-U-37a, takes less than 2 seconds to move from an upright to a horizontal position when the seat was exposed to radial acceleration.
This mechanism was used to study the effect in man of changing from a sitting to a supine position while under going radial acceleration up to 5.0 G. For this study certain physiological responses have been observed on adult males.
When the G level was below the blackout threshold for the subject in a seated position, the change of position to the supine produced no deleterious effects either subjectively or objectively.
When the G level was above the blackout threshold for the subject in the seated position, the impending functional disturbances disappeared as the subject's position changed from seated to supine.
These experiments have demonstrated, therefore, that there is no physiological contraindication for aircraft personnel to change from a seated to a supine position during radial acceleration. If the supine position were to be used to protect the pilot against the effects of high radial acceleration, prepositioning of the seat by the pilot would not be necessary. Instead, a G-controlled mechanism set at a specific G level could be employed to change the seat position automatically.

4,867

Stauffer, F. R. 1950 COMPARATIVE EFFECTS OF HIGH RADIAL ACCELERATION ON MAN IN MODIFICATIONS OF THE SUPINE POSITION. (Naval School of Aviation Medicine, Pensacola, Fla.) Research Proj. MR005.15-0001.1.b.; Rept. NM 001 059.02.06; 5/17/50 ASTIA ATI-86 955

ABSTRACT: (1) Three more modifications of the supine position have been tested to determine human tolerance to high radial accelerations of five-second duration

(2) As long as the head and heart of a subject are at the same G-level, minor adjustments in the position of his thighs and legs do not limit his tolerance below 12-13 G for five seconds. (3) Comfort and respiratory ability, not blackout nor circulatory insufficiency, are the factors which appear most active in limiting human tolerance in all tested modifications of the supine position. (4) Comfort and respiratory ability are somewhat improved if slight flexion is present in the hips. (5) The results leading to these conclusions and the physiological problems inherent in high acceleration of subjects in the supine position have been discussed in considerable detail.

4,868

Stauffer, F.R. 1951 STUDIES ON THE EFFECTIVENESS OF AUTOMATIC SUPINATION IN PROTECTING MAN AGAINST HIGH RADIAL ACCELERATION. (U.S. Naval School of Aviation Medicine, Pensacola, Fla.) Project NM 001 059.02.07. 29 Jan. 1951. ASTIA ATI 108815.

ABSTRACT:

1. Seventeen adult males have been subjected on the Pensacola Human Centrifuge to radial acceleration stresses up to 12 G for five seconds.

2. At the beginning of these exposures the subjects were in a conventional seated position, i.e., subject to positive acceleration effects. Protection against blackout and associated positive acceleration effects was provided by a changeable seat automatically controlled by G forces acting in the direction head to hips of a seated individual. When the G force exceeded 3.9 G the back rest of the seat rotated backward to place the subject in a modified supine position. The position was maintained until the G force had dropped below 2.7 G at which time the back rest and suoject returned to their original positions.

3. The physiological changes during such stresses have been discussed from the standpoint of the practicability of using such a protective device position during radial acceleration. If the supine position were to be used to protect the pilot against the effects of high radial acceleration, prepositioning of the seat by the pilot would not be necessary. Instead, a G-controlled mechanism set at a specific G level could be employed to change the seat position automatically for pilots exposed to positive acceleration in aircraft.

4,869

Stauffer, F.R. 1951 CURRENT STUDIES ON DEVELOPMENTAL ANTI-BLACKOUT EQUIPMENT. (Naval School of Aviation Medicine, Pensacola, Fla.) MR005.12-0006.1.2, Feb. 5, 1951.

4,870

Stauffer, F.R., C. Herman, Dr. Drury and C.F. Lombard 1951 INTRAVASCULAR EXTRAVASCULAR FLUID SHIFTS OCCURRING IN YOUNG GOATS FOLLOWING 30-SECOND EXPOSURES TO RADIAL ACCELERATION OF 5 G.
(University of Southern Calif., School of Medicine, Los Angeles)
Contract N6ori77, Task 1, 31 March 1951

ABSTRACT: Some of the mechanisms of intravascular- extravascular fluid exchange have been studied by following the changes in the hematocrit and plasma protein concentrations of young goats subjected to radial acceleration A total of 32 animals, all under two weeks old, were employed by division into five fairly uniform groups. In these animals blood samples were obtained from the carotid artery, abdominal aorta, jugular vein and vena cava after 30 seconds of either positive or negative 5 G.

The findings indicated that during the short exposures at 5 G a considerable amount of plasma protein passed through the capillary wall. This leakage was especially marked under positive G. It was further increased under experimental conditions which produced temporary anoxia in these capillary areas subsequently subjected to increased intravascular hydrostatic pressure.

The findings indicated further that under short 5 G exposures, especially when positive in direction, reactions frequently took place to remove erythrocytes from the active circulation.

Protein leakage and red cell trapping, have made it difficult to draw any definite conclusions from either the hematocrit or plasma protein concentration changes alone. A study of the simultaneous changes of these two variables, however, especially in simultaneous samples from a corresponding artery and vein, has allowed a fairly definite understanding of some of the characteristics of fluid exchange across the capillary wall.

Finally an impaired circulatory flow through the congested areas was suggested by the relatively long time lag before the systemic concentration curves reached their maxima.

4,871

Stauffer, F.R. 1951 FACTORS IN HEMOCONCENTRATION: THE EFFECTS OF CIRCULATORY STAGNATION AND OF ANTI-G SUIT PRESSURE. (University of Southern Calif., School of Medicine, Los Angeles) Contract N6ori77, Task 1, March 31, 1951

ABSTRACT: Serial samples were taken during a 5-minute period from the median veins of 26 men subjected to quiet sitting after ambulatory activity. Some were exposed for 15 seconds to anti-G suit pressures of 6 psi applied to the legs or to the legs and abdomen combined.

No significant change in plasma protein concentration was observed.

In all three groups there was a slight but significant decrease in the hematocrit, more so following the application of external pressure.

The mechanism by which red cells undergo apparent dilution is discussed. Emphasis is placed upon the part played by circulatory stagnation arising from the cessation of ambulatory activity and by the application of external pressure.

4,872

Stauffer, F.R 1951 THE EFFECT OF THE INVERTED POSTURE IN YOUNG GOATS WITH SPECIAL REFERENCE TO THE INTRAVASCULAR - EXTRAVASCULAR FLUID BALANCE
(University of Southern Calif., School of Medicine, Los Angeles)
Contract N6ori77, Task 1, 31 March 1951

ABSTRACT: Six male goats under 2 weeks old were placed in a vertical head-down position for several hours during which time periodic blood samples were obtained from large vessels in the neck.

The difference between simultaneous hematocrits of carotid and jugular blood was not very great.

The difference between simultaneous plasma protein concentrations of carotid and jugular blood was less than the difference between the hematocrits

The hydrostatic intravascular pressure, increased in the head region, caused a marked passage of fluid outward from the blood as demonstrated by the uniform increase in arterial plasma protein concentration.

On the basis of plasma protein concentration changes, an estimated hematocrit change was calculated as the "expected" hematocrit.

The failure of actual red cell concentration to approximate or surpass this "expected" concentration indicated a fairly extensive packing of red cells trapped in stagnant capillary loops.

The maintained inverted posture caused serious respiratory embarrassment apparently of a combined anoxic-anemic-stagnant anoxia type.

The maintained inverted posture reduced not only the total blood volume but also the effective circulating blood volume, thereby decreasing the margin of safety in blood sampling.

4,873

Stauffer, F. R. 1951 FURTHER EVIDENCE OF FLUID TRANSLOCATION DURING VARIED ACCELERATION STRESSES: GROSS PATHOLOGICAL FINDINGS AND WEIGHT CHANGES IN SPECIFIC TISSUES
(Office of Naval Research, Washington, D. C.)
Contract N6ori77

SUMMARY: Three groups of young goats exposed to: (1) short-duration, high-

magnitudt negative G; (2) long-duration, low-magnitude negative G; and (3) short-duration, high-magnitude positive G stresses have been compared with a normal unstressed group from the standpoint of gross pathological findings, the percentage of body weight of various organs, and the percentage water content of various tissues.

In general, short-duration high-magnitude G stresses, either positive or negative, produce homorrhagic changes in the stressed end of animal. Edema and congestion are less prominent and less lasting. Positive G stresses in general produce less intravascular-extravascular changes than negative G stresses of equivalent numerical magnitude.

Long-continued low negative G stresses produce little or no homorrhage, but a marked increase in filtration with the formation of edema in the stressed end constantly occurs.

Under any form of G there is a tendency for congestion to occur in very vascular tissues which are sideloops of more essential circulating paths.

4,874

Stauffer, F.R. 1951 RADIAL ACCELERATION AND THE URINARY OUTPUT OF SUPINATED MAN. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 059. 02.08; MR005.15-0001.1.8; Aug. 1951. ASTIA ATI 112 894 See also J. Aviation Med. 22(5):391-402, 428, Oct. 1951.

ABSTRACT: (1) The urinary output has been studied in 15 normal adult males before, during, and after exposure to forces of 3, 5, and 7 G lasting for one minute and directed from front to back (subject supine). (2) The results of exposures to 3 and 5 G forces were similar to 1 G controls. After a force of 7 G supine for one minute there was a slight and temporary decrease in the subject's urinary output (cc./min.) with a slight transient increase in the urinary specific gravity. There was a slight increase in urinary chloride concentration (mgm. per cent) but no change in the rate of chloride excretion(mgm./min.). (3) A review of the literature, in the light of these experiments, has suggested that these changes were the result of an increased tubular reabsorption of water, primarily on an osmotic pressure basis, because of the hemoconcentration produced during the stress. (4) Further analysis has suggested that the mechanisms causing a decreased urinary output following positive G stresses may be quite similar although aided by a marked shunting of cardiac output away from the kidney. (5) These experiments add to the evidence which suggests (a) that vasovagal syncope, 'fainting', has different physiological repercussions from unconsciousness during positive G stress, and (b) that there is no hormone relegated solely to the renal tubular reabsorption of water. (SAM, Brooks AFB, Texas)

4,875

Stauffer, F. R. 1951 RADIAL ACCELERATION AND THE URINARY OUTPUT OF SUPINATED MAN. J. Avia. Med. 22(5):391-402, 428, Oct. 1951
See also (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 059.02.08.; MR005.15-0001.1.8., 8/7/51

ABSTRACT: (1) The urinary output has been studied in 15 normal adult males before during, and after exposure to forces of 3, 5, and 7 G lasting for one minute and directed from front to back (subject supine).
(2) The results of exposures to 3 and 5 G forces were similar to 1 G controls. After a force of 7 G supine for one minute there was a slight and temporary decrease in the subject's urinary output (cc./min.) with a slight transient increase in the urinary specific gravity. There was a slight increase in urinary chloride concentration (mgm. per cent) but no change in the rate of chloride excretion (mgm./min.)
(3) A review of the literature, in the light of these experiments, has suggested that these changes were the result of an increased tubular reabsorption of water, primarily on an osmotic pressure basis, because of the hemoconcentration produced during the stress.
(4) Further analysis has suggested that the mechanisms causing a decreased urinary output following positive G stresses may be quite similar, although aided by a marked shunting of cardiac output away from the kidney.

4,876

Stauffer, F.R., & L.B. Cochran 1951 PRELIMINARY STUDIES ON THE EASE WITH WHICH PILOTS CAN GRASP AND PULL THE EJECTION SEAT FACE CURTAIN HANDLES. (Naval School of Aviation Medicine, Pensacola, Fla.)
Project MR005.13-4002.2.2., 6 Nov. 1951.
See also Project NM001.059.22.02, 8 Nov. 1951. ASTIA ATI 135023

ABSTRACT: Determinations were made of the level of g force at which the average pilot can perform the muscular actions necessary to reach and pull the face-curtain handles, thus simulating the procedure required to actuate the ejection seat firing mechanism. Twelve naval fighter pilots of various physical build were tested on the Pensacola human centrifuge for the ability to actuate the Martin-Baker (model F2h-2) ejection-seat mechanism. The subjects were protected with anti-g suits and exposed to levels of positive radial acceleration about 2.0 g. Above their relaxed black-out tolerance level. The mean black-out level of the subjects' control runs for 10-sec. exposure was 4.7, with a range of 3.3 to 5.8 g. Eleven of the subjects were able to actuate the ejection-seat mechanism at 6.6 g (range of 5.2 to 7.4g), and within an average time of 4.6 sec. (varying from 2.5 to 8.0 sec.). The failure of the twelfth pilot was attributed to fatigue. The results suggest that most suit-protected pilots should be able to actuate the mechanism at 2.0 g above their control black-out level, providing that the g levels are constant. Proper indoctrination on the effects of g forces is recommended.

4,877

Stauffer, F. R. 1952 ACCELERATION PROBLEMS OF NAVAL AIR TRAINING; I. NORMAL VARIATIONS IN TOLERANCE TO POSITIVE RADIAL ACCELERATION. (Naval School of Aviation Medicine, Pensacola, Fla.) Research Rept. NM 001 059.02.09; MR005. 15-0001.1.9., 3/20/52; ASTIA AD-149 480
See also J. Avia. Med. 24(3):167-188, June 1953

ABSTRACT: One phase of acceleration as a problem in Naval Air Training, has been presented. There is a relatively high incidence of blackout and unconsciousness occurring in personnel engaged in routine flight training maneuvers. Possible solutions have been mentioned but the lack of definitive data has been demonstrated as a major factor responsible in preventing a feasible solution at this time. Data are presented on 215 subjects to show the normal variations in tolerances to certain positive G stresses. These data show: (a) The range in tolerance of the normal population is fairly large. (b) The tolerance of the average population is fairly low. (c) The individual tolerance fluctuations under "normal" conditions are fairly large. (d) Critical symptoms (blackout and unconsciousness) are separated in the average individual by only small G-levels, and short time intervals.

Some of the uses of the Human Centrifuge, as an aid to flight training have been presented. It has been pointed out that selection of pilots for G-tolerance cannot be done as yet on the Human Centrifuge although this machine can supply valuable practical training for certain selected individuals. Determination of a man s ability to "fly G" must still be made in actual flight. (DACO)

4,878

Stauffer, F.R. 1952 CERTAIN PHYSIOLOGICAL RESPONSES IN MAN CHANGING FROM THE SITTING TO SUPINE POSITION DURING RADIAL ACCELERATION. (Naval School of Aviation Medicine Naval Air Station Pensacola, Fla.) NM 001 059.02.02, 9 Feb. 1950. ASTIA ATI 208 679.

ABSTRACT: The back portion of the controllable supine seat, DDC Project 9-U-37a, takes less than 2 seconds to move from an upright to a horizontal position when the seat was exposed to radial acceleration. This mechanism was used to study the effect in man of changing from a sitting to a supine position while undergoing radial acceleration up to 5.0 G. For this study certain physiological responses have been observed on 12 adult males. When the G level was below the blackout threshold for the subject in a seated position, the change of position to the supine produced no deleterious effects either subjectively or objectively. When the G level was above the blackout threshold for the subject in the seated position, the impending functional disturbances disappeared as the subject's position changed from seated to supine. These experiments have demonstrated, therefore, that there is no physiological contraindication for aircraft personnel to change from a seated to a supine position during radial acceleration. If the supine position were to be used to protect the pilot against the effects of high radial acceleration, prepositioning of the seat by the pilot would not be

4,879

Stauffer, F R. 1953 ACCELERATION PROBLEMS OF NAVAL AIR TRAINING, I. NORMAL VARIATIONS IN TOLERANCE TO POSITIVE RADIAL ACCELERATION. J. Avia. Med. 24(3):167-188, June 1953.
See also (Naval School of Aviation Medicine, Pensacola, Fla.) Research Rept. NM 001 059.02.09; MR 005.15-0001.1.9., 3/20/52; ASTIA AD-149 480.

ABSTRACT: One phase of acceleration as a problem in Naval Air Training, has been presented. There is a relatively high incidence of blackout and unconsciousness occurring in personnel engaged in routine flight training maneuvers. Possible solutions have been mentioned but the lack of definitive data has been demonstrated as a major factor responsible in preventing a feasible solution at this time Data are presented on 215 subjects to show the normal variations in tolerances to certain positive G stresses. These data show: (a) The range in tolerance of the normal population is fairly large. (b) The tolerance of the average pupulation is fairly low. (c) The individual tolerance fluctuations under "normal" conditions are fairly large. (d) Critical symptoms (blackout and unconsciousness) are separated in the average individual by only small G-levels, and short time intervals.

4,880

Stech, E. L. 1963 CALCULATION OF HUMAN SPINAL FREQUENCY FROM CADAVER DATA AND COMPARISON WITH TESTS ON LIVE HUMAN SUBJECTS.
(Frost Engineering Dev. Corp., Colo.) Tech. note 122-100, Jan. 1963.

4,881

Stech, E. 1962 STANDARD ACCELERATION EXPOSURE
(Preliminary Data Sheet, Frost Engineering Co.) Aug. 1962

4,882

Stech, E.L. 1963 THE EFFECT OF AGE ON VERTEBRAL BREAKING STRENGTH, SPINAL FREQUENCY, AND TOLERANCE TO ACCELERATION IN HUMAN BEINGS.
(Frost Engineering Development Corp., Englewood, Colo.)
Technical Note 122-101, Jan. 1963.

4,883

Stech, E. L. 1963 THE USE OF A SUBJECTIVE ACCELERATION SEVERITY INDEX IN RESTRAINT SYSTEM TESTS.
(Frost Eng. Develop. Corp. Colo.) (Life Support Systems Lab., Wright-Patterson AFB, Ohio.) BD Tech. Rept. 122-102, Jan. 1963.

ABSTRACT: A review was made of data collected and made available by the Civil Aeromedical Research Institute on live human subject drop tests. During the data review, it was noted that subject comments might be useful as a measurement of acceleration severity. The subject reports were quantified through the use of a rating scale and then averaged for each drop height and cushioning condition. When plotted against the impulsive velocity change involved, the averaged subjective index illustrated results which would be predicted by support system dynamic models. Therefore, the index scale can be considered valid. The scale also showed a reasonably good accuracy in terms of differentiating between various impact-cushion conditons. In addition, an average subjective endpoint at 11.2 fps for pure impact was obtained from the data which also indicated that the head becomes the controlling factor in tolerance to short rise time acceleration pulses. (Author)

4,884

Stech, E.L. 1963 AN ANALYSIS OF FREE FALL ACCIDENT DATA INVOLVING THE HUMAN BODY IN THE TRANSVERSE DIRECTION.
(Life Support Systems Lab., Aerospace Medical Lab., Bioastronautics Div., AFSC, Wright-Patterson AFB, Ohio) BD Tech. Rept. TN-122-108, April 1963.

ABSTRACT: Accidents involving free falls during mountain climbing are evaluated using a numerical injury severity scale. Zones of minor injury, major injury, and lethal injury are developed from the data, and a velocity change of 53 fps is calculated to represent the 50% probability of major injury in the transverse direction. A comparison with DeHaven's earlier free fall data shows that DeHaven's points represents specially selected examplec and should not be considered typical of transverse injury probabilities.

4,885

Steel, F. L. 1962 EARLY GROWTH OF RATS IN AN INCREASED GRAVITATIONAL FIELD.
Nature (London) 193:583-584, Feb. 10, 1962.

4,886

Steele, J.E. 1955 MOTION SICKNESS.
In U.S. Assistant Secretary of Defense (Research and Development) Washington D.C., Shock and Vibration Bulletin No. 22, Supplement.
ASTIA AD- 94 697

4,887

Steele, Jack E. 1961 MOTION SICKNESS AND SPATIAL PERCEPTION. A THEORETICAL STUDY. (Wright-Patterson Air Force Base) ASD TR 61-530; ASTIA AD 273 602.

ABSTRACT: Theories of motion sickness are reviewed and compared with a new theory in which the activity of the central nervous system is more important than the intensity or modality of sensory stimulation. Concepts treated are the development and validation of an inertial reference frame; the perceptual transformation of sensory data, which reduces its content, increases its reliability and can incorporate compensations for environmental variables; and the consequences of perceptual inadequacy. (Author)

4,888

Stehling, K. R. 1960 LUNAR LANDING PROBLEMS. Interavia 15:1428-1430, Nov. 1960

ABSTRACT: The propulsion problems of a lunar soft landing mission are discussed. A rocket system is considered for use in the slowdown for the soft landing, since no other braking forces are available. The characteristics of a rocket retro-system are studied, assuming an ideal system. It is concluded that a composite propulsion system is ideal for a soft landing, and that a solid rocket should be used to cancel out about 90% of the approach velocity, with some simple hypergolic or monopropellant liquid system used for trimming the residual velocity, maintaining attitude control, and final touchdown maneuvers. The characteristics are described of a hypothetical propulsion system for landing a net instrument package of about 200 lbs. on the lunar surface. Information on the SURVEYOR program is included.

4,889

Stehling, K. R. 1960 LANDING ON THE MOON. Space/Aeronautics 33(2):42-45, Feb. 1960

ABSTRACT: "Hard" and "soft" impact landings on the moon are briefly considered. Hard impact velocities with no braking will approximate 7000-10,000 fps and the shock may reach 500,000 g's. "Soft" impact landings using rocket control may produce shock as little as 10 g's. Problems of descent perturbation, braking, ground blast, and impact, with respect to nature of the lunar surface are all reviewed. Additional problems must be considered if solid rockets are used for the lunar landing. It is concluded that "soft" landings will be very hard to simulate here on earth and thus the first "soft" moon landings will probably be unmanned.

4,890

Stehling, K.R. 1961 THE MANNED LUNAR PROJECT
Interavia (Geneva) 16 (12): 1654-1655. Dec. 1961

ABSTRACT: Unmanned lunar explorations during the next five years will yield considerable information about the lunar surface structure, radiation levels near the moon's surface, and other physical constants pertaining to the moon. Although much of this information will be used in support of manned lunar landing activity, a substantial fraction will be used for the general advancement of lunar science. The research program of the National Aviation and Space Agency is subdivided as follows: (1) Ranger lunar probe for hard landing; (a) Surveyor lunar probe for soft landing; (3) Prospector, a mobile instrument unit which can travel on the lunar surface over limited distances; and (4) Apollo, manned space vehicle for a three-man crew. Description of htese programs is presented and illustrations are included of the Ranger and Surveyor probes.

4,891

Steinberg, I. I. 1959 MEDICAL ELECTRONICS: BLACK BAG IN SPACE
Astronautics 4(6):26-27, June 1959

ABSTRACT: Description of specially designed electronic devices to determine the physiological and psychological responses of the first man in space.

4,892

Steiner, S.H. 1959 STANDARDIZATION OF THE ENDPOINT FOR CENTRIFUGE EXPERIMENTS DURING POSITIVE ACCELERATION.
(Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, 27-29 April 1959.)

ABSTRACT: A plea has been made to standardize the endpoint in human centrifuge experiments at all installations. Light loss is usually taken as a standard endpoint, particularly for experiments involving G protective equipment. The British group use a blackout point which is below that usually obtained at other centers. The advantage to the subject is obvious. At the Aero Medical Association Meetings in 1958 it was agreed that all centrifuge centers would compare this system with a white light panel commonly used at many installations in this country. This system involves visualization of 760 mu red filtered light, in a dark adapted subject, adjusted to 0.5 log units above visual threshold for this wave length. A gradual onset run of 0.1 g/sec is used to prevent temporary blackouts due to slowness of cardiovascular adaptation. Each member of our subject panel was consecutively run to blackout with red light and our standard white light panel. Three runs of various combinations completed one series.

4,893

Steiner, S. H. 1959 STANDARDIZATION OF AN ENDPOINT TO POSITIVE ACCELERATION ON THE HUMAN CENTRIFUGE. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TN 59-426; ASTIA AD-240 876; Dec. 1959

ABSTRACT: The experimental variables in acceleration research should be standardized among all of the different centrifuges. This would make similar data comparable from one laboratory to another. The purpose of this study is to establish an objective and standardized endpoint for positive acceleration experiments. A comparison was made of blackout thresholds to a red filtered light of 760 mu, raised 0.5 log units above visual threshold in dark adapted subjects to a white light in the same subjects. A significant difference was found for each subject ($p < .02$). Differences between white and red light varied 1.1 to 2.8 g for this group. The differences observed would vary from one centrifuge to another depending on the intensity and transmission spectrum of the white light used. Physiological implications, advantages, and possible sources for error are discussed. (AUTHOR)

4,894

Steiner, S. H., G. C. E. Mueller, and J. L. Taylor, Jr. 1960 HEMODYNAMIC CHANGES DURING FORWARD ACCELERATION. Aerospace Medicine 31(11): 907-914 November 1960.

ABSTRACT: Chloralose anesthetized mongrel dogs were accelerated at 6, 10, and 14 G for ten-minute time periods, in the forward facing position, on the Wright Air Development Division centrifuge. Cardiac output, heart rate, circulation time, blood pressure, respiratory rate, and qualitative appearance of arterial blood were recorded.

Only minimal changes in cardiac output occurred. These changes correspond closely to decreases in heart rate, and increases in circulation time, resulting in unimpaired stroke output. Blood pressure related to midchest surface anatomy fell slightly, but probably does not represent physiologically important alterations in the vital cardiac regulatory areas.

Respiratory frequency was increased and all arterial blood samples showed qualitative evidence of desaturation accompanied by marked clinical cyanosis of the mucous membranes.

4,895

Steiner, Sheldon H., Gustave C.E. Nueller, et al 1960 HEMODYNAMIC CHANGES DURING TRANSVERSE ACCELERATION
Paper: 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel Bal Harbour, Miami Beach, Fla., May 9-11, 1960

ABSTRACT: The measurement of the cardiac output using a dye-dilution technique has been made in dogs during transverse acceleration stresses of 6, 10 and 14 G

for ten minutes at each G level. Arterial samples drawn before and during the stress were analyzed for oxygen saturation. Preliminary observations of data reveal no essential change in cardiac output, and peripheral resistance is maintained without significant changes. At 6 G the oxygen saturation remains within normal limits and at higher G levels there is a progressive diminution of arterial oxygen saturation.

4,896

Steiner, S. H., & G. C. E. Mueller 1961 HEART RATE AND FORWARD ACCELERATION. J. Appl. Physiol. 16(6):1078-1080, Nov. 1961

ABSTRACT: Cardiac rate was measured in 6 human subjects during forward acceleration at 8 g and compared with changes in head position while maintaining the remainder of the body in the same position. There was no change in cardiac rate for the 20-second duration the plateau with the head in a neutral position (fully supine). The heart rate increased 20% with the head elevated and decreased 16% with the head depressed. Changes in rate are produced by altering the position of the carotid baroreceptors in relation to those located in the trunk, presumably due to alteration produced by acceleration forces in the perfusion pressures in the carotid arteries. (AUTHOR)

4,897

Steiner, S. H., & R. H. Behnke 1961 PULMONARY VENOUS ADMIXTURE IN MAN DURING NEGATIVE PRESSURE RESPIRATION. J. Appl. Physiol. 16(6):1047-1049, Nov. 1961

ABSTRACT: Arterial blood gases were measured after 10 mins of full-phase negative pressure breathing at a guage pressure of -40 mm. Hg. Oxygen capacity increased slightly, and oxygen saturation fell from 96.9% to 92.6% in the seated position and from 96.0% to 92.2% in the recumbent position. At this transthoracic pressure differential there would be expected only an 8-10 mm. decrease in oxygen tension resulting in a 1% decrease in arterial saturation. pH and calculated carbon dioxide tension were not altered. The physiological shunt appeared to increase as evidenced by the arterial saturation. If blood is redistributed away from poorly ventilated regions, the redistribution is not complete during negative pressure breathing at this magnitude. Although there appears to be an increased shunting, it is quite small compared to that reported in the anesthetized dog at only - 20 mm. Hg. The differences are probably related to the effects of anesthesia causing a decrease in lung volume and tidal volume. However, the arterial saturation at 8 g was 75%, and 8 g has been estimated as being equivalent to -28 mm. Hg (-3.5 mm. Hg/g). Therefore, the degree of arterial desaturation during forward acceleration is more reasonably related to the hydrostatic effects than to possible negative pressure breathing effects. (AUTHOR)

4,898

Steiner, S. H., & G. C. E. Mueller 1961 PULMONARY ARTERIAL SHUNTING IN MAN DURING FORWARD ACCELERATION. J. Appl. Physiol. 16(6):1081-1086, Nov. 1961

ABSTRACT: The arterial blood gases were determined during forward acceleration 90 degrees to the acceleration vector at 6 g and 8 g breathing room air and 8 g breathing 100% oxygen. Arterial saturation fell to 84% at 6 g and 75% at 8 g. Prebreathing oxygen for 15 mins prior to acceleration with continued inhalation during the acceleration plateau only partially corrected the undersaturation to 86% at 8 g. Recovery was not complete in 3 mins unless oxygen therapy was used. Whole blood carbon dioxide content was depressed at 6 g and 8 g on room air, but this was corrected by oxygen inhalation. However, during the recovery period while breathing oxygen the carbon dioxide content was depressed. pH was reduced and carbon dioxide tension elevated slightly during each acceleration period. Since cardiac output and alveolar ventilation have been reported to be essentially unaltered during forward acceleration at these magnitudes, the observed effects must represent substantial alterations in the individual ventilation to blood flow ratios throughout the lung, with approximately 50% of the cardiac output shunted thru totally nonventilated areas at 8 g. There also must be some inadequately perfused or nonperfused peripheral areas, as evidenced by the fall in carbon dioxide contant and pH and the accumulation of a substantial oxygen debt previously reported during acceleration. (AUTHOR)

4,899

Steiner, S. H. et al 1961 PULMONARY GAS TRANSPORT AS INFLUENCED BY A HYPERGRAVITATIONAL ENVIRONMENT.
J. Appl. Physiol. 16:641-643, July 1961.

4,900

Steiner, S.H., G.C.E. Mueller, A. Caton and J.L. Taylor EFFECTS OF FORWARD ACCELERATION UPON ARTERIAL BLOOD OXYGEN, CARBON DIOXIDE AND pH IN MAN. (In preparation).

4,901

Steiner, S.H., G.C.E. Mueller, and J. Prine THE PATHOLOGY OF CANINE SUBJECTS EXPERIENCING FORWARD ACCELERATION. (In preparation).

4,902

Steiner, S.H. and G.C.E. Mueller THE CAROTID BARORECEPTORS AS DETERMINANTS OF HEART RATE DURING FORWARD ACCELERATION. (In preparation).

4,903

Steinkamp, G. R., W. R. Hawkins, G. T. Hauty, R. R. Burwell, & J. E. Ward 1959 HUMAN EXPERIMENTATION IN THE SPACE CABIN SIMULATOR: Development of Life Support Systems and Results of Initial Seven-Day Flights. (School of Avia. Med., USAF Aerospace Medical Center, (ATC) Brooks AFB Texas) Research Rept. No. 59-101, Aug. 1959.

4,904

Steinhoff, , Fehlke, & Buss, tr., J.B. Bateman, & V.J. Wulff 1945 FUNCTIONAL AND FLIGHT TESTS OF THE COMPRESSED AIR EJECTION SEAT INSTALLATION OF THE He 219. (Rechlin Testing Ground) Interim Rept. No. 1, 3 Aug. 1944. Translated as Appendix 11 to Lovelace, W.R., E.J. Baldes, & V.J. Wulff, The Ejection Seat for Emergency Escape from High Speed Aircraft ASTIA ATI 7245

SUMMARY: The function of the compressed air emergency catapult seat installation of the He 219 was tested on the ground and during flight. Forty ejections were made with dummies and three with human beings during flight. The assembly is fit for operation. Maximum permissible ejection pressures determined from the results of ejection experiments on ten human beings on the ground are as follows: For the pilot's seat, 100-105 atm.; For the observer's seat, 85-90 atm. With these pressures it is certain that the tail can be cleared at velocities of flight up to 500 km/h and at any altitude. (Author)

4,905

Stembridge, V. A., W. M. Crafft and F. M. Townsend 1958 MEDICAL INVESTIGATION OF AIRCRAFT ACCIDENTS WITH MULTIPLE CASUALTIES J. of Aviation Medicine 29(9):668-675, September, 1958

ABSTRACT: Suggested methods for handling multiple casualties from aircraft accidents are outlined including: permission for postmortem examination; handling of bodies at the scene; identification problems; external examination; autopsy with histopathologic and toxicologic studies; and liaison with other accident investigators. A case is presented illustrating the actual performance of these steps.

4,906

Stepanov, B. 1960 ON THE WAY TO THE STARS Krasnaya zvezda P. 3; 18 May 1960

4,907

Stephenson, W. B. 1962 INVESTIGATION OF HIGH-SPEED IMPACT: A TECHNIQUE Aerospace Engineering 21(11):10-16

4,908

Stephenson, W.B. 1962 PERFORMANCE OF A SMALL TWO-STAGE, LIGHT-GAS GUN USED FOR IMPACT TESTING. (Arnold Engineering Development Center, Air Force Systems Command, U.S. Air Force) ASTIA AD-270 170, January 1962

ABSTRACT: The performance of a small, two-stage, light-gas model launcher used for high velocity impact testing is estimated for the practical range of operating varibles. Hydrogen and helium are compared as propellants. The effects of powder charge, piston weight, and pump tube gas charge pressure are shown. Experimental results are included.

4,910

Stern, M.I. 1949 DETERMINATION OF URINARY TOTAL NEUTRAL 17 and 20 KETOSTEROIDS IN "STRESS". (RAF, Institute of Aviation Medicine, Farnborough) FPRC 719, July 1949.

4,911

Sternick, S., D.T. Stimmel, and I.J. Sattinger 1961 HUMAN REACTION TO MILITARY VEHICLE RIDE (Institute of Science and Technology, University of Michigan, Ann Arbor, Michigan) Report No. 2889-17-F, Jan. 1961, ASTIA AD 250 099

ABSTRACT: The results of an investigation conducted at Willow Run Laboratories (now Institute of Science and Technology), of The University of Michigan, into the effects of ride on both passengers and crewmembers of military ground vehicles are described. A general analysis of these effects is given as a basis for defining the problems associated with vehicle ride and of recommending an experimental program to obtain quantitative information on the effects of ride on comfort and performance. Test techniques and test equipment requirements for comfort tests using the Method of Adjustment and for performance tests using tracking, driving, visual recognition, and information handling tasks are outlined. These tests are based on the use of a vehicle-motion simulator which would subject human beings to prescribed sinusoidal and transient motions. As an example of how the various test phases can be performed, a suggested first year's test program is developed to obtain data on the subjective evaluations of sinusoidal and nonsinusoidal motions in pitch and roll.

4,912

Steuberm M.F. 1949 COMPARISON OF OVERALL IMPACT LOADS OBTAINED DURING SEAPLANE LANDING TESTS WITH LOADS PREDICTED BY HYDRODYNAMIC THEORY. (National Advisory Committee on Aeronautics) Technical Note 1781, January 1949

4,913

Stevens, H.L. 1939 PROPOSED CENTRIFUGE
(RAF, Institute of Aviation Medicine, Farnborough)
FPRC 43, July 1939

4,914

Stevenson, S.A. 1960 A BIBLIOGRAPHY OF AEROSPACE MEDICAL DIVISION REPORTS IN THE FIELDS OF ENGINEERING PSYCHOLOGY AND TRAINING PSYCHOLOGY 1945-1960. (Wright Air Development Division, Wright-Patterson AFB, Ohio)
WADD Bibliography Q-Z; May 1960.

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Presentation of Information
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Unusual Environments, Vigilance, and Stress
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Training Research
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Apparatus, Methodology, and Statistics

4,915

Stewart, W.K. 1940 FINAL OBSERVATIONS ON THE VALUE OF CROUCHING AS A PREVENTATIVE OF BLACKING-OUT. (RAF, Institution of Aviation Medicine, Farnborough) FPRC No. 177. ASTIA ATI 164 410

ABSTRACT: Eleven subjects made 100 man-runs undergoing centrifugal force in planes. Nine subjects were able to raise their blackout thresholds one to two "g' by crouching; two showed no improvement. An accessory rudder bar to facilitate the crouch position is described.

4,916

Stewart, W.K. 1940 OBSERVATIONS ON THE EFFICIENCY OF ABDOMINAL BELTS IN THE PREVENTION OF BLACKING OUT. (Farnborough) FPRC No. 176. ASTIA ATI 206389

ABSTRACT: All tests conducted in planes by a small number of subjects.
(a) Elastic belts do not raise blackout threshold, may shorten period between blackout and unconsciousness. Although they produce a feeling of confidence at low values of "g", they are potentially dangerous.

(b) Pneumatic belts inflated at pressures exceeding 50 mm Hg prevent fastening of Sutton harness. Even pressures of 80 to 100 mm Hg (of therapeutic value according to Armstrong) do not elevate blackout threshold.

(c) Hydrostatic belts are uncomfortably cold even at altitudes as low as 10,000 feet. At 6 "g" belts are a serious hindrance due to increased effective weight. Water does not drain out of belts after exposure to "g" and is very uncomfortable. Hydrostatic belts elevate "g" threshold at least 0.5 "g", but disadvantages outweigh the gain. It is recommended that experiments on belts as anti "g" devices be discontinued.

4,917

Stewart, W.K. 1940 NOTE ON EXPERIMENTS CARRIED OUT IN BATTLE K.9289. Report F.P.R.C. #212-A, December 1940

4,918

Stewart, W. K. 1940 AN INVESTIGATION INTO THE EFFECT OF A RECLINING POSTURE ON THE ABILITY TO WITHSTAND HIGH "G" (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. No. 212; 10 Dec. 1940. ASTIA ATI 206318

ABSTRACT: One subject made experimental runs exceeding 5 "g" for 10 to 20 seconds. Peak run was 6 "g" for 6 to 9 seconds. This resulted in unconsciousness when subject was unprotected. When cockpit seat was inclined 45 degrees from vertical and feet raised to level of seat, complete visual protection was obtained.

The venous and arterial hydrostatic levels were reduced only one inch by this maneuver, but the decrease in the leg-thigh and thigh-spine angles promoted venous return. Visual fields were not markedly reduced by this procedure, but tilting sufficient to protect from higher values of "g" would produce definite visual impairment.

4,919

Stewart, W. K. 1941 REPORT ON BLACKING-OUT (RAF, Institute of Aviation Medicine, Farnborough) FPRC Report 233, Jan. 1941.

4,920

Stewart, W.K. 1941 REPORT ON ACCELERATION.
(Flying Personnel Research Committee, England) Report No. 136a
ASTIA ATI 153 560, May 1941.

ABSTRACT: To investigate pooling of blood in the legs, a metal oncometer in the form of a boot was constructed in order to investigate the effect of high G on the total volumes and blood flows in the lower limbs. Using the standard technique of Hewlett and Van Zwaluwenberg, considerable work was carried out on the ground to determine the total increase in leg volume due to a venous stasis, produced by a pressure in the sphygmomanometer cuff of 60 - 80 m. Hg. However, it was unfortunately found to be impossible to use the oncometer in the air owing to disturbance from the increase in the external air pressure as height is lost. This is at present inevitable when producing high G in the Battle. Consequently this method has had to be temporarily abandoned.

Work has also been commenced on the influence of moderate G on ocular reaction times and on the localisation of the failure of vision. In connection with the latter, atropinasion of the pupils does not effect the threshold value.

4,921

Stewart, W. K. 1941 INFLUENCE OF DRUGS ON ABILITY TO WITHSTAND CENTRIFUGAL FORCE (RAF, Institute of Aviation Medicine, Farnborough) FPRC No. 338, 11 Aug. 1941

ABSTRACT:
(a) CYCLITON (like coramine and camphor) produces a rise in respiratory rate and blood pressure. 2 cc injected in human subjects have no effect on blackout threshold but alleviate fatigue due to "g" in flight tests.
(b) BENZEDRINE. 25 mg injected have no effect on "g" tolerance.
(c) GLUCOSE. Injection of 80 gms in 500 cc water has no effect on "g" tolerance.
(d) EPHEDRINE and ADRENALINE. Have synergistic effect on the sympathetic nervous system. Ephedrine alone has no effect on "g" tolerance but ephedrine plus adrenaline produce a slight improvement.
(e) ARENAL CORTICAL EXTRACT (ESCHATIN). When 10 cc (250 dog units) are injected, they produce a very variable rise in blood pressure and in "g" tolerance.
CONCLUSION: None of the drugs tested have any immediate application to the problems of "g".

4,922

Stewart, W. K. 1941 FINAL REPORT ON EFFECT OF ABDOMINAL COMPRESSION ON ABILITY TO WITHSTAND G (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. No. 300. ASTIA ATI 206 420.

ABSTRACT: The Valsalva maneuver becomes less effective with increasing altitude. Thus one subject was able to produce only 42 mm Hg rise in blood pressure at 35,000 feet as compared with 65 mm at sea level. Another produced only 10 mm Hg rise at 31,000 feet as compared with 26 mm at sea level.
It is concluded that increased intra-abdominal pressure has 2 effects:

(1) an immediate beneficial effect on cerebral circulation which is maximally effective after 60 seconds, and
(2) a retardation of blood flow from the lower limbs which leads to a decrease in the minute volume of the heart, hence to syncope. Therefore increased intra-abdominal pressure of long duration will lower the "g" threshold. An increase shortly before exposure to "g" will raise the threshold but will not prevent blackout or syncope if the "g" is applied for a sufficient period of time. The discomforts and dangers of abdominal belts are believed to outweigh the slight protection afforded.

4,923

Stewart, W. K. 1942 NOTE ON SPENCER ACCELERATION BELT AND LEGGINGS USA FIRM. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 458, May 1942.

4,924

Stewart, W.G. 1943 THE EFFECT OF TILTING THE HEAD BACK ON THE INCIDENCE OF SICKNESS ON THE 4-POLE SWING. (RCAF no. 2 Clinical Investigation Unit.) June 1943.

4,925

Stewart, W.G., G.W. Manning and A.J. Sutherland 1943 CORRELATION BETWEEN SWING REACTION AND AIRSICKNESS. (National Research Council, Canada) Report #C-2873, 30 April 1943

ABSTRACT: Considered as a group (492 swing subjects) and regardless of body position 32 (11.5%) Type I, 10(24.4%) Type II and 68 (40.2%) Type III swing reactors become airsick. From this general group of 492 swing experiments it was found that 3 Type I, 1 Type II and 13 Type III swing reactors ceased training from airsickness. The 4 Type I and Type II reactors were, however, Type III swing reactors when swung again in the sitting and not the original supine position.

Group 4, the sitting, eyes open position, when analysed per se, reveals that 11 (13.6%) Type I, 3 (16.7%) Type II and 29 (51.8%) Type III swing reactors became airsick. Only 10 men in Group 4 (all Type III) ceased training for airsickness. This number represent 17.9% of the Type reactors and 34.5% of these Type III reactors who became airsick any number of times. Six (12.8%) of these men were at Elementary Flying Training Schools and 4(44.4%) were at Air Observer Schools. The ceased training rate for all reasons among men in Group 4 (Types I, II and III swing subjects) was found to be 25.2% including 6.5% for airsickness. Among Type III reactors of Group 4 who ceased training for all reasons, airsickness acounts for 58.9% of the ceased training cases.

4,926

Stewart, W. K. 1945 SOME OBSERVATIONS ON THE EFFECT OF CENTRIFUGAL FORCE IN MAN. J. Neurol. Psychiat. 8:24-33.

4,927

Stewart, W. K. 1945 INVESTIGATIONS ON CENTRIFUGAL FORCE
(R. A. F. Physiological Laboratory)
(Paper, Meeting of the Physiological Society, 10 February 1945)

ABSTRACT: This problem has been studied in four general ways: (1) by experienced subjects in experimental aircraft, (2) by physiologists piloting various aircraft, e.g. Diringshofen, Davidson, (3) by mass study of pilots and their reactions, (4) in man-carrying centrifuges.

The major effects of centrifugal force on man result from the increased weight of his body components, especially the blood. Carotid blood pressure and cardiac output are lowered, with impairment of circulation and of central nervous functions. Of these, vision suffers first owing to the retinal circulation being opposed by the intraocular pressure which, if artificially raised, lowers the G threshold for blacking-out. Total failure of vision may be preceded by a progressive rise of threshold and light sense may outlast visual acuity. In a large group of pilots, large unaccountable differences in threshold occur. The average difference between greying of vision and black-out is 0-7 G. Central circulatory failure results in brief unconsciousness (not necessarily preceded by black-out if G is excessive and suddenly applied) followed on recovery by marked confusion or disorientation.

Raised blood sugar, benzedrine or adrenal cortical hormone scarcely influence visual impairment, and since susceptibility to the cerebral effects of G is increased during flight by O_2 lack (if severe or reinforced by CO) the effects described are attributed to retinal and cerebral anoxia. Occlusion of the leg circulation raises and reactive hyperaemia lowers the black-out threshold to G. During the partial visual impairment of a prolonged manoeuvre, muscular effort (abdominal straining) may raise the blood pressure and restore normality. A pilot's resistance to the stress may depend on his general circulatory reactivity.

Duration is important. 20 G for 0·01 sec. or 12 G for 0·1 sec. causes no visual or neurological disturbance. (Tolerance of brief large forces probably depends on the structural strength of the body). Several minutes of acceleration insufficient to impair vision cause only fatigue. In flight, the acceleration which affects vision usually reaches its maximum before reflex compensation (autonomic or somatic) can occur.

Increased weight may immobilize the trunk, but the limbs if supported are movable at right angles to the acceleration. Rapid rotation of the head (or a turret) at about 20 degrees/sec. under high G may cause temporary disorientation, otherwise vestibular disturbances are uncommon in experienced pilots.

(J. of Physiology 104:7P-8P, 10 Feb. 1945)

4,928

Stewart, W. K. 1945 SOME OBSERVATIONS ON THE EFFECT OF CENTRIFUGAL FORCE IN MAN.
J. Neurol., Neurosurg., Psychiat. N.S. 8(1):24-33.

ABSTRACT: (1) Some observations are presented which support the view that there is minimal impairment of cortical function at the "black-out" threshold.
(2) Application of centrifugal force as a method of experimental investigation holds marked possibilities for the study of fatigue, physiology of vision, of cortical function as well as circulatory problems.

4,929

Stewart, W.K. & H.L. Roxburgh 1945 GERMAN OCCUPATION DISARMANENT: AVIATION MEDICAL ASPECTS IN SCHLESWIG-HOLSTEIN
(Flying Personnel Research Committee, Air Ministry, Gt. Britain) FPRC 627, Appendix 14, May 1945.

ABSTRACT: Results of the interrogation of German personnel.
In response to questions about the ejection seat, the Squadron Commander gave the following information:
Experiments were first carried out on a ground test rig at the Heinkel aircraft works. This rig, essentially constructed from inclined rails, would appear to have been similar to the Martin-Baker test rig, and to have a vertical height of at least 10 m.
A compressed air system of propulsion was first investigated and abandoned in favour of an explosive charge.
Accelerations of 4-6 g were first investigated and gradually increased to 14 g which was the acceleration necessary for clearance fror the Me. 162.
The duration of the acceleration was not known but the distance of propulsion at ground level was stated to be 10 m. and it is considered that these figures are reasonable consistent with present R.A.F. knowledge. At this acceleration, it was necessary to hold the head back and to place the feet on supports. The Squadron Commander did not himself notice any marked difference between the acceleration values of 6 and 14 g.
The highest of g reached in the tests was 26; a few cases of back injury occurred but these had not been observed by the officer.
He stated that the apparatus had actually been used in emergencies on two to three occasions and he thought that the maximum air speed had been 800 Km/hr. (500 mph). No difficulty had been commented on, either in separating from the seat or in autorotation after ejection. He could not state whether any masks had been dislodged in the air blast.

4,930

Stewart, J.K. 1946 EJECTION OF PILOTS FROM AIRCRAFT: A REVIEW OF THE APPLIED PHYSIOLOGY. (Air Ministry, Flying Personnel Research Committee) Rept. No. 671, Sept. 1946. ASTIA AD 222 472

ABSTRACT: For seat ejection two general stages are envisaged. Firstly,

ejection from the aircraft, which in itself is a great advance but implies a conscious pilot for preservation of life; secondly, development of ejection with ancillary automatic mechanism to ensure that an unconscious pilot will avoid severe injury. Cabin jettisoning is of primary importance for very high altitudes or very high speed aircraft and should be thoroughly investigated. If it proves acceptable physiologically, the final provisions for escape should include both jettisoning and ejection, but where this proves impossible in any given case, it should be the function of some central authority or committee to state which system has to be installed.

4,931

Stewart, W. K. & Pekarek 1946 IMPROVED ESCAPE FACILITIES IN FLIGHT FOR PILOTS AND AIRCREWS IN SERVICE AIRCRAFT. (RAF, Ministry of Supply, Great Britain) Scientific and Technical Memo., November 1946.

4,932

Stewart, W. K. 1952 THE PHYSIOLOGICAL EFFECTS OF GRAVITY. In Lectures on the Scientific Basis of Medicine (London) 2:334-342, 1952-1953, passim.

4,933

Stewart, W. K. 1952 PHYSIOLOGICAL PROBLEMS OF HIGH PERFORMANCE MILITARY AIRCRAFT. Advancement of Sci. (London) 9:378-381.

4,934

Stewart, W.K. 1955 LUNG INJURY BY IMPACT WITH A WATER SURFACE Reprinted from Nature, 175: 504-505, Jan.-Mar., 1955

ABSTRACT: Medical findings during the inquiry into the recent Comet disasters have suggested that the possibility of lung damage by impact with a water surface at the terminal velocity of fall should be investigated. It is known from observations on the effects of explosive blast that severe lung damage occurs when the impulses communicated to the chest wall exceeds a certain limit.

4,935

Stewart, W.K., H.P. Ruffel Smith, and D.J. Williams 1955 ROLE OF THE NERVOUS SYSTEM IN ADAPTATION TO HIGH PERFORMANCE FLYING (PROC. ROY. SOC. MED. 48, MAY 5, 1955) (Flying Personnel Research Committee, Air Ministry) F.P.R. C. Report No. 942, May 1955

4,936

Stewart, W. K. 1956 HIGH ALTITUDE AND SPACE TRAVEL Royal Society for the Promotion of Health Journal (London) 76 (8) August 1956.

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Stewart, W. K. 1959 BEHAVIOR IN CONVENTIONAL AND EXTRA-TERRESTIAL FLIGHT. SOME FUTURE ASPECTS OF AVIATION MEDICINE. Nature (London) 184:578-582, Aug. 22, 1959

ABSTRACT: Reviews physiological, psychologic, and biochemical aspects of behavior and reactions of man and animals during conventional and space flight.

4,938

Steyer, W.A. 1950 TRACK OPERATED TEST VEHICLES, DESCRIPTION AND PERFORMANCE FOR EJECTION SEAT EXPERIMENTATION (Northrop Aircraft, Inc., Hawthorne, Calif.) Rept. No. SP-5, 3 Oct 1950, ATI 95 213

ABSTRACT: This report is a detailed presentation of test equipment preparations and operations performed by Northrop Aircraft, Inc. for the Aircraft Laboratory, Engineering Div., Air Materiel Command pursuant to ejection seat experimentation in accordance with Contract AF33(038)-3096. As part of Air Force Project MX-864 ejection seat tests were conducted on track operated vehicles on the 10,000 ft. aerodynamic research track facility located at Edwards Air Force Base, Muroc, California. The services rendered by the Contractor included design and fabrication of rocket-propelled test carriages and seats, carriage velocity recording instrumentation and seat actuation mechanisms, together with all preparations and actual operations of test carriages with seat configurations as directed by AMC Aircraft Lab personnel. Instrumentation operations pursuant to performance of the ejection seat test articles were performed by personnel of AMC Instrumentation and Photographic Laboratories.

4,939

Stickle, J. W., & N. S. Silsby 1960 AN INVESTIGATION OF LANDING-CONTACT CONDITIONS FOR A LARGE TURBOJET TRANSPOPT DURING ROUTINE DAYLIGHT OPERATIONS. NASA TN D-527

4,940

Stickle, J. W. 1961 AN INVESTIGATION OF LANDING-CONTACT CONDITIONS FOR TWO LARGE TURBOJET TRANSPORTS AND A TURBOPROP TRANSPORT DURING ROUTINE DAYLIGHT OPERATIONS. (National Aeronautics & Space Admin. Washington, D. C. NASA TN $-899.

SUMMARY: The report presents statistical results of an investigation to determine the vertical velocity, airspeed, rolling velocity, bank angle, and distance from the runway threshold, just prior to ground contact. A total of 395 landings of two turbojet transports and a turboprop transport were made on a dry runway at the Los Angeles International Airport. (NASA)

4,941

Stieglitz, W. I. 1950 A NOTE ON CRASH-WORTHINESS. Inst. Aero. Sci. Preprint No. 256

(Paper, Annual Meeting of the Institute of Aeronautical Sciences, 1950.)

4,942

Stiehm, E. R. 1961 ACCELERATION PROTECTION BY MEANS OF STIMULATION OF THE RETICULO-ENDOTHELIAL SYSTEM.
Aerospace Medicine 32(3):248, March 1961.

ABSTRACT: An animal's non-specific resistance to stress is intimately associated with the reticulo-endothelial system (RES). Hypertrophy of these cells is associated with increased resistance to a wide spectrum of stresses, including bacterial invasion, drum trauma, hemorrhage, and X-irradiation. Thus, it was of interest to see if resistance to acceleration stress could be enhanced by such means. Bacterial endotoxin, a potent RES stimulator, was given to rats and their ability to withstand 20 positive G was measured. Tolerance to acceleration was increased 100 per cent in some cases without reaical alteration in the animal's metabolism. The conditions for such enhancement of acceleration resistance are presented and the underlying mechanisms discussed.

4,943

Stiehm, E. R. 1961 HOST FACTORS IN RESISTANCE TO ACCELERATION STRESS. In Bergeret, P., ed., Bio-Assay Techniques for Human Centrifuges and Physiological Effects of Acceleration. (London, New York, Paris: Pergamon Press, 1961) AGARDograph 48. Pp. 130-139.

4,944

Stiehm, E. R., & J. M. Lyle 1961 THE EFFECT OF COBALT POLYCYTHEMIA ON THE ACCELERATION TOLERANCE OF THE RAT. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-6102; ASTIA AD-252 886; 1 Mar. 1961
See also Aerospace Medicine 32(7):630-633, July 1961

ABSTRACT: Twenty-five animals were made polycythemic by cobalt administration. The action of cobalt resulted in some growth retardation and an average increase in hemoglobin from 16.9 gm./100 ml. to 21.9 gm./100 ml. The tolerance to positive acceleration was then measured using a physiologic end point approaching death. Nine animals were centrifuged immediately after cobalt administration and 16 were centrifuged 10 days after cessation of cobalt, at which time any toxicity due to cobalt has disappeared but polycythemia persists. No significant difference of tolerance to acceleration was noted in either cobalt group as compared to control rats, suggesting that increasing the amount of oxygen to the tissues does not result in a reversal of the cellular anoxia caused by positive acceleration.

4,945

Stiehm, E. R. 1961 ACCELERATION PROTECTION BY MEANS OF STIMULATION OF THE RETICULO-ENDOTHELIAL SYSTEM. (Naval Air Development Center, Johnsville, Pa.) NADC-MA-6129, 22 June 1961. ASTIA AD 260 549
NOTE: CARI P&S
See also J. Appl. Physiol. 17(2):293-298, March 1962

ABSTRACT: Stimulation of the rats' reticulo-endothelial system (RES) was found to be effective in enhancing the tolerances to high G acceleration stress. Utilizing 10 daily consecutive intraperitoneal injections of endotoxin at increasing doses from 100 to 1200 gms, the median survival time of 122 rats undergoing 20 positive G acceleration was increased from a control level of 9.7 min to 14.2 min. One group of 48 rats had a median survival of 23.6 min compared to a control level of 11.3 min. The protective action of RES stimulation and the inhibitory action of RES blockade was found to be effective in rats with normal or prolonged survival but not in rats with diminished tolerance before stimulation or blockade. An analysis of factors for optimal RES stimulation is presented as are possible mechanisms of action. (AUTHOR)

4,946

Stiehm, E. R., & J. M. Lyle 1961 THE EFFECT OF COBALT POLYCYTHEMIA ON THE ACCELERATION TOLERANCE OF THE RAT. Aerospace Medicine 32(7):630-633, July 1961
See also (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-6102; ASTIA AD-252 886; 1 Mar. 1961 (F)

ABSTRACT: Twenty-five animals were made polycythemic by cobalt administration.

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4,947

Stiehm, E. R. 1962 THE EFFECT OF HYPOTHERMIA ON THE RAT'S TOLERANCE TO HIGH POSITIVE ACCELERATION WITH EVIDENCE FOR THE EXISTENCE OF DIFFERENT ACCELERATION SYNDROMES AT HIGH AND LOW G. (Naval Air Development Center, Johnsville, Pa.) NADC-MA-6203, May 31, 1962. ASTIA AD 277 704

ABSTRACT: The tolerance to high positive acceleration at levels of 20 to 80 g was studied in normal and hypothermic rats. Normal rats have a mean survival time at 20 g of 680 seconds but this decreases to 105 sec. at 30 g. Only slight further decreases are noted at higher g, suggesting that 30 g is the point at which cerebral circulation is interrupted. Hypothermia at 22.5 degrees C. decreases the tolerance of rats to 20 g positive acceleration but markedly increases their tolerance to 30 g and above. The beneficial effect of hypothermia was most pronounced at 40 g at which level hypothermic rats have a mean survival time of 252 sec. compared to that of control rats of 75 sec., an increase of 236 per cent. The ECG is useful as an indication of death at 20 g but not at 30 g or above. Animals that do not survive high g levels die of respiratory paralysis despite good heart action. Hypothermia must make the respiratory center less sensitive to the deleterious effect of hypoxia. There seem to be two distinct syndromes of physiologic failure during positive acceleration. One is a "cardiac" syndrome, occurring at 20 g and below, characterized by partial maintenance of cerebral circulation until cardiac failure ensues, and the other is a "cerebral" syndrome, occurring at 30 g and above, characterized by immediate interruption of cerebral circulation. Agents such as hypothermia, which increase tolerance at one level of positive acceleration, will not necessarily be of benefit at another level.
(Aerospace Medicine 33(11):1397, Nov. 1962)

4,948

Stiehm, E. R. 1962 ACCELERATION PROTECTION BY MEANS OF STIMULATION OF THE RETICULO-ENDOTHELIAL SYSTEM. J. Appl. Physiol. 17(2):293-298, Mar. 1962 See also (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-6129, 22 June 1961

ABSTRACT: Stimulation of the rats' reticulo-endothelial system (RES) was found

to be effective in enhancing the tolerances to high G acceleration stress. Utilizing 10 daily consecutive intraperitoneal injections of endotoxin at increasing doses from 100 to 1200 gms, the median survival time of 122 rats undergoing 20 positive G acceleration was increased from a control level of 9.7 min to 14.2 min. One group of 48 rats had a median survival of 23.6 min compared to a control level of 11.3 min. The protective action of RES stimulation and the inhibitory action of RES blockade was found to be effective in rats with normal or prolonged survival but not in rats with diminished tolerance before stimulation or blockade. An analysis of factors for optimal RES stimulation is presented as are possible mechanisms of action. (AUTHOR)

4,949

Stiehm, E. R. 1963 DIFFERENT EFFECTS OF HYPOTHERMIA ON TWO SYNDROMES OF POSITIVE ACCELERATION.
J. Appl. Physiol. 18:387-392, March 1963.

4,950

Stigler, R. 1912 VERSUCHE UBER DIE BETEILIGUNG DER SCHWEREEMFINDUNG AN DER ORIENTIERUNG DES MENSCHEN IM RAUME (Experiments about the participation of the gravity sensation on the orientation of humans in space)
Archiv. Physiol. (Bonn) 148:573

4,951

Still, E.W. 1960 EQUIPPING MAN FOR A FLIGHT TO THE MOON
Engineering, (London) 189(4907): 634-635, May 6, 1960

ABSTRACT: A review is presented of a paper read before the British Interplanetary Society on April 28, 1960. A resume of the United States Space Program was given, followed by a discussion of the environmental requirements for interplanetary travel and the engineering techniques being developed to meet these requirements. (Aerospace Medicine 31(10): 869, Oct. 1960)

4,952

Stiltz, H. L. 1961 AEROSPACE TELEMETRY. (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1961)

4,953

Stimler, F.J. and R.S. Ross 1960 DROP TESTS OF 16,000-SQUARE-INCH MODEL PARACHUTES VOLUME VIII SUMMARY REPORT (Goodyear Aircraft Corporation, Akron, Ohio) Contract No. AF33(616)-2310 RDO No. 672-160 AF Technical Report 5867 April 1960 ASTIA AD 240877

ABSTRACT: Parachute model drop-tests program was conducted in the Goodyear Aircraft Corporation airship dock at Akron, Ohio. Twenty-seven different models of the following types with 16,000 sp. in. total canopy area were tested: Solid Flat, Solid Extended Skirt, Solid Spherical, Solid Conical, Airfoil, Exeter Type 12, Guide Surface, Ring Slot, and FIST Ribbon.

An information sheet is provided for each of the parachute models and includes a short statement describing general behavior of the parachute during descent and a basic reference list where more information may be found concerning similar parachutes. The following data are also tabulated for terminal vertical velocities of approximately 10, 15, 25 and 40 feet per second by taking the average value for both the horizontal and vertical types of release: drag coefficient, average glide angle, average and maximum angles of oscillation, logarithmic decrement, and frequency of oscillation.

Curves of drag coefficient vs. vertical descent velocity are presented for each parachute family for comparison purposes. The variation of average angle of attack with vertical velocity is presented for the Solid Flat Circular parachute. The effect of suspension-line ratio on the drag coefficient of the Solid 10% Extended Skirt parachute is also given for the range of suspension line ratios of 0.60 to 1.40.

In general , of the parachutes tested showed a decrease in drag coefficient for an increase in vertical descent velocity; however, above a critical vertical velocity the drag coefficient became constant in most cases. Only for the very stable parachutes did the drag coefficient remain approximately constant for the vertical velocity.

4,954

Stimmel, E.W. et al 1954 CONSTRUCTION OF AN INEXPENSIVE MOTORIZED SWING (USAF School of Aviation Medicine, Randolph Field, Texas) Proj. no. 21-1208-0012, Report No. 6: Sept. 1954. ASTIA AD 54 727

ABSTRACT: The construction of an inexpensive, motorized swing from generally available materials is described. Such a swing affords more uniform motion and a considerable saving in manpower.

4,955

Stingely, N. E. 1961 ACCELERATION-DECELERATION STUDIES OF PROJECT MERCURY CHIMPANZEES (Air Force Missile Development Ctr., Holloman AFB, N. Mex.) Proj. Mercury support, Rept. ESP 921E 9039 61001, Revised Apr. 1961

ABSTRACT: The objectives of these tests is to determine the physiology and bio-

chemistry of the chimpanzee's response to simulated acceleration-deceleration flight profiles of the project mercury flights and to expose all programmed orbital flight animals to simulated acceleration-deceleration profiles to determine psychometer response ability.

4,956

Stingely, N. E. 1961 COUNTDOWN AND PROCEDURES FOR PROJECT MERCURY FLIGHT MR-2 (CHIMPANZEE SUBJECT). (AF Missile Development Center, Holloman AFB, New Mexico) AFMDC TR 61-20, June 1961. ASTIA No. AD-261652

ABSTRACT: This report presents a countdown in abbreviated form with detailed procedure sheets necessary to define specific actions. These actions are necessary to ready a chimpanzee subject and couch for flight in the Project Mercury capsule and the post-flight release and care of the subject. The countdown and procedures not only describe the mechanics of preparing the subject and couch for flight, but also include a plan for obtaining a maximum of useful research data. Thus the biomedical adequacy of the Project Mercury capsule and a verification of ground, flight and recovery procedures could be determined, and the chimpanzees' physiology, biochemistry and psychomotor performance could be studied. During the preliminary phases of the Project Mercury Animal Support program, chimpanzees were subjected to temperature-humidity tests, psychomotor training and acceleration-deceleration studies on a centrifuge and deceleration tracks. Considerable knowledge of the chimpanzees' physiology and behavior and invaluable experience in the use of Project Mercury hardware was gained during these exercises. The first drafts of this report were based on the above experiences. The final copy was updated from the experiences gained during dry runs and the actual MR-2 flight. (Author)

4,957

Stingely, N. E. 1962 THE PHYSIOLOGICAL RESPONSES OF CHIMPANZEES TO SIMULATED LAUNCH AND RE-ENTRY ACCELERATIONS. (6571st Aeromedical Research Lab., Holloman AFB, N. Mex.) Rept. No. ARL TDR 62-11; Proj. 6892; July 1962 ASTIA AD-282 883

ABSTRACT: Five male chimpanzee subjects were exposed to simulated space flight conditions of launch acceleration and atmospheric re-entry deceleration. Heart and respiration rates showed significant differences for the three conditions of launch. The conditions of launch were: launch acceleration only, launch acceleration with vibration and noise, and launch acceleration with noise, vibration, urinary tract catheterization and arterial and venous catheterizations. Physiological responses associated with launch and re-entry differed significantly from the baseline period that preceded each of the launches. Physiological changes associated with re-entry were not as severe as those seen with launch. The subjects recovered from the environmental stressors of both launch and re-entry very rapidly. The resultant responses should be good predictors of chimpanzee cardiac and respiratory activity during the critical acceleration phases of space flight and also serve as a baseline for the study of the effects of weightlessness following launch acceleration and prior to re-entry deceleration. (AUTHOR)

4,958

Stingely, N.E. 1962 COUNTDOWN AND PROCEDURES FOR PROJECT MERCURY ATLAS-5 FLIGHT (CHIMPANZEE SUBJECT). (Aeromedical Research Lab., Holloman AFB, New Mexico) ARL-TDR-62-17 Oct. 1962. ASTIA AD 288 921

ABSTRACT: This report presents the countdown and detailed procedures followed to prepare the chimpanzee subject and couch for flight in the Project Mercury capsule, and the post-flight release and care of the subject. It summarizes experiences gained during the Mercury Redstone-2 and the Mercury Atlas-5 flight programs.

4,959

Stirman, J.A. & B.J. Wilson 1957 TRAUMATIC RENAL FAILURE: A POSSIBLE ETIOLOGY. (School of Aviation Medicine) Rept 58-8. Sept. 1957.

ABSTRACT: The present study was undertaken to quantitate and define in experimental animals the changes in renal function incident to the hypovolemia which attends an acute extracellular fluid volume deficit, and the subsequent repair of this deficit with a balanced salt solution or with compatible whole blood. The results based on ten dogs indicated that a balanced salt solution was more effective than whole blood in repairing the glomerular filtration rate and urine flow in conditions of extracellular fluid deficiency. 24 hours after treatment with whole blood the blood urea level was significantly elevated.

4,960

Stivers, R.H. 1957 RANDOM ACCELERATION TEST FACILITY DESIGN CRITERIA (Sandberg-Serrell Corp., Pasadena, Calif.) Rept. No. R324-5, Contract AF(611) 2047, 15 Oct. 1957. ASTIA AD 145 649.

ABSTRACT: Design requirements are presented for a random acceleration test facility which will be located in the vicinity of the Hydrodynamics Laboratory at the Rocket Test Laboratory, Edwards AFB. The facility will conform, in general, to sizes, locations, types of construction, and equipment indicated the planning drawings and criteria, insofar as such are applicable and practicable when subsurface conditions are known. Structural callouts, evaluations, and other information shown on planning drawing will be verified during the final design phase. The facility will include a tower equipped with a soft mount and shaker, a pumphouse containing power supply equipment for the soft mount and shakers, a shop with boiler and terminal rooms, a control building, provisions for future installation of temperature conditioning facilities, and other necessary back-up facilities. Missiles to be tested will be subjected to controlled vibrations (amplitudes to $\pm$ 1 in., frequencies to 1000 c); these vibrations will simulate selected in-flight vibrations. Nonhazardous liquids will be circulated in the propulsion system during tests in lieu of actual propellants to minimize hazards and to simulate in-flight propellant mass and dynamic effects; non-firing tests only will be conducted.

4,961

Stocker, J. 1961 A CRASH NEED NOT BE FATAL
Popular Mechanics 115(1): , Jan. 1961

4,962

Stoeckel 1942 SPECIAL SEAT AND CONTROLS DESIGNED FOR HIGH ACCELERATIONS (Sitzanlage Mit Steuerungslinrichtung Fuer Hohe Flugbeschleunigungen) ASTIA ATI-51 067, 23 February 1942

ABSTRACT: A discussion of the technical and physiological problems arising when the crew of an airplane are placed on horizontal position. This is a part of the intensive research as to the limits of endurance of the human organism which are underway at various places. The endurance limits seem to depend mainly on the magnitude, postition, and duration of the acceleration vector which acts upon the human organism, as well as on the individual well-being of the airman. The aerotechnical conclusions of this aeromedical observations are that in normal upright sitting position radial accelerations beyond 6 g and longer than 4 seconds generally cannot be endured without causing blackout. With prone position, no such limit exists.

4,963

Stoll, A. M. 1953 HUMAN TOLERANCE TO COMBINED ACCELERATIONS - INVESTIGATIONS OF PHASE II - PRELIMINARY STUDY ON PRIMATES SUBJECTED TO MAXIMUM SIMPLE ACCELERATION LOADS. (Naval Air Development Center, Johnsville, Pa.) NADC-MA-5201, 22 May 1953.

4,964

Stoll, A. M. 1952 HUMAN TOLERANCE TO COMBINED ACCELERATIONS. (Naval Air Development Center, Johnsville, Pa.) NADC-MA-L5207, s Dec. 1952.

4,965

Stoll, A , B.M. Lewis, & D.H. Lewis 1955 MEASUREMENTS TO EVALUATE THE EFFECTIVENESS OF THE FULL PRESSURE HALF SUIT IN APPLYING EXTERNAL PRESSURE TO THE BODY. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5502, 21 March 1955

4,966

Stoll, A. M. 1955 HUMAN TOLERANCE TO POSITIVE G AS DETERMINED BY PHYSIOLOGICAL END POINTS. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5508; ASTIA AD-75 326
See also J. Avia. Med. 27:356-367, 1956

ABSTRACT: A method of analysis adapted to the use of data covering a wide range of acceleration rates is described. This method is used in the analysis of the accumulated data available at the Aviation Medical Acceleration Laboratory on tolerance to a wide range of levels of positive G resulting in grayout, blackout, and unconsciousness in unprotected humans. The data are plotted as a strength-duration curve of maximum G vs. total time of exposure to G. The curve is found to conform to the usual physiological patterns except in the range of low G for exposure times longer than 6 seconds, in which area cardiovascular reflexes become effective in increasing G tolerance. Comparisons with similar data from other laboratories indicate that good agreement is obtained when the time required to reach maximum G, as well as time at maximum, is taken into consideration. Because of the precision of the experimental procedure employed and the agreement obtained in areas where comparable independent data exist, it is concluded that in spite of the relatively small number of individual end points (forty), the tolerance curve as drawn here may serve as a valid standard of reference for protection studies and for animal studies employing similar patterns of acceleration. A nomogram derived empirically from the experimental data is presented from which may be found the approximate tolerance time for various levels of G attained at various constant, linear rates of acceleration. This chart may serve as an instruction device and a guide in experimental design. (AMAL)

4,967

Stoll, A., B. M. Lewis, & D. H. Lewis 1955 A STUDY OF THE EFFECTS OF EXTERNAL PRESSURIZATION OF THE LEGS AND ABDOMINAL CAVITY UPON THE CARDIOVASCULAR SYSTEM WHEN APPLIED DURING EXPOSURE TO HIGH POSITIVE ACCELERATION. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 302; TED ADC AE 1401; 31 Dec. 1955

ABSTRACT: There has been completed a series of experiments in which measured external pressure was applied to the lower half of the body of the dog while pressures were measured from the carotid artery, the pulmonary artery, the rectum and the surface of the abdomen. Analysis of the data shows that: (1) cardiovascular pressures both above and below the diaphragm rise with increasing external pressurization and there is a transfer of blood from the abdomen to the thorax; (2) external pressures above 3 psi produce hemorrhages in the capillaries of the lungs, liver and spleen.

4,968

Stoll, A., R. Lawton, L. Greene, R. Zabelicky, & E. Kephart 1955 THE EFFECT OF INCREASED FORCES OF ACCELERATION UPON THE BLOOD FLOW AND DISPLACEMENT OF INTRAVASCULAR FLUID. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 313; 31 Dec. 1955

ABSTRACT: The development of two forms of instrumentation for the study of blood flow are under way, the first utilizing the thermostromuhr principle, and the second the dye dilution technique. Instrumentation of the thermistor thermostromuhr has proceeded through one pilot model which indicated the unit to be insensitive at body temperature (37 degrees C). Attempts are being made to secure, at this time, high resistance thermistors which will be sensitive at the temperature of the blood. The construction, design, and procurement of all the equipment for the dye dilution technique have been completed. Calibration of all components has been carried out, as well as numerous experiments at 1 G level.

4,969

Stoll, A.M. 1956 HUMAN TOLERANCE TO POSITIVE G AS DETERMINED BY PHYSIOLOGICAL END POINTS. J. Aviation Med. 27(8):356-367, Aug. 1956. (See also (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA5508, 30 Aug. 1955.

ABSTRACT: A method of analysis of experimental data covering a wide range of acceleration rates and positive G levels is described. The data are plotted as a strength-duration curve and found to conform to the usual physiological pattern except in the range of low G for exposure times longer than 6 seconds, wherein cardiovascular reflexes become effective. Comparisons show agreement among the data from the Aviation Medical Acceleration Laboratory, Wright-Patterson Air Force Base, Naval School of Aviation Medicine at Pensacola, and Mayo Clinic centrifuges. A nomogram relating approximate tolerance times to various G levels attained at various acceleration rates is derived empirically and discussed with respect to the influence of the rate of attaining G level on the total tolerance time. (DACO)

4,970

Stoll, A.M. 1957 SOME PHYSIOLOGICAL AND PATHOLOGICAL EFFECTS IN CHIMPANZEES EXPOSED TO 40 TRANSVERSE G FOR 15 AND FOR 60 SECONDS (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR27, August 30, 1957

ABSTRACT: The purpose of this study was to determine some of the physiological and pathological effects in chimpanzees to approximately 40 G applied transversely from chest-to-back and from back-to-chest, simulating the supine and the prone pilot positions respectively, with maximum G maintained for 15 seconds in each position. Four adult chimpanzees were used and each animal was subjected to only one exposure. All animals were given a physical examination before the run and autopsied at a time between 18 and 44 hours following exposure. All 4 animals survived. Only provisional gross diagnoses are available from the

autopsies at this time; however, these indicated that none of the pathologic changes observed were sufficiently severe to constitute a lethal injury. Tentative conclusions are: (a) the position of less trauma is that in which the G force is applied from chest to back (supine); (b) in the position of less trauma, the heart rate is nevertheless profoundly reduced and some abnormalities in conduction are evidenced; and (c) while the animals survived, the EKG events recorded allow for the possibility that permanent damage to the conductive system of the heart may have occurred.

4,971

Stoll, A. M. 1957. INVESTIGATION OF HUMAN TOLERANCE TO COMBINED ACCELERATIONS (Naval Air Development Ctr., Johnsville, Pa.) July 1957

4,972

Stoll, Alice M. and J. D. Mosely 1958 PHYSIOLOGIC AND PATHOLOGIC EFFECTS IN CHIMPANZEES DURING PROLONGED EXPOSURE TO 40 TRANSVERSE G J. of Aviation Medicine 29(8):575-586, August 1958

ABSTRACT: Chimpanzees were used in acceleration tests to determine the maximum forces to which it was anticipated that man might be exposed. The immediate effect of the present study was to extend the experimentally observed survival limit for the chimpanzee to at least 40 G for sixty seconds at maximum G with relatively little damage resulting when the animal sustains the G force in the fully supine position. Undoubtedly from the evidence obtained, it may be inferred that a shorter exposure at this G level could be endured without loss of consciousness or incurrence of an incapacitating injury.

4,973

Stoll, A. M., & J. D. Mosely 1958 PHYSIOLOGIC AND PATHOLOGIC EFFECTS IN CHIMPANZEES DURING PROLONGED EXPOSURE TO 40 TRANSVERSE G. J. Avia. Med. 29(8):575-586, Aug. 1958

ABSTRACT: To learn more of the effects of accelerative forces, five chimpanzees were exposed to 40 transverse G for periods up to 60 seconds in length. Electrocardiographic and respiration measurements were made during exposure and pathological effects were noted during autopsy 18 to 44 hours after exposure. The condition of the animals after exposure was evaluated clinically also. Certain conclusions in regard to preferential position during exposure to acceleration are also given.

4,974

Stone, Gerald 1961 A STUDY OF THE STATIC STRENGTH CHARACTERISTICS OF THE HUMAN NECK. (Paper, Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Material Center, Philadelphia, Penn. June 14-15, 1961.

ABSTRACT: This paper is concerned with the development of procedures and techniques for determining the maximum static exertive force of the human neck. Detailed description of a specialized device fabricated for the purpose of determining maximum neck moments is presented along with experimental results obtained using this device.

In all, ten subjects were utilized to obtain the experimental data. The subjects were all well motivated and typical of the general pilot population.

The data obtained details static maximum exertive neck moments which are pertinent to engineering design in connection with ejection from high speed aircraft. Of particular interest in the presented data is the large difference extension moments, the extension moments being approximately four times the flexion moments. Also shown is a trend which indicates greater muscle strength exists on the left side of the neck.

A requirement is shown for more detailed studies to enable a better biomechanical understanding of the complex structure which comprises the human neck. Included in these studies should be dynamic analysis of the neck under the influence of impulse and cyclic loading conditions.

4,975

Stone, I. 1955 HELMET DESIGNED FOR SUPERSONIC BAILOUTS. Aviation Week, pp.33-35 , 12 Dec. 1955

ABSTRACT: A new full-face helmet has been developed to afford complete head and face protection for the pilot of today's high-speed aircraft. Retention of the conventional helmet and oxygen mask combination is among the prime requisites for survival in high-speed high-altitude bailouts and other emergencies, pilots say. North American Aviation will be the first to evaluate the new helmet, developed by Protection, Inc. The two firms have been collaborating on the project since the supersonic bailout of NAA test pilot George F. Smith (AW Nov. 14, p.14). Frequently, windblast has ripped away helmet and oxygen mask, exposing pilots to hypoxia (lack of oxygen) and head and face injuries. Integration of the helmet and mask could eliminate the loss of these components in the face of strong windblast.

4,976

Stone, I., & E. Clark 1956 USAF REVEALS NEW X-2 CRASH DETAILS. Aviation Week 65(19):26-27, 5 Nov. 1956

ABSTRACT: New details on the loss of the Bell X-2 rocket research plane and the death of USAF Capt. M. G. Apt are revealed. Apparently high-speed pitching of the aircraft caused the pilot to eject the capsule. There is some indication that blackout due to excessive negative g forces may have prevented the pilot from completing the ejection procedures.

4,977

Stone, I. 1958 GRAVITY, HEAT, AFFECT SPACE CABIN DESIGN. Aviation Week 69(14):30-31, 6 Oct. 1958.

4,978

Stone, R. W., Jr. and W. Letko 1962 THE EFFECTS OF ANGULAR MOTION OF ROTATING SPACE VEHICLES ON THE ABILITY OF AN ASTRONAUT TO PERFORM SIMPLE TASKS Paper, Annual Meeting of the Inst. of Environmental Sciences, Chicago, Ill., 10-13 April 1962.

ABSTRACT: Use of angular motion to simulate effects of gravity in weightless space is a possible solution to the prevention of deterioration of muscle tone, muscle atrophication, and debilitation of the cardiovascular system that man may face when exposed to long periods of weightlessness. Tests are conducted to determine the maximum rotational rate that will not induce motion sickness by head and body movement when rotating a space vehicle 24 feet in diameter. Test results showed that stimulation of the vestibular organs of the inner ear can be caused by rotational rates beyond 10 r.p.m. The cross-coupled dynamics involved when moving the head or body in a rotating vehicle may cause the vestibular stimulation. Also there was a decrease in effectiveness in task performance as the vehicle rate of rotation increased. Thirteen of 29 subjects tested failed to complete the entire experiment. Also, the subjects that completed the tests experienced a reduction in efficiency at the higher rotational rates (beyond 10 r.p.m.). All subjects experienced malaise and nystagmus, both being particularly bothersome beyond 10 r.p.m. The results furthee suggest the need for experiments wherein the head motion is controlled to remain below certain of the tolerance boundaries suggested, so as to determine if efficiency can be maintained below the tolerable limits.

4,979

Strand, O. T. May 1950 IMPACT EFFECT OF TWO TYPES OF PROTECTIVE HELMETS. (U. S. Air Force, Air Materiel Command, Wright Field, Ohio) AFTR 6020.

4,980

Streltsov, V.V. 1942 AVIATION MEDICINE AND PHYSIOLOGY IN RUSSIA DURING THE LAST 25 YEARS. Byull. Eskper. biol i med., (5-6)14:7-15

ABSTRACT: Russian aviation medicine did not exist under the Czars. In 1924 the first psychophysiologic laboratory for the study of the aviation problems of the Red Army was founded. This group first studied the physiology and hygiene of high flight - oxygen need under reduced barometric pressures, physiologic role of accelerated motion, and night vision in relation to the lighting of the cabin interior. In 1929 to 1930 there were studies on the ear and its relation to aviator's disease. Other studies took up the function of the heart and circulatory system. In 1931 began the studies in the barometric chamber on breathing, metabolism, digestion and function of the central nervous system and receptors.

In 1933 the first flight instruction in the barometric chamber was established and other such schools soon followed. Investigations were pursued on the influence of oxygen starvation on the central and vegetative nervous systems. Other experiments studied the effect of oxygen starvation on the digestive tract. Another field of study was the physiology of parachuting, begun in 1931, particularly a kinocyclographic analysis of parachute falls.

4,981

Streltsov, V. 1944 THE FUNCTION OF THE EYE IN AVIATION. Am. Rev. Soviet Med., 2:126-133, Abstract: Quart. Rev. Ophth., 1:44, 1945

ABSTRACT: Acute visual disturbances occur in pilots who perform high velocity turns at high altitude or take an airplane out of a dive. Two types of visual disorder result from increased force of gravity. When this force is directed caudad, the pilot has the sensation of a dark veil moving past the eyes from below upward; as speed is accelerated the visual field is greatly obscured or completely blacked out. This is due to an acute anemia of the retina, following a rush of blood from the head. When the force is directed cephalad, red spots appear before the eyes or on surrounding objects, and the sky appears to be colored red; this is due to vascular engorgement of the choroidal vessels.

The ocular function under flying conditions is also affected by high powered sources of light such as searchlights. Experiments have shown that when the eyes are exposed to the beam of a searchlight, the person is unable to see illuminated objects previously distinctly perceptible for 20 to 30 minutes. So far no ideal light filter to overcome this has been found.

4,982

Strickland, B.A. and G.L. Hahn 1949 THE EFFECTIVENESS OF DRAMAMINE IN THE PREVENTION OF AIRSICKNESS. Science, 20 :371

4,983

Strickland, B. A., Jr., G. L. Hahn & H. Adler 1950 STUDIES ON AIRSICKNESS. J. Aviation Med. 21(2):90-97.

SUMMARY: 1. Observations on the symptomatology of motion sickness during these studies have left the impression that the terms vagotonia and sympatheticotonia as applied to this condition are rarely applicable. No such distinct differentiation in symptmotology was noted among 485 subjects subjected to motion stimuli.

2. A new method of research on airsickness, the use of experimentally produced aircraft motion in actual flight, has been devised.

3. Dramamine (B-dimethylaminoethyl benzohydryl ether 8-chlorotheophyllinate) is a very effective preventive of airsickness.

4. Based on a preliminary controlled study of twenty susceptible subjects, Dramamine appears to be no more effective than a placebo in preventing swing sickness.

5. Under the conditions described, hyoscine hydrobromide in doses of 0.65 mg. is from 10 to 12 per cent better than Dramamine in preventing experimentally produced airsickness.

6. Among 206 subjects given 100 mg. doses of Dramamine there occurred an 8.7 per cent incidence of undesirable side effects. With 0.65 mg doses of hyoscine hydrobromide the only undesirable side effect noted among eighty-eight subjects was dryness of the mouth which occurred in 15 per cent.

7. In a controlled study of thirty subjects, Dramamine did not adversely affect the performance of a complex coordination test or a reaction time test.

4,984

Strickland, B. A., Jr., & G. L. Hahn, & H. Adler 1951 EFFECTS OF DRAMAMINE ON AIRSICKNESS. (School of Aviation Medicine, Randolph Field, Texas) Project No. 21-32-007, Rept. No. 1, Feb. 1951; ASTIA AD-98 533

SUMMARY: 1) A new technique of research on airsickness, namely, the simulation of flight under turbulent conditions by experimentally produced aircraft motion in actual flight, has been devised. 2) Dramamine proved to be a moderately good preventive of airsickness, reducing the sickness rate to 28.7 percent in contrast to 55.6 percent for subjects receiving placebos. 3) From a preliminary study of 20 susceptible subjects, dramamine appeared to be no more effective than placebo in preventing swing sickness. 4) Under the conditions described, hyoscine hydrobromide in doses of 0.65 mg. was superior to 100 mg. doses of Dramamine in preventing experimentally produced airsickness. 5) Of 206 subjects receiving Dramamine (100 mg) 8.7 percent experienced undesirable side effects. With hyoscine hydrobromide (0.65 mg) the only undesirable side effect noted among 88 subjects was dryness of the mouth in 15 percent. 6) In thirty subjects, Dramamine did not affect adversely the performance of a complex coordination test or that of a reaction time test. 7) When placebo only was administered, the incidence of airsickness was influenced by the time interval between the last meal and the flight. Time since last meal was of little consequence in influencing incidence of airsickness in subjects given Dramamine. 8) When placebo was administered the subject's expectation of becoming airsick influenced his chances of actually becoming airsick. When Dramamine was given as a preventive, the subject's expectation of becoming airsick did not affect his chances of becoming airsick. (AUTHOR)

4,985

Strollo, M. 1955 VARIOUS EXPRESSIONS OF INSTINCTIVE LIFE IN RATS AND THEIR RELATION TO ACCELERATION: EXPERIMENTAL STUDY. Riv. Med. Aeronaut. 18 (4).

4,986

Strollo, M. 1957 TREND OF BIMANUAL COORDINATION IN SUBJECTS EXPOSED TO DECELERATION AFTER ANGULAR ROTATION. (Andamento della coordinazione bimanuale in soggetti sottoposti a decelerazione dopo rotazione angolare) Rivista di medicina aeronautica (Roma), 20(4): 641-663, Oct. - Dec. 1957

ABSTRACT: Thirty subjects of a mean age of 27 years performed a bimanual coordination test to evaluate their tolerance to deceleration following angular rotation. Studies were made with a modified Casella's chrono-accelero graph connected to an instrument for the free bimanual coordination test. Tolerance was ascertained from two basic values, (1) the time which elapsed from the moment of deceleration to the moment of task performance, and (2) changes in task performance deduced from the number of errors and from the observed behavior. This test is valuable in presenting relative data of personal psychophysical characteristics, under the stress of brisk deceleration, which are essential for piloting and for selection of flying personnel. It also constitutes an efficient instrument for objective training by an exact determination of a candidate's capacities.

4,987

Strollo, M. 1959 PROSPETTIVE DI INTERESSE PSICOLOGICO IN MATERIA DI VOLO SPAZIALE (PSYCHOLOGICAL ASPECTS OF SPACE FLIGHT) Minerva Medica 50(31): 1141-1146
NOTE: Reel 11, Flash 6

ABSTRACT: A number of problems of applied physiology connected with the feasibility of launching a manned vehicle into space, probably with the intention of reaching other planets, are discussed and a brief review is made of the serious problems involved. The need for studying a number of particular aspects of man in space is stressed, in the first place from the standpoint of "survival", and secondly, of 'operativeness". A preliminary picture is also drawn of the presumable psychological reactions of man to space flight. This picture is forcedly limited and fragmentary on account of the uncertainty of the first, tentative, experimental approaches and the lack of reliable data. These psychological changes are classified according to three different structural levels of the human personality: 1) psycho-physiological (senso-perceptive reality); 2) emotional-affective (psycho-emotional resonances and balance); 3) intellective (performance and operativeness). (Minerva Medica 50(31):1157, 1959)

4,988

Strollo, M. 1961 [SOME EFFECTS PRODUCED BY RADIAL ACCELERATIONS OF DIFFERENT SIGNIFICANCE AT THE VISUAL-MOTOR LEVEL.]
Rev. Med. Aero (Paris) 2:40-43, Dec. 1961

4,989

Strong, H.L. 1952 THE AIR FORCE BOX SCORE PRESENTATION
(Conference on High Speed Escape, Wright Air Development Center, Wright-Patterson AFB, Ohio, 29-30 September 1952).

ABSTRACT: Experiences with conventional bailout are compared with bailout by means of an ejection seat on the basis of U.S. Air Force records and questionaires. The majority of fatalities due to ejection occurred in bailout below 2000 ft. A device for the automatic separation of the pilot from the ejection seat would alleviate this problem. Failure of the canopy jettisoning system was another cause of fatal or delayed escape. If the pilot could eject through the canopy, the number of accidents would be reduced. Standardization of releases and other devices, as well as elimination of unnecessary equipment might remove mental obstacles often responsible for accidents. Accidents could be further reduced by ejection seat training particularly when procedures and location of releases are changed; improvement of parachute training (over 50% of all escape injuries are connected with landing) is badly needed; and adequate oxygen training under the supervision of a specialized technician, who could also cope with problems related to the use of altitude suits, would be most important.

4,990

Strong, James 1955 1 G IN ALL DIRECTIONS
Aeroplane 88:676, May 20, 1955

ABSTRACT: A half-humorous review of space travel aspects of acceleration. The author believes that space ships should be designed for 1 G acceleration and deceleration in spite of fuel economics.

4,991

Strughold, H. 1936 LUFTFAHRTMEDIZINISCHE FORSCHUNG (Aeronautical Medicine Research)
Internationaler Sportarzte-Kongress, II. (Berlin) 2: 212-215

4,992

Strughold, H. 1946 SPEED IN AERIAL WARFARE AND PHYSIOLOGIC REACTION TIME. (War Dept., Air Forces) TSEAA-660-99, Appendix A, 28 Feb. 1945

4,993

Strughold, H. 1950 THE MECHANORECEPTORS OF SKIN AND MUSCLES UNDER FLYING CONDITIONS. In German Aviation Medicine, World War II (Washington, D. C.: U. S. Government Printing Office, 1950) pp. 994-999

4,994

Strughold, H. 1951 THE HUMAN TIME FACTOR IN FLIGHT I. THE LATENT PERIOD OF OPTICAL PERCEPTION AND ITS SIGNIFICANCE IN HIGH-SPEED FLYING (School of Aviation Medicine, USAF Randolph AFB, Texas) Special Report, January 1951

4,995

Strughold, H. 1955 THE MEDICAL PROBLEMS OF SPACE FLIGHT. International Record Med. 168:570-575

4,996

Strughold, H. 1956 A SIMPLE CLASSIFICATION OF THE PRESENT AND FUTURE STAGES OF MANNED FLIGHT. In School of Aviation Medicine, Randolph AFB, Texas, Epitome of Space Medicine, Item 31
See also J. Avia. Med. 27:328-331 , August 1956

ABSTRACT: An examination of environment, speed, and distance as factors in the evolution of rocket-powered space flight.

SECOND ABSTRACT: The final achievement of a space flight to the moon or to Mars will be the end result of a gradual evolution. The stages of this evolution are examined under three main categories in this article: (1) the physiological and mechanical properties of the environment; (2) the speeds attained by rockets; (3) and distances they travel over and away from the earth. (CARI)

4,997

Strughold, H. 1956 MEDICAL PROBLEMS INVOLVED IN ORBITAL SPACE FLIGHT
In School of Aviation Medicine, Randolph AFB, Texas, Epitome of Space Medicine, Item 32
See also Jet Propulsion 26:745-748, 756, 788, Sept. 1956

ABSTRACT: Discussion of medical problems involved in circumplanetary or orbital space flight including: the state of weightlessness, its sensomotor effect, and its effect upon the general wellbeing of satellite-vehicle occupants; the optical properties of the environment and the visual appearance of light sources; physiological day-night cycling; and problems of human engineering of the space cabin involving pressurization, supply of oxygen, removal of carbon dioxide, photosynthetic gas exchange, and the event of sudden decompression of the cabin. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903; ASTIA AD-227 817; Feb. 1959)

4,998

Strughold, H. 1958 FROM AVIATION MEDICINE TO SPACE MEDICINE
Air University Quarterly Review, Summer 1958
See also J. Avia. Med. 23(4):315-318, 329, 1952

ABSTRACT: A brief outline of the development of space medicine is given. The lower layer of the atmosphere supports propeller (up to 60,000 feet) and jet (up to 80,000 feet) flight and is the realm of conventional aviation medicine. Space medicine is concerned with additional dimension, vertical, and its province is rocket flight which has no vertical limit. The transition from lower atmosphere to space conditions is gradual and various physiological functions of the atmosphere cease at different altitudes. These 'space-equivalent' altitudes are: for anoxia, 52,000 feet; body fluids boil at 65,000 feet; heavy primaries of cosmic radiation penetrate to 120,000 feet; ultraviolet solar radiation, to 135,000 feet; optical appearance of the sky, 400,000 feet; and penetration of meteorites, 500,000 feet. The so-called upper atmosphere of physicists is, for all physiological purposes, equivalent to free space. Aviation at present is in an amphibious stage, in a transition between conventional flight and space flight. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space Medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903; ASTIA AD-227 817; Feb. 1959)

4,999

Strughold, H. 1958 MAN IN SPACE Flug-Revue 9:12-14 Sept. 1958.

5,000

Strughold, H. 1959 BIOASTRONAUTICS ADVANCES IN RESEARCH (USAF School of Aviation Medicine) Document 47999(U), March 1959

ABSTRACT: In this publication fifteen special progress reports are published which deal with problems immediately applicable in rocket flight and satellite flight. Other reports about progress in fields which will be of usefulness in more advanced space operations. All of these special reports may serve as a source of information for physiologists and physicians working in a space medicine or bioastronautics, and also to the physical scientists, rocket engineers, military officials and government administrators concerned with the national space program.

5,001

Strughold, H., & O. O. Benson 1959 SPACE MEDICAL RESEARCH New England J. Med. 261(10):494-502, 3 Sept. 1959

5,002

Stubbs, R. A. 1951 MOTION RECORDING DEVICES USED BY THE RCAF AND THE DEFENCE RES. MED. LAB. IN MOTION SICKNESS STUDIES. (Defense Res. Med. Lab., Toronto) October 1951.

5,003

Stubbs, R.A. 1953 DYNAMIC CENTRIFUGE TRIALS OF ANTI-G VALVES J. Aviation Med. 24(4):334-339, 370

ABSTRACT: The effects of various input pressures and ambient temperatures on the Aro M-8 and Clarke M-4 anti-g valves were investigated using wooded dummies and human subjects (wearing G-4A and G-4B anti-g suits) on the RCAF centrifuge. The valves were subjected to centrifugal accelerations of 3 to 8 g at 1 g increments. Each valve was subjected to more than 1,200 centrifuge runs. The results indicated that the Aro M-8 valve has some advantages over the Clarke M-4 valve in meeting the anti-g valve requirement of a modern, high speed aircraft.

5,004

Strumza, M. V. 1961 [PROBLEMS POSED BY SPEED (ACCELERATION, DECELERATION)] Presse. Med. 69:317-320, Feb. 11, 1961

5,005

Stubbs, R. A. 1960 SOME ENGINEERING CONSIDERATIONS FOR THE MANNED ORBITING VEHICLE. Can. Aeronaut. J. 6:375-379, Nov. 1960

ABSTRACT: Cabin pressure, temperature, and constituent gases, along with man's tolerance to accelerations during launch, orbit, and reentry are discussed in this paper. (CARI)

5,006

Stubbs, S.M. 1963 INVESTIGATION OF THE SKID-ROCKER LANDING CHARACTERISTICS OF SPACECRAFT MODELS. (National Aeronautics and Space Administration, Washington) Technical Note D-1624, April 1963

ABSTRACT: A "belly-landing" technique in which the vehicle was caused to skid and rock on its curved lower surface (heat shield) in order to convert sinking-speed energy into angular energy was investigated on a hard-surface runway for speed ranges that might be encountered in the use of a paraglider letdown system Landings were also made in calm water. Landing motions and acceleration data were obtained over a range of landing attitudes, horizontal velocities, and vertical velocities. Stability limits for various center-of-gravity locations were determined for hard-surface landings. A brief experimental study was made of the effect of a small shock absorber on accelerations and rocking motions.

5,007

Stuckman, E.C. 1959 PROJECT MERCURY, PILOT SUPPORT SYSTEM DEVELOPMENT LIVE SPECIMEN EXPERIMENT. (McDonnell Aircraft Corporation) Report 6875, Serial No. 11, 1959.

ABSTRACT: Four live female Yorkshire pigs were subjected to impact landing tests simulating the Mercury capsule landing in a laboratory investigation of the energy absorbing characteristics of columned aluminun honeycomb. Two specimens sustained impact accelerations of approximately 38g without injury while the other two sustained impact accelerations of approximately 58g with only minor internal injuries. None of the specimens were rendered senseless by the impact. Preliminary biological analysis of the specimens indicates the improbability of serious effects from any of the injuries of the test subjects.

5,008

Sturm, R. 1944 DESCRIPTION OF A DEVICE FOR MEASURING BLOOD PRESSURE UNDER INCREASED G. (Acceleration Conference, Rochester, Minn.) 23 Feb. 1944

ABSTRACT: An inflatable cuff covers the wrist of the subject. Cuff pressure and

finger pulsations are recorded. Systolic blood pressure is taken as that pressure just below the cuff pressure which cuts off finger pulsations. Blood pressure at any level of the body may be determined by anchoring the hand at that level.
Trial runs show that blood pressure is well maintained at heart level during 5 to 6 "g" on the centrifuge. This does not look as if venous return were impaired.

5,009

Sturm, R. E., & E. H. Wood 1944 AN INSTANTANEOUSLY RECORDING CARDIOTACHOMETER APPLICABLE TO THE STUDY OF HEART RATE CHANGES IN HUMAN BEINGS DURING EXPOSURES TO ACCELERATION (Mayo Clinic) CAM No. 371; Sept. 1944

ABSTRACT: For human centrifuge studies of acceleration a record of instantaneous heart rate is necessary. The circuit diagrams and an explanation of the operation of a suitable cardiotachometer are given. The instrument is activated by the R wave impulse of the ECG but can be adapted for activation by ear opacity, volume, or pressure pulse impulses. By appropriate modification the instrument can be used to record the instantaneous rate of occurrence of any phenomenon which produces or can be caused to produce changes in electrical potentials.

5,010

Sturm, R. E., E. H. Wood & E. H. Lambert 1945 DETERMINATION OF MAN'S BLOOD PRESSURE ON THE HUMAN CENTRIFUGE DURING POSITIVE ACCELERATION. Fed. Proc. 4(1):69, March 1945.

ABSTRACT: An apparatus consisting of the following parts has been devised for the indirect determination of man's systolic blood pressure on the human centrifuge: (1) an inflatable cuff surrounding the wrist; (2) a magnetically operated inflating valve, which on opening raises the cuff pressure 40 mm. of mercury; (3) a constant leak, deflating the cuff approximately 10 mm. of mercury per second; (4) a photo-electric opacity pulse detector on a finger distal to the cuff and (5) an adjustable electonic synchronizer, which opens the magnetic inflating valve in response to impulses received from the photo-electric pulse detector.

In operation, the cuff pressure is raised above systolic blood pressure. The constant leak then slowly reduces this pressure. When a systolic pressure peak pushes a pulse wave past the cuff, it is detected in a finger. The pulse activates the magnetic valve, which instantly raises the cuff pressure 40 mm. of mercury. By simultaneously recording the finger pulsations and the wrist cuff pressure a determination of systolic blood pressure at the wrist is obtained every three or four heart beats.

During exposure to positive acceleration the blood pressure at the level of the eyes fell approximately 20 to 30 mm. of mercury per g increase in acceleration. The maximal fall occurred within seven seconds and was followed by recovery of the blood pressure level while acceleration was maintained. Thus like other physiologic changes in man during positive acceleration, the blood pressure displays a period of failure followed by a period of compensation.

5,011

Sturm, R. E., & E. H. Wood 1946 AN INSTANTANEOUSLY RECORDING CARDIOTACHOMETER. (Acceleration Lab., Mayo Aero Medical Unit, Rochester, Minn.)

ABSTRACT: An instrument has been developed which continuously and instantaneously records the heart rate. In principle, the device consists of an electrical circuit which deflects a galvanometer at a constant rate; the swing of the galvanometer is interrupted and returned to the zero position instantaneously ($\frac{1}{50}$ second) by the R-wave of the electrocardiogram. Thus, the length of the galvanometer deflection is proportional to the interval between successive R-waves and when used with a suitable camera the device plots a graphic record of the heart rate with each heart beat.

The instrument was designed to allow convenient study of the rapid changes in heart rate which occur in man during exposure to positive acceleration and for this purpose has been extensively and satisfactorily used in this laboratory for some years. It has been found that throughout the period of progressive failure which is encountered during the first six to eleven seconds of exposure to positive gram the heart rate rapidly increases. If the acceleration is maintained, the period of compensation then occurs and this increase is checked and the heart rate is usually slowed.

Although as used in these studies the instrument is activated by the R-wave impulses of the electrocardiogram, it can easily be adapted to record the pulse rate from opacity, volume or pressure pulse impulses. Also, by appropriate modification it can be used to record the instantaneous rate of occurrence of other phenomena which produce or can be made to produce changes in electrical potentials.
(Federal Proceedings 5(1):102, 1946)

5,012

Suchs, L.D. 1952 HISTORICAL SKETCHES OF THE CATAPULT DEVELOPMENT PROGRAM (Pitman-Dunn Labs., Frankford Arsenal, Philadelphia, Pa.) 29-30 Sep. 1952, ASTIA AD-14 357

5,013

Sudan, E. J. 1942 LES EFFECTS PHYSIOLOGIQUES DUS AUX GRANDES VITESSES (The physiological effects of very high velocity) Schweiz. Aero Rev. 229-230, 1942.
ABSTRACT: Aeronaut.Engng. Rev. 179, 1942.

5,014

Suddath, J. H. 1960 A THEORETICAL STUDY OF THE ANGULAR MOTIONS OF SPINNING BODIES IN SPACE. NASA TR R-83

5,015

Sueda, M. 1937 INFLUENCES OF VIBRATIONS: EFFECT ON BODY WEIGHT AND LIFE PERIODS OF ANIMALS
Mitt. Med. Acad. Kioto (Kyoto-Ikadaigaku Zasshi) 21:1703, 1704

ABSTRACT: A train in motion produces two types of vibration: vertical or, up-and-down, and a side-to-side lurching movement. To test the effects of these motions upon the body-weight and the life period of animals, the following experiments were performed.

1. One group of rabbits was placed in a box constructed so as to shake vertically with a vibrating amplitude of 2 cm and at a vibration speed of 140 times per minute. A second group of rabbits was placed in a box prepared to reproduce the lurching vibrations of trains, i.e., the box moved from side-to-side with an angle of inclination 7°34" 4', and at a vibrating speed of 140 times per minute. These two boxes were shaken continously by electric power and the effects upon the animals noted.

It was found that the vertical vibration caused by relatively slight injuries. The body weight decreases rather slowly at first, but after a certain period the decreasing stops despite the continuance of the vibrations. The body weight thus lost was not recovered even after a long rest. Some of the animals lived for a long period under these conditons although some of them died of disease which developed while they were being shaken.

Those animals subjected to the lurching motions died after 9 to 21 days (mean 16.5), the rate at which the body weight declined was much higher than in the case of the animals shaken vertically. Just prior to death, the weight of the animals suffered an additional sudden decrease.

From these results, and from my former conclusions concerning the life period of spermatozoa subjected to vibrations, we may conclude that the vertical motion of trains has but relatively little harmful effect upon passengers while the lurching motion has a much more serious effect.

2. Two groups of white rats under an absolute fast wer subjected to continous horizontal vibrations. The vibrating amplitude of the first group was 2 cm, and of the second 4 cm. The first group died in 2.5 days, and the second in 2.0 days, while those rats on an absolute fast not being subjected to vibrations (the controls lived for about 6 days. These results demonstrate the injurious effects of vibration upon the life period of animals. The longer the period of vibration is continued, the greater the rate at which the body weight diminishes.

5,016

Sueda, M. 1938 EXPERIMENTAL STUDY OF THE EFFECT OF VIBRATIONS UPON THE BLOOD PRESSURE OF RABBITS. Mitt. Med. Akad. Kioto, 24:672-676

ABSTRACT: A group of male rabbits were placed in a box prepared to reproduce the lurching vibrations of trains and the box was moved for 24 hours continuos ly. At certain intervals during and after the shaking operation, the maximal blood pressure was examined. The results were as follows:

1. In the case of a large number of animals (a) the maximal pressure rises during the course of the shaking process. In the case of the remainder (b) the pressure falls. Following 24 hours of continuous shaking, the blood pressure returns essentially to its original point in both groups.

2. In the case of convalescent animals, the blood pressure rises slightly in group "a" and remains at this point even after 24 hours of repose. In group "b" the blood pressure rises slightly at the beginning of the process, then falls, a fall from which it does not recover even after 24 hours of repose.

5.017

Sullivan, G., T. A. Schulkins, and T. Freedman 1961 INTERNALIZED ANIMAL TELEMETRY SYSTEM—BIOMEDICAL AND SURGICAL CONSIDERATIONS. Aerospace Medicine 32(3):249, March 1961.

ABSTRACT: This paper describes an experimental chronic instrumentation system that makes use of a single channel telemeter to eliminate the disadvantages usually seen in conventional animal instrumentation systems. Discussed are the size and shape of the telemeter unit, the selection of site of implementation and the physiological parameter selected for experimental transmission. The electrode type and location and the introduction of artifacts are discussed as well as the surgical procedure and post operative convalescence. Finally the physiological data obtained and the significance of this data in evaluating the response of the cardiovascular system to severe environmental conditions of loud noise, severe vibration and large G forces is reviewed.

5,018

Sullivan, G.H., C.J. Martell, & G. Weltman 1963 MYOELECTRIC SERVO CONTROL. (Spacelabs, Inc., Van Nuys, California)

ABSTRACT: Under high accelerative forces, it becomes extremely difficult for a pilot physically to move his arms and hands to exercise control over his craft. By attempting to move his arms, the pilot generates muscles action potentials, or myoelectric signals, which may be utilized as a control source. The basic arm movements desired, and the muscles involved, were determined and the myoelectric activity patterns characteristic of the movements measured. Transforms were performed on the "raw" signals and control logics which relates myoelectric signals to desired servoaction were written. A simulator trainer was constructed which accepts the myoelectric inputs from sets of three or four muscles, indicates the desired arm movement, performs the preset logic on the elicited myoelectric signals, provides success-failure feedback and drives a splint in uniplanar up-down movement. The development of the control logics and servo system mark a significant advance in prosthetic control with direct application to amputees and malformed (Thalidomide) children.
(Aerospace Medicine 34(3):267, March 1963)

5,019

Sullivan, James 1962 MAN AGAINST SPACE--HIGH G AND ZERO G.
Science World, Vol 4, No. 5 4 April 1962

5,020

Summerfield, M. 1957 PROBLEMS OF LAUNCHING AN EARTH SATELLITE. PART I
Astronautics 2(4): Nov. 1957

5,021

Summerfield, M. 1957 PROBLEMS OF LAUNCHING AN EARTH SATELLITE. PART II.
Astronautics 2(5): Dec. 1957

5,022

Sunderman, J.F. 1958 BIBLIOGRAPHY OF SPACE LITERATURE
AF Mag. , 41: 168-174, March 1958

ABSTRACT: Books on missiles, rockets, satellites, astronautics, space, space-flight, and closely related fields, listed by subject area and by the year published.

5,023

Suvorov, P. M. 1958 EFECT OF ANGULAR ACCELERATION ON THE SECRETORY AND MOTOR ACTIVITY OF THE HUMAN STOMACH Bull. Exper. Biol. and Med. 45(5):531-532, May 1958.

ABSTRACT: Secretion of gastric juice was measured in human subjects during and after angular accelerations of 3-5 g for 30 seconds. Gastric secretion was stimulated by inflation of rubber bag in the stomach or by ingestion of a 5% alcohol solution. Acceleration was found to produce an inhibition of gastric secretion for 10-30 minutes, followed by a sharp increase in activity. Increased secretion was generally accompained by increases in the free and total acidity and peptic activity of the joice. Periodic contractions of the stomach were unchanged. Repeated accelerations at intervals of 5-6 days had no significant effect on the gastric response to acceleration.

5,024

Suvorov, P. M. 1958 VLIIANIE RADIAL"NYKH USKORENII NA SEKRETSIU SLIUNNYKH, ZHELUDOCHNYKH ZHELEZ I PERIODICHESKIE SOKRASHCHENIIA ZHELUDKA (The Effects of Radial Accelerations on Salivary and Gastric Gland Secretion and on Periodic Gastric Contraction).
Biull. eksp. biol. med. 46(9):28-34, Sept. 1958.

ABSTRACT: The author studied the effects of radial accelerations on the secretion of parotid glands, gastric glands, and on periodical stomach contractions. Radial accelerations in the craniocaudal and caudocranial directions caused inhibition of the reflex salivary secretion and of periodic stomach contractions. A spontaneous secretion of the gastric juice was noted in high accelerations in dogs with a Basov stomach fistula. Disturbance of the para-sympathetic innervation in a dog with an isolated Heidenhain stomach pouch resulted in the absence of spontaneous gastric secretion. However, a prolonged inhibition of gastric secretion was noted in these conditions. It is assumed that the changes described above are connected with the changes in the nervous system particularly in its parasympathetic and sympathetic portions.

5,025

Suvorov, P. M. 1959 "EFFECT OF ANGULAR ACCELERATION ON THE SECRETORY AND MOTOR ACTIVITY OF THE HUMAN STOMACH.
A.M.A. Proceedings , April 1959

Abstract: Five persons were subjected to radial accelerations. During accelerations and for ten to thirty minutes after their discontinuance there was complete absense of gastric secretion followed by a period of increased secretion (about three times more than under normal conditions). Upon repeated stimulation, only insignificant normalization of these changes took place. The periodic contractions of the stomach remained unchanged.

5,026

Suvorov, P. M., & M. G. Papkov 1960 (CENTRIFUGE TESTS ON FLYING PERSONNEL WITH FUNCTIONAL CNS DISTURBANCES.) Voyenno-meditsinskiy zhurnal 1960 (8):73-76.

ABSTRACT: A study of the effect of radial acceleration on personnel with functional CNS disturbances, but fit for flying duty. During acceleration the normal regulation of the cardio-vascular system is impaired. The use of the centrifuge in aviation medicine allows more direct investigation of the ability of personnel to withstand radial acceleration and hence their more accurate medical assessment. (CARI)

5,027

Suvorov, P.M. and M.G. Papkov 1960 THE VALUE FOR MEDICAL EXPERTISE OF EXAMINING FLIGHT PERSONNEL WITH FUNCTIONAL DISTURBANCES OF THE NERVOUS SYSTEM IN A CENTRIFUGE. Military Medical Journal (8):117-122, JPRS #7609, August 1960

5,028

Surosky, A. E., D. A. Hill, & J. S. di Rende 1959 GRAVITY-ZERO GRAVITY --- ENVIRONMENTAL CONTINUUM. In 1959 Proceedings of the Institute of Environmental Sciences, Annual Technical Meeting, April 22-24, 1959, La Salle Hotel, Chicago, Illinois (Institute of Environmental Sciences, Mt. Prospect, Ill.) pp. 189-192

ABSTRACT: Gravity, a universal environment, is rapidly assuming a critical role as an environmental parameter. Its decrease with increasing altitude and its rapid effective variation from zero to several g's leads to some unusual design problems. This paper conjectures on the nature of gravity and future utilization of its gradient. The effects of the gravity-zero gravity continuum on men and equipment are discussed. Some thoughts are presented concerning the "gravity" environment in the test laboratory. (AUTHOR)

5,029

Suzuki, J., & G. Totsuka 1960 POSTROTATORY NYSTAGMUS: MODIFICATIONS OBSERVED IN EXPERIMENTS WITH REPEATED ROTATORY STIMULATION. Acta oto-laryngol. 51:570-578

5,030

Suzuki, J. I., & A. Komatsuzaki 1962 CLINICAL APPLICATION OF OPTOKINETIC NYSTAGMUS: OPTOKINETIC PATTERN TEST. Acta oto-laryngologica (Stockholm) 54(1):49-55, Jan. 1962

ABSTRACT: Optokinetic nystagmus was provoked by constant acceleration followed by constant deceleration of an electrically controlled rotating drum. Nystagmus thus induced was recorded on a chart fed at the speed of 0.1 cm./sec. Two-channel electronystagmography was used with time constants of 6 seconds and 0.015 seconds in order to approximate the former to eye deviation and the latter to eye speed. Eye speed of the slow-phase-induced nystagmus in normals increases and decreases in close approximation to the angular speed of the drum. The patterns obtained were denominated "optokinetic pattern" (OKP), and the procedure "OKP test". OKP was modified by a weak spontaneous vestibular nystagmus in proportion to its degree. When optokinetic stimulation was applied to spontaneous nystagmus of ocular or central origin, OKP appeared to show characteristic patterns according to causative lesions. An analysis of these patterns, therefore, is expected to contribute to differentiation and identification of spontaneous nystagmus. (AUTHOR)

5,031

Swearingen, J.J. 1950 PROTECTION OF PASSENGERS AND AIR CREW FROM AIR BLAST EFFECTS OF EXPLOSIVE DECOMPRESSION.
(Civil Aeromedical Research Institute, Federal Aviation Agency, Oklahoma City, Oklahoma) Project No. 50-516, CARI Report No. 1, Aug. 1950.

ABSTRACT: Sudden loss of pressure as the result of structural failure in pressurized aircraft results in the immediate exposure of personnel to two major stresses: wind blast and lack of oxygen. The Civil Aviation Medical Reseach Laboratories have recently studied the effects of the air blast of explosive decompression on "passengers" seated at various distances from windows of the same dimensions as those found in some current transport aircraft. The first method of protection considered is location of the seats beyond the boundaries of the danger area. The second is application of the simple principle of increasing the time of pressure equalization. Application of this latter principle appears to be practical, need not interfere with vision, and will not cause uneasiness since passengers will not be aware of its use.

5,032

Swearingen, J.J. & D.J. Morrow 1956 MOTIONS OF THE HEAD AND TRUNK ALLOWED BY SAFETY BELT RESTRAINT DURING IMPACT.
(Civil Aeronautics Medical Research Laboratory, Federal Aviation Agency, Oklahoma City, Okla) Project. No. 53-204. June 1956.

ABSTRACT: This study was conducted to record and describe the actual path of motion of the head and trunk as it is propelled forward or to the side over a safety belt in a crash. Records of these orbits of motion for one hundred male subjects are presented in the three figures immediately following: Because of the low forces (about 1 g) used to displace the body in this study, the measurements presented here must be considered as minimal protective distances. In the crash situation two factors will certainly act to permit greater movements of the body. These are : (a) the greater forces involved in crashes, and (b) the practice of passengers wearing their lap safety belt more loosely than the standard maintained for these tests. In this connection laboratory tests were conducted, and even under the 1 g forward loading, it was demonstrated that the soft tissues of the abdomen are compressed until the safety belt is virtually a straight line across the iliac crest of the pelvis. Hence the forward displacement of the body will be increased one inch for every two inches of safety belt not pulled through the buckle.

5,033

Swearingen, J.J., E.B. McFadden, J.D. Garner, & J.G. Blethrow 1960 HUMAN VOLUNTARY TOLERANCE TO VERTICAL IMPACT. (Paper, 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960). Aerospace Med. 31(12):989-998

ABSTRACT: Results of several facets of testing of human tolerance to vertical impact forces in standing and sitting positions are presented. Tentative strength of the legs at various knee angles was determined in the standing position by static and dynamic tests. In addition x-ray studies of bone deformation during static loading were made.

5,034

Swearingen, J.J., E.B. McFadden, J.D. Garner, J.G. Blethrow and W. Reed 1960 PROTECTION OF SHIPBOARD PERSONNEL AGAINST THE EFFECTS OF SEVERE SHORT-LIVED UPWARD FORCES RESULTING FROM UNDERWATER EXPLOSIONS. (Federal Aviation Agency, Civil Aeromedical Research Inst., Oklahoma City, Okla) Contr. NA-onr-104-51, Jan. 1960

ABSTRACT: Human voluntary tolerances to vertical impact were determined while standing with knees locked, standing with knees bending, squatting, and seated in a rigid chair. Various energy-dissipating materials and devices were evaluated for protection against vertical impact.

5,035

Swearingen, J. J. & E. B. McFadden 1960 STUDIES OF AIR LOADS ON MAN. (Civil Aeromedical Research Institute, Federal Aviation Agency, Oklahoma City, Oklahoma) CARI Report 63-9, See also Human Factors, 2(2):84-91. May 1960.

ABSTRACT: Data obtained in three different studies related to measurement of forces on the body due to air movement are summarized. The effects of short duration blast forces on personnel seated or standing at various distances from openings during pressure loss, blast forces necessary to disorient the body from numerous positions, effects of clothing on the drag forces, and measurements of forces and moments on the body during wind tunnel tests are discussed and compared.

5,036

Swearingen, J. J. & E. B. McFadden 1960 STUDIES OF AIR LOADS ON MAN. Human Factors, 2(2):84-91, May 1960
See Also Civil Aeromedical Research Institute, Federal Aviation Agency, Oklahoma City, Oklahoma. CARI Report 63-9

ABSTRACT: Data obtained in three different studies related to measurement

of forces on the body due to air movement are summarized. The effects of short duration blast forces on personnel seated or standing at various distances from openings during pressure loss, blast forces necessary to disorient the body from numerous positions, effects of clothing on the drag forces, and measurements of forces and moments on the body during wind tunnel tests are discussed and compared.

5,037

Swearingen, J. J., E. B. McFadden, J. D. Garner, and J. G. Blethrow 1960 DETERMINATION OF HUMAN TOLERANCE TO VERTICAL IMPACT FORCES (FAA, Oklahoma City, Oklahoma Contract NAonr 25-58, Task No. NR 102-074.

ABSTRACT: Relative strength of the legs at various knee angles was determined in the standing position by three different test procedures. Man's weakest knee angle was found to be 60°.

X-ray studies of the legs and feet during vertical loading failed to reveal any bending of the femur or tibia or compression of cartilages in the knee or ankle. There was a slight lateral bending of the fibula and the tarsal and metatarsal bones were displaced downward.

Human voluntary tolerances to vertical impact were determined while (1) standing with knees stiff, (2) standing with knees bending, (3) squatting, and (4) seated in a rigid chair. In addition, various energy-absorbing materials and devices were evaluated for protection against vertical impact. These tolerances and evaluations are being summarized.

5,038

Swearingen, J.J. & R.G. Snyder 1961 HUMAN TOLERANCE TO VERTICAL IMPACT. (Paper, Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Material Center, Philadelphia, Pa., June 14-15, 1961)

ABSTRACT: The results of several studies concerned with the voluntary physiological tolerance limits and transmission of impact forces parallel to the body's logitudinal axis (caudal-cranial) are presented. Over 500 tests of 13 male subjects were conducted utilizing an instrumented drop test apparatus. Impact forces at the foot and seat level and attenuation at shoulder level was measured for each subject. Results of the seated impacts showed that subjects seated on a rigid chair seat reached voluntary tolerance (complaints of severe pains in chest, head, abdomen, and lumbar spinal areas) when the shoulder accelerometer reached 10-12 G at over 600 G/sec. with mean initial impact loads of 95 G (.0075 sec, 19,000 g/sec jolt). Various materials and methods including Styrofoam, polyvinyl chloride, undrawn nylon, horsehair and rubber, hydraulic bleed pistons, and Stafoam were studied in an attempt to increase the deceleration time and subjects tolerance. Of these, Stafoam indicated most promise as a significant damping agent. Standing impact tolerance was studied with knees locked stiffly and with knees flexed. Attempts to determine static leg loading

through double exposure x-rays was essentially negative. Strength of the legs at various knee angles in both static and dynamic tests, and human tolerance to impact in the squatting position were also investigated. Brief discussion of more recent vertical deceleration research activities at CARI are noted.

5,039

Swearingen, J. J. 1962 DETERMINATION OF CENTERS OF GRAVITY OF MAN. (FAA, Civil Aeromedical Research Institute, Oklahoma City, Okla.) 62-14 August 1962.

5,040

Swearingen, J. J., A. H. Hasbrook, R. G. Snyder, & E. B. McFadden 1962 KINEMATIC BEHAVIOR OF THE HUMAN BODY DURING DECELERATION. Reprint Aerospace Medicine 33:188-197, Feb. 1962
See also (Civil Aeromedical Research Institute, Federal Aviation Agency, Oklahoma City, Oklahoma) Rept. 62-13; ASTIA AD-283 938; June 1962

ABSTRACT: The geometry of motion of the head, trunk and appendages was established for one hundred male subjects restrained by a safety belt during forward and side dynamic loadings. Lethal structures of present aircraft seating and cockpit arrangements are revealed by correlating crash injuries with these kinematic data. In addition an analysis of the forces created by body kinematics during forward deceleration sheds new light on seat anchorage problems. (AUTHOR)

5,041

Sweeney, H. M., & H. S. Mayerson 1937 EFFECT OF POSTURE ON CARDIAC OUTPUT. Amer. J. Physiol. 120:329-335

5,042

Sweeney, H.M. and E.J. Baldes 1946 INVESTIGATION OF HUMAN TOLERANCE DURING HIGH LINEAR DECELERATION - A STUDY OF HUMAN TOLERANCE TO FORCES DEVELOPED IN AIRCRAFT CRASHES. Special CAM Report, 14 June 1946

5,043

Sweeney, H.M. 1948 PRINCIPLES OF PROTECTION AGAINST EFFECTS OF NEGATIVE G. Federation Proc., 7:121

ABSTRACT: A colored motion picture was made to show methods of protecting against the effects of negative acceleration. The development of hemorrhage and petechiae

in the sinuses and conjunctivae is shown in man and animals. Motion pictures of the blood vessels of the brain of a monkey with a lucite calvarium under g show that within the closed box of the skull fluid counter-pressure protects against blood vessel ruptures. The technique of radial arterial and frontal vein canullation using an Ungar type double needle is demonstrated together with the use of a Gauer-Wetterer inductance pressure gauge for measurement of venous and arterial-pressure in man while undergoing negative acceleration. This film shown pictures of humans undergoing abrupt accelerations demonstrating the greater tolerance achieved by shortening the period of application of g The principle of protection afforded by inclination of the long axis of the body to the direction of the g-forc is demonstrated.

5,044

Sweeney, H. M. 1949 HUMAN CENTRIFUGE IN OPERATION AT AERO MEDICAL LABORATORY TO DETERMINE "G" TOLERANCES. Technical Data Digest pp. 15-24, 1 April 1949

ABSTRACT: High-speed postwar aircraft have intensified the problem of determining exactly how many g's a pilot can tolerate in an average turn lasting from 10 to 15 seconds. The Air Materiel Command's Aero Medical Laboratory uses a human centrifuge, which simulates the flight of a fast plane in a turn, to find out if anti-g suits, either presently used or proposed, are capable of protecting an airman from blackout and subsequent unconsciousness. (DACO)

5,045

Sweeney, H. M. 1951 HUMAN DECELERATOR
J. Avia. Med. 22(1):39-41; 49, Feb. 1951

ABSTRACT: A device for controlled linear deceleration has been developed, with which the three important factors of acceleration, magnitude, rate of change and duration, can be independently varied through a known reproducible range, permitting a quantitative application of all combinations of factors for the evaluation of the effect of each factor.

5,046

Swann, H. G. 1944 PHYSIOLOGICAL EFFECTS OF HIGH NEGATIVE MASK PRESSURES DURING A SIMULATED FREE FALL. (U. S. Army Airforce, Air Materiel Command, Wright Field, Ohio) TSEAL-3-696-68, Report #1, Nov. 1944.

5,047

Swann, H. G. 1945 PHYSIOLOGICAL EFFECTS OF HIGH NEGATIVE MASK PRESSURES DURING A SIMULATED FREE FALL. (U. S. Army Airforce, Air Materiel Command, Wright Field, Ohio) TSEAL 3-696-38A, Report #2, March 1945.

5,048

Sweeney, R. 1957 STUDIES PROBE MAN'S FUNCTION IN SPACE. Aviation Week, 67(26):45-47,49. Dec. 30, 1957

ABSTRACT: Research activities are described on problems of man's existence and function during space flight as carried out by three Southern California contractors: North American Aviation, Convair, and the Douglas Aircraft Company. These studies, taking place before manned space flight is attempted, range from proposals (as in the case for North American) to a service for specific investigations to company-under-written general thinking efforts. Convair projects described include investigations of (1)human tolerance to complex and transverse accelerations; (2) human tolerance to combined environmental stresses in today's high-performance aircraft; (3) criteria concerning selection and training of bio-satellite crews; (4) calculations on a manned nuclear-propelled space vehicle; and (5) human factors in design of minimum capability required for a manned orbital vehicle. Douglas Aircraft Co. work has been categorized into three phases: supersonic at altitudes up to 100,000 ft.; hypersonic, over Mach 5, flight at altitudes up to one million feet; and pure space flight.

5,049

Sweeney, Richard 1958 SPACE MONOPOLIZES CONTROL STUDY Aviation Week 68:34-35, Feb. 10, 1958

ABSTRACT: It was indicated at a USAF Control-Display Integration Symposium in early February that space flight technology study proposals would be along the following lines: reference and coordinate systems; acceleration control; and flight path reference.

5,050

Sweeney, Richard 1958 PILOT OUTLINES ORBITAL TEST PROGRAM Aviat. Wk. 68:51-57, April 28, 1958

ABSTRACT: Summary of a paper by A.W. Blackburn in which is outlined a four-phase program for flight testing an operational vehicle system proposed to place a manned aircraft in orbit. Design and performance parameters are taken from vonBraun's Mars project and scaled down.

5,051

Sweeney, R. 1959 CENTRIFUGE CHECKS ORBITAL PILOT STRESSES. Aviation Week 70(23):52-53, 55, 59, 8 June 1959

5,052

Sweeney, R. 1959 CENTRIFUGE TESTS PILOT RE-ENTRY CONTROL Aviat. Week 71:89, July 6, 1959

5,053

Sweitzer, Dorothy I. 1960 ASTRONAUTICS INFORMATION. BIOLOGICAL AND ARTIFICIAL INTELLIGENCE
(Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena) Dec. 1960, Literature search no. 254, Contract NASw-6 ASTIA AD 251 506

5,054

Sweitzer, Dorothy I. 1961 ASTRONAUTICS INFORMATION. BIOLOGICAL AND ARTIFICIAL INTELLIGENCE
(Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena) May 1961, Suppl. to Literature search no. 254, AD 251 506, Contract NASw-6 ASTIA AD 262 179

5,055

Switzer, R.E. 1951 FINAL REPORT--PHYSIOLOGICAL, BIOCHEMICAL AND ANATOMICAL EFFECTS OF ACCELERATION ON THE BODY RELATIVE TO PILOT POSITION IN HIGH-SPEED AIRCRAFT. (A reprint of USN project by the University of Southern California). Pub. no. M 35-51, 10 July 1951.

5,056

Syrotynin, M. M. 1961 COSMIC MEDICINE AND ITS TASKS (Kosmichna Medytsyna ta Yiyi Zavdannya)
Trans. of Fiziologichnyy Zhurnal (USSR) 7(1):3-8, 1961.
(Joint Publications Research Service, New York, N. Y.)
June 14, 1961 JPRS: 9418

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5,057

Taborelli, R. V., I. G. Bowen, & E. R. Fletcher 1959 TERTIARY EFFECTS OF BLAST--DISPLACEMENT (OPERATION PLUMBBOB). (U. S. Civil Effects Test Group) Report WT-1469; Project 33.3; 22 May 1959

ABSTRACT: The objective of Project 33.3 was to determine the velocity-time and distance-time histories of anthropomorphic dummies and equivalent spheres (idealized models having an acceleration coefficient α equal to that of the dummy) displaced by blast winds. The dummies and spheres were located at stations within regions of about 5 and 7 psi overpressures.
The technique used for recording the movement of these objects was phototriangulation. Analysis of the films obtained gave the velocity and distance in the case of one shot. In a second shot the field of view was obscured by smoke (perhaps dust too) before any motion could be recorded by the cameras.
In one phase of the experiment, equivalent spheres were caught in flight at near predicted maximum velocity by missile traps. The depth of sphere penetration in the calibrated capture medium was then used to compute the sphere velocity. (AUTHOR)

5,058

Tabusse, L., & R. Mainard 1956 LES EFFETS DE LA VITESSE ET DES ACCELERATIONS SUR LE SYSTEME CARDIOVASCULAIRE. (THE EFFECTS OF SPEED AND ACCELERATIONS ON THE CARDIOVASCULAR SYSTEM.) La santé de l'homme (Lyon) 92:5-7, Jan.-Feb., 1956

ABSTRACT: The effects of high speed and accelerations on the cardiovascular system as shown by research and actual supersonic flight are briefly outlined. Changes have been observed in the electrocardiogram, arterial pressure, cardiac rhythm, and vasomotricity. It is concluded that supersonic flight is dangerous for the cardiovascular system, and may cause ischemic hypoxia which will eventually lead to anoxemic hypoxia.

5,059

Tabusse, L., R. P. Delahaye & R. Pannier 1962 [APROPOS OF EJECTION FROM AN AIRPLANE AT SUPERSONIC SPEED]
Rev. Med. Aero (Paris) 2:53-57, Nov.-Dec. 1962 (France)

5,060

Tadokoro, Y. 1943 EFFECTS OF ACCELERATION ON THE CARDIAC FUNCTION IN HUMAN SUBJECTS. II. ON THE ELECTROCARDIOGRAPH AND APICAL ELECTROKYMOGRAPH. Kokuigaku, 1(1):71, Oct. 1943.

ABSTRACT: Ten healthy males were subjected to 4 positive G for 10 seconds. Electrocardiogram from chest lead and apical electrokymography was examined using carbon microphone. In EKG, the delayed intraventricular conduction, R wave lowered, disappearance of T wave was noticed. Apical kymography showed diminished shape in aortic wave and tension wave.

5,061

Tait, J. and W.J. McNally 1934 SOME FEATURES OF THE ACTION OF THE UTRICULAR MACULAE (AND OF THE ASSOCIATED ACTION OF THE SEMICIRCULAR CANALS) OF THE FROG. Philos. Trans. Roy. Soc. B. 224(513):241-286

5,062

Takahashi, J. 1944 THE EFFECTS OF ACCELERATION ON THE HUMAN BODY. Kokuigaku, 2(1,2):158, Aug. 1944.

ABSTRACT:
1) Comparison of appearance of blackout between while normal breathing and Valsalva maneuver under positive G stress was studied.
2) Changes of pulse rate under positive and transverse G stress were recorded.
3) Neurological study during and after G stress were done.

5,063

Takahashi, J. & K. Tanimura 1944 EFFECT OF CENTRIFUGAL ACCELERATION ON THE INTERNAL ORGANS IN HUMAN SUBJECTS. Kokuigaku, 2(1,2):160, Aug. 1944.

ABSTRACT: Under the stress of positive 4 G with normal breathing, cardiac silhouette markedly decreased in transverse and longitudinal diameter and cardiac area, but vertical diameter decreased a little. The heart axis approached to the vertical from horizontal. During maximal expiration under the same G stress, transverse and longitudinal diameters show little changes and cardiac area decreases slightly. The main axis of heart approaches the horizontal.

5,063

Talbot, J.M. 1958 UNEXPLAINED AIRCRAFT ACCIDENTS IN THE U.S. AIR FORCES IN EUROPE. J. Aviation Med. 29(2):111-116.

ABSTRACT: The following points deserve emphasis. The reported experiences of USAFE flyers show convincingly that hypoxia and spatial disorientation and, to a lesser extent, decompression sickness, are continuing threats to flight safety and crew effectiveness.. There is a serious and compelling requirement to improve the logistics and maintenance of personal protective flying equipment. The reported USAFE experiences firmly support present policy that requires thorough refresher training of jet aircrew personnel in flight physiology and protective equipment every 18 months. In the USAFE experience may be found ample justification for both fundamental and applied research for a better understanding of human performance capabilities and limitations, and for improving the design and reliability of the equipment that is essential to flying safety and aircrew effectiveness.

5,064

Tantzen, R.G. 1959 DATA REDUCTION REPORT OF SPACE-TIME SLED DATA (Air Force Missile Development Center, Holloman Air Force Base, N. Mex.) Misc. rept. no. 59-2-21, proj. no. 5201, 29 July 1959, ASTIA AD-222 590

ABSTRACT: This paper is the data reduction of the space-time system for a particular sled run on the Holloman Track.

It contains a listing of the recorded times the sled passed interrupters placed at 13-foot intervals along the track. These raw times are smoothed by a least squares process. Velocities and accelerations are computed and listed at 13-foot intervals. Explanations of computation procedures and confidence limits are given. Graphs of velocity and acceleration are included.

5,065

Tantzen, R.G., W.C. Crehl 1961 MASTER FILE OF DATA OF THE HOLLOMAN TRACK (Air Force Missile Development Center, Holloman AFB, New Mexico) TR-61-10, April, 1961. ASTIA AD 255 757.

ABSTRACT: This master file serves as a basis for computing data in any desired coordinated system. In addition to the survey data printed in this report, the information is available on IBM cards, on Remington Rand magnetic tape (Uniservo) and on IBM magnetic tape (704).

5,066

Tate, K.A. 1951 PERFORMANCE AND STRUCTURAL INTEGRITY TEST OF TYPE HG MK-1 CATAPULT (Naval Aircraft Factory, Philadelphia, Pa.) 24 July 1951; Rept. no. M-5039, ASTIA AD-102 384

ABSTRACT The object of the tests was to prove the integrity and determine the performance characteristics of the subject catapult. The tests were also conducted to obtain the characteristics of the MK-4 Arresting Gear for operation under conditions required for use with the HG-MK-1 Catapult. The HG-MK-1 catapult performance is shown. Characteristics of acceleration and oil back pressure for ten consecutive launchings at various "G" values requested by another agency are also shown. Sample acceleration histories of 2300 and 3020 pound deadloads are shown. The acceleration curves obtained vary from a pure trapezoidal form due to the presence of vibratory peaks particularly during the first portion of the run. Arrestation will impose a minimum deceleration of 2.5 G's on the load.

5,067

Tatum, A.L. 1949 MOTION SICKNESS. Wisconsin M. J., 48: 930

5,068

Taub, J., et al. 1954 CRASH INJURY.STUDY. KLM ROYAL DUTCH AIRLINES CONVAIR 240 ACCIDENT AT SCHIPHOL AIRPORT ON MAY 25, 1953. (KLM-Royal Dutch Airlines and Dutch Dept. Aviation (RLVD), July 1954)

5,069

v. Tavel, F. 1947 THE IMPORTANCE OF THE TIME FACTOR FOR DISTURBANCES DUE TO ACCELERATION DURING MILITARY FLIGHT. Schweizerische Medizinische Wochenschrift 77(22/23):611-614

ABSTRACT: It was pointed out that the time factor is of practical importance for the development of disturbances, particularly unconsciousness during flights related with high accelerations acting on the pilot. For better understanding of this factor in prevention and causality of flight accidents and for indoctrination a handy chart was developed and described. The datas were gathered from observations in several test flights during short and long acting accelerations and from some indications in the literature. The possible causes of some disturbances and their relations to anoxia are discussed. (AUTHOR)

5,070

Taylor, D., & S.R. Harris 1957 A VISUALIZATION STUDY OF WIND BLAST EFFECTS ON FLIGHT CLOTHING AND PERSONAL GEAR (U) (Arnold Engineering Development Ctr., Arnold Air Force Station, Tenn.) AEDC-TR-57-13, Aug. 1957. ASTIA AD 135 335

5,071

Taylor, E.J., R.F. Chandler, L.W. Rhein, R.H. Edwards & V.L. Carter 1963 THE EFFECTS OF SEVERE IMPACT ON BEARS
Paper: 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 29-May 2, 1963

ABSTRACT: As one phase of the NASA impact studies, a series of high level deceleration test were performed with bears on the Daisy Deceleration test facility. A series of 11 tests were accomplished at impacts as high as 92 g's and velocities as high as 68.5 ft/sec. The test subject was oriented in the $-G_z$ (eyeballs up), $+G_y$ (eyeballs left), $-G_y$ (eyeballs right), and right and left oblique positions (eyeballs up and right, eyeballs up and left). No significant biological effects were noted in any runs at moderately severe levels (35-50g); at $-92gG_z$, one animal died after a marked vagotonic shock, complicated by severe fractures, visceral lacerations and pulmonary trauma.

5,072

Taylor, E. R. 1958 PHYSICAL AND PHYSIOLOGICAL DATA FOR BIOASTRONAUTICS. (School of Aviation Medicine, Brooks AFB, Texas) 18 March 1958

ABSTRACT: The purpose of this publication is to gather together, under one cover, useful data pertinent to space flight, both physical environments of various portions of space, and the needs and limitations of the human organism.

5,073

Taylor, E. R., & L. W. Rhein 1962 EFFECTS OF IMPACT - RELATIVE BRADYCARDIA (Paper, 33rd Annual Meeting of the Aerospace Medical Assoc., 9-12 April 1962, Atlantic City, N. J.)

ABSTRACT: While awaiting acceleration and impact, the heart rate tends to increase due both to work of respiration against restraint and to epinephrine. Immediately after impact, there is a slowing of the rate lasting several seconds, after which the rate returns to or even exceeds the pre-impact rate. This relative bradycardia has been shown to be directly related to phase of respiration at impact; if at full inspiration, the effect is maximal. The effects of atropine are shown. The relationship to blast injury is discussed. The use of this effect in human sled testing is presented. (J. Aerospace Medicine 33(3):355-356, Mar.1962)

5,074

Taylor, Ellis R. & Leroy W. Rhein 1962 THE NATURE OF REFLEX BRISKNESS (6571 st Aeromedical Research Lab., Holloman Air Force Base, New Mexico) ARL-TDR-62-27 Project 7850; Task 785001 Dec. 1962

ABSTRACT: An accelerometer sensor was used in the testing of patellar and other deep tendon reflexes. A qualitative difference was noted in the time-history and wave form produced by patients with the clinical picture of "increased briskness" due to well-demonstrated upper motor neuron pathology. The "brisk" reflex achieves maximum force in the same time as normal, but maintains this force at approximately the same level for .04 to .10 seconds; at this time damping occurs quickly. In contrast, normal subjects exhibit damping instantaneously after reaching peak acceleration. Thus, the phenomenon of briskness is a prolongation of peak acceleration, hence of peak force.

5,075

Taylor, E.R. 1962 THROMBOCYTOPENIA FOLOWING ABRUPT DECELERATION. A PRELIMINARY COMMUNICATION. (6571st Aeromedical Research Lab., Holloman Air Force Base, N. Mex.) Rept. No. ARL TDR 62-30, December 1962. ASTIA AD 293 880

ABSTRACT: A series of six progressively severe abrupt acceleration tests was conducted on seven human sled subjects in the forward-facing position, with the final two impacts on each subject being -20Gx peak, at an onset rate of 800G/sec. Thrombocyte counts made before, 1 hour after and 24 hours after impact revealed a one-hour post-impact decrease of major proportion, with full recovery to mean pre-impact thrombocyte concentrations by 24 hours post-impact. An elevation of pre-impact (baseline) thrombocyte counts occurred after the first and fifth tests. Various mechanisms for this effect are presented and areas of potential use are outlined. (Author)

5,076

Taylor, E. R., L. W. Rhein, & J. F. Ferguson 1962 THE EFFECT OF IMPACT UPON THE PATELLAR AND OTHER DEEP TENDON REFLEXES. (6571st Aeromedical Research Lab., Holloman AFB, N. Mex.) Proj. 7850; ARL TDR 62-18; ASTIA AD-284 461; Aug. 1962

ABSTRACT: Alterations of the deep tendon reflexes have been frequently observed in humans after impact. A series of experiments was conducted to study reflexes in humans undergoing a 15 seat G impact, with a control group undergoing a 5 seat G impact. Using standard clinical examination and notation techniques, no quantitative differences were noted between the experimental and control groups. In the opinion of the medical examiners, however, a slight increase in 'briskness' was found in the experimental group in contrast with the control group. Development of a reflex sensor suitable for sled testing is necessary for further work in this investigation. (AUTHOR)

5,077

Taylor, E. R., L. W. Rhein, & G. R. Beers 1962 EFFECT OF ATROPINE UPON THE RELATIVE BRADYCARDIA ASSOCIATED WITH IMPACT. (6571st Aeromedical Research Lab., Holloman AFB, N. Mex.) Rept. No. ARL TDR 62-13; Proj. 7850; ASTIA AD-282 884; Aug. 1962

ABSTRACT: The relative bradycardia immediately following impact in the backward-facing configuration at 15 G's is demonstrated to be abolished completely in humans by the intramuscular injection of 1.6 milligrams of atropine sulphate 45 to 60 minutes preceding impact. This evidence supports the hypothesis previously advanced that bradycardia is due to a vagal reflex from an undetermined sensor system and mediated through the vagus nerve to the heart. (AUTHOR)

5,078

Taylor, E.R. and L.W. Klein 1962 A [illegible]
EXPERIMENTATION CONTROL. (6571st [illegible]
AFB, N. Mexico) ARL TDR 62-19, Pro[illegible] ASTIA AD 28[illegible]

ABSTRACT: The validity of using, as a control, subjects undergoing acceleration and minimal impact as compared with using subjects undergoing [illegible] abort at the completion of countdown was tested, using heart rate as the criterion for comparison. Subjects undergoing acceleration and minimal impact were found to have a statistically significant increase in heart rate immediately post-impact as compared with the subjects not fired. This effect is attributed to preliminary acceleration; since experimental subjects undergo preliminary acceleration also, control subjects should undergo actual acceleration and minimal impact. (Author)

5,079

Taylor, E. R. 1962 BIODYNAMICS OF AEROSPACE FLIGHT
(U. S. Air Force) Project No. 7850, 31 Jan. 1962

5,080

Taylor, E.R. and R.F. Chandler 1962 A SIMPLE REFLEX SENSOR:
A DESCRIPTION AND TRIAL USE. (Aeromedical Research Laboratory,
Holloman AFB, New Mexico) Technical Documentary Rept. no. ARL-TDR-62-23,
ASTIA AD- 286-850, September 1962

ABSTRACT: A simple device for the quantitative measurement of deep tendon reflexes was designed with locally available materials. This device consists of a strain gage accelerometer and mounting, a battery source, and an electrocardiographic recorder.

Preliminary clinical investigation with this device indicates that the device has both practical and theoretical advantages over other existing reflex sensing and recording devices.

5,081

Taylor, E.R. 1963 BIODYNAMICS: PAST, PRESENT AND FUTURE.
(6571st Aeromedical Research Lab., Aerospace Medical Div., Air Force
Systems Command, Holloman Air Force Base, New Mexico)
Report No. ARL-TDR-63-10, March 1963. ASTIA AD 402 084

ABSTRACT: A brief operational definition of biodynamics is presented.

following a condensed history of the field, including a review of weaknesses of the transient mechanical analytic approach, present biological research activities are listed. A definition of working relationships between disciplines is advanced.

5,082

Taylor, E.R. 1963 PROBLEMS AND TECHNIQUES OF HUMAN SLED SUBJECT SELECTION. (6571st Aeromedical Research Lab., Holloman AFB, N. Mexico) Report. No. ARL TDR 63-5, March 1963, ASTIA AD-299 472

ABSTRACT: The present methods of human sled subject selection for abrupt acceleration experimentation are enumerated. The problem in validity of selection from the population at risk, while maintaining safety, is discussed. Selection examinations include medical history and physical examination, X-ray photographs, anthropometry, neurological evaluation, electroencephalography, clinical psychological appraisal, laboratory measurements, electrocardiography trial impact, and prolonged clinical appraisal.

5,083

Taylor, E. R., R. F. Chandler, L. W. Rhein, R. H. Edwards, & V. L. Carter 1963 THE EFFECTS OF SEVERE IMPACT ON BEARS. (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 29-May 2, 1963)

5,084

Taylor, H. R. 1955 AN INSTRUMENT FOR INVESTIGATING AUTOMOBILE BRAKE USAGE UNDER PRACTICAL CONDITIONS. Electronic Engineering 27:470-476, Nov. 1955

ABSTRACT: The instrument provides a detailed record of when and how the brakes on a car were used so that the effects of speed, drive, route, traffic, etc. could be investigated. A tachometer generator was driven by the propeller shaft and also generated a voltage proportional to the angular speed of the rear wheels. This signal was differentiated electrically to measure the angular deceleration of the wheels. A voltage proportional to the power dissipation at the brakes was derived from the product of the speed signal and the hydraulic pressure in the braking system which was measured with a potentiometer transducer. The temperature of the bulk of one brake drum was measured by a thermistor. These four signals were suitably amplified and applied to a four-pen recorder.

5,085

Taylor, J.W. 1960 X-IRRADIATION AND ACCELERATION STRESS. (Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.) NADC-MA-6003, 1 March 1960. ASTIA AD 234 596

ABSTRACT: It was determined whether a correlation existed between the stress due to ex-irradiation and the stress due to acceleration. Sprague-Dawley rats were exposed to an acute dose of 600 r ± 20% x-irradiation and then centrifuged at 20 G for 7 minutes. The data resulting from this procedure was then compared with data for two control groups, one centrifuged and one irradiated. There appeared to be no significant correlation between irradiation stress and acceleration stress at the experimental levels used in the study. (Author)

5,086

Taylor, N.B.G., J. Hunter and W.H. Johnson. 1957 ANTIDIURESIS AS A MEASUREMENT OF LABORATORY INDUCED MOTION SICKNESS. Can. J. Biochem. Physiol. 35:1017-1027

5,087

Taylor, W. J. R., W. H. Johnson, and E. A. Sellers 1960 CARDIOVASCULAR CHANGES WITH VESTIBULAR STIMULATION Aerospace Medicine 31(8):627-638 August 1960

ABSTRACT: Individuals susceptible to motion sickness were found to demonstrate characteristic cardiovascular reactions in response to selected physical stimuli. These reactions have been shown to differ from those in a comparable group of subjects who were more resistant to vestibular stimulation. One hundred randomly selected RCAF aircrew candidates, ages seventeen to twenty-seven years, were subjected to controlled vestibular stimulation; forty-one subjects by swing, fifty-nine on a turntable. Changes in blood pressure, heart rate and A-V conduction time were analyzed. With vestibular stimulation by either method, both systolic and diastolic pressure rose; the heart rate initially rose and then fell. The P-R interval shortened initially and then became more prolonged. These changes were compared with those occurring in the same subject after exercise, with carotid sinus pressure and with eyeball pressure. The turntable

population was divided into two groups according to the degree of susceptibility to experimentally produced motionsickness. The motion sick group showed a smaller rise in systolic blood pressure than the less susceptible group, while the rise in diastolic pressure was more pronounced. An elevation in heart rate was initially present in the motion sick group. Heart rate finally decreased in both groups. Early in the period of rotation the A-V conduction time of the susceptible group was shorter than the resting value, becoming more prolonged toward the end of exposure. No change in P-R interval occurred in the non-reactive group. The cardiovascular reaction pattern after exercise, with carotid sinus pressure and with eyeball pressure of the subjects experiencing motionsickness was likewise shown to differ from that of the non-sick group. The findings of this study demonstrate a correlation between autonomic reactivity and susceptibility to motion sickness.

5.088

Tarriss, C., S. C. Allen, & V. E. Hall 19 A STUDY OF ORTHOSTATIC INSUFFICIENCY BY THE TILT BOARD METHOD. (Stanford University) CAM No. 1

ABSTRACT: Out of 91 healthy male subjects aged 18-28, 20 were fainters and 71 non-fainters. The accumulation of blood in the lower part of the body causes cerebral anoxia. It can be prevented by leg bandaging and, to some extent, by physical training.

5.089

Teare, D. 1951 POST-MORTEM EXAMINATIONS ON AIR-CRASH VICTIMS
British M. J. (4733):707-708, Sept. 22, 1951

ABSTRACT: The author describes fatal injuries received by passengers and crew members in an airplane crash. He suggests that certain parts of an aircraft are more dangerous in the event of a crash than others.

5.090

Technisch Documentatie en Informatie Centrum voor de Krijgsmacht 1959 SPACE MEDICINE BIBLIOGRAPHY. (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht (Netherlands). ASTIA AD-227 817, Feb. 1959

5,091

Tedeschi, C.G. 1944 CUMULATIVE EFFECTS OF REPEATED HEAD TRAUMA OF MINIMAL INTENSITY; OBSERVATIONS ON EXPERIMENTAL ANIMALS Proc. Soc. exp. Biol. Med. 57:264-266

5,092

Tenney, S.M., & C.R. Honig, 1955 THE EFFECT OF THE ANTI-G SUIT ON THE BALLISTOCARDIOGRAM. REVERSAL OF NORMAL RESPIRATORY VARIATION AND CHANGE IN THORACIC BLOOD VOLUME. J. Aviation Med. 26(3):194-199

ABSTRACT: The standard U.S. Air Force pneumatic anti-G suit (type G-4A when inflated to a pressure above 75 mm. Hg. caused a diminution or reversal of the normal respiratory variation of the systolic complexes of the BCG. Indirect evidence has been presented to show that the pulmonary blood reservoir is enlarged at the time the respiratory variation is reversed from normal, and with this observation an explanation has been sought for the change in right and left ventricular force relationships.

5,093

Tereshkovich, K.A. 1936 DISTURBANCE OF VEGETATIVE NERVOUS SYSTEM IN PARACHUTE JUMPERS. Klinicheskaya meditsina, (Moskva) 8:405-8

5,094

Tereshkovich, K. I. 1937 THE HIGH-SPEED AVIATION AND THE PILOT. The Plane (Samolet) 6:20

5,095

Tereschovich, K. 1937 WIRKUNG DER BESCHLEUNIGUNG AUF DES ORGANISMS (Effects of Acceleration Upon the Organs)
Vyestn. Vozd. Flota 19(4): 29-34.

5,096

Terry, C. W. 1945 [illegible] TESTS OF ANTI-BLACKOUT EQUIPMENT. [illegible] Med., U.S. National Research Council, [illegible], D.C.) CAM # 426, 25 April 1945.

5,097

Thaler, 1943 INVESTIGATION OF THE INFLUENCE OF HIGH WIND VELOCITY ON THE UNPROTECTED HUMAN HEAD. Deutsche Luftfahrtforschung, Sept. 10, 1943.

5,098

Thatcher, J. O. M. 1942 PARA TROOPS AND PARA PHYSICIANS Nav. med. Bull., Washington 40:280-281, 1942

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Thiele, F.V. 1943 ATMOSPHERIC AND IMMERSION BLAST INJURIES. War Med., (Chicago) 4:262-269.

5,100

Thetford, P. E., & F. E. Guedry 1952 JUDGMENT OF THE POSTURAL VERTICAL DURING EXPOSURE TO A MISLEADING VISUAL FRAMEWORK IN UNILATERALLY LABYRINTHECTOMIZED SUBJECTS. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 110 500.27., 28 July 1952. ASTIA ATI 169369

ABSTRACT: Four unilaterally labyrinthectomized human Ss made judgments of the postural vertical in the presence of a tilted visual framework. In general, the estimates of postural verticality were not displaced in the direction of the injured side. The tilted visual framework did not have unusual effects on the judgments rendered hence these Ss with one functional labyrinth did not demonstrate a less stable conception of verticality than previously observed 'normals.'

5,101

Thetford, P. E., & F. E. Guedry 1952 THE POSTURAL VERTICAL IN UNILATERALLY LABYRINTHECTOMIZED INDIVIDUALS. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 110 500.26., 1 June 1952 ASTIA ATI 159 447

5,102

Thieme, F. P. 1950 LUMBAR BREAKDOWN CAUSED BY ERECT POSTURE IN MAN. With emphasis on Spondylolisthesis and Herniated Intervertebral Discs. (University of Michigan, Anthropological Papers No. 4, University of Michigan Press, 1950.

ABSTRACT: It was found that the mechanical strains resulting from erect posture and lumbar curvature, particularly a shear component of the vertical compression forces, are the contributory cause of the two types (spondylolisthesis and herniated intervertebral discs) of low back breakdown which are discussed here.

A short discussion of the evolutionary adaptations of man, in relation to the assumption of erect posture, is included.

5,103

Thomas, A.R. 1941 "BLAST CHEST": RADIOLOGIC ASPECT OF PULMONARY CHANGES FOLLOWING EXPOSURE TO HIGH PRESSURE WAVES Brit. J. Radiol. 14:403-406

5,104

T... B., Jr. 1961 RESEARCH, DEVELOPMENT, TEST AND EVALUATION IN THE NAVY ...esearch Paper: U. S. Naval Postgraduate School, 1961) Rept. VF 3386

5,105

Thomas, L.J. 1962 A BIBLIOGRAPHY OF REPORTS ISSUED BY THE BEHAVIORAL SCIENCES LABORATORY: ENGINEERING PSYCHOLOGY, TRAINING PSYCHOLOGY ENVIRONMENTAL STRESS, SIMULATION TECHNIQUES AND PHYSICAL ANTHROPOLOGY. (Behavioral Sciences Lab., 6570th Aerospace Medical Research Laboratories, AMC, Wright-Patterson AFB, Dayton, Ohio) ASTIA AD-282 281, June 1962

CONTENTS: This bibliography lists, by functional groupings, the technical reports, technical notes, contractor reports, memorandum reports, and journal articles prepared by the Behavioral Sciences Laboratory, and its contractors from 1945 through 1961.

5,106

Thomas, L.J. 1963 A BIBLIOGRAPHY OF REPORTS ISSUED BY THE BEHAVIORAL SCIENCES LABORATORY: ENGINEERING PSYCHOLOGY, TRAINING PSYCHOLOGY, ENVIRONMENTAL STRESS, SIMULATION TECHNIQUES, AND PHYSICAL ANTHROPOLOGY (Behavioral Sciences Laboratory, 6570th Aerospace Medical Research Lab., Aerospace Medical Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio) March 1963.

ABSTRACT: This bibliography lists, by functional groupings, the technical reports, technical notes, contractor reports, memorandum reports, and journal articles prepared by the behavior sciences laboratory, and its contractors, from 1946 through 1962.

5,107

Thomlinson, J. 1960 EMERGENCY STOPPING OF AIRCRAFT WHICH OVER-RUN AIRFIELD RUNWAYS (Advisory Group for Aeronautical Research and Development, Paris, France) 7 March 1960 Rept no 226 ASTIA AD 232 995

ABSTRACT: Many of the various ways that have either been tryed or proposed for stopping aircraft which overrun an airfield runway are discussed. Soft ground over-run area schemes are discussed and not regarded with favor. Mechanical systems are considered where special fittings, such as an arresting hook, are provided on the aircraft, and also where no such fittings are provided. Aircraft catching devices, such as arresting wires and barrier nets, are examined and the energy absorption systems which might be used are described. Some of the more important points in the mechanics of these schemes are briefly mentioned. (Author)

5,108

Thompson, A.B. 1959 PHYSIOLOGICAL AND PSYCHOLOGICAL CONSIDERATIONS FOR MANNED SPACE FLIGHT (Vought Astronautics Div. of Chance Vought Aircraft, Inc., Dallas) CVA-E9R-12349, 1 June 1959

5,109

Thompson, A. B. 1962 A PROPOSED NEW CONCEPT FOR ESTIMATING THE LIMIT OF HUMAN TOLERANCE TO IMPACT ACCELERATION. (Paper presented at the Aerospace Med. Assoc. Conf., Atlantic City, N. J., 11 April 1962.) Aerospace Medicine 33(11):1349-1355, Nov. 1962

SUMMARY: Mathematical techniques are being developed for determining human whole body response to various impact accelerations, but no satisfactory method is avail-

able for defining the human response tolerance limit to impact loads resulting from abrupt decelerations. Limits set by tota. G vs. time, rate of onset, and velocity change are ill-defined and variable. A concept is proposed whereby limits are set by the force exerted per unit area on the body by the restraint or support system at maximum deceleration. Correlation is made between blast tolerance, sled test tolerance, and automobile accident and fall impact survivals which indicates that 28 to 32 pounds per square inch is the onset lev r shock and 45 to 55 pounds per square inch is the level for 50 per cent mor for transverse accelerations of less than 0.07 second duration. In this concept G, rate of onset, and onset time are all dependent variables while impact force per unit area, delta velocity change and impact pulse time define the tolerance envelope. (AUTHOR) (Aerospace Medicine 33(3):355-356, March 1962)

5,110

Thompson, G.V.E. 1957 ASTRONAUTICS AT CRANFIELD Aeronautics 37:60

ABSTRACT: Summaries of papers read at the symposium on "High Altitude and Satellite Rockets" held at the RAF College of Aeronautics, 18-20 July 1957.

5,111

Thomson, F.B., W.K. Kerr and B. Rose 1942 ABILITY OF THE C2F OXYGEN DEMAND VALVE TO FUNCTION NORMALLY AT ACCELERATIONS UP TO 10 G. (National Research Council, Canada) Report # C-2603, October 15, 1942

ABSTRACT: The sample of the C2F Oxygen Demand Valve was tested in all positions at accelerations from 1 to 10 G and no significant change in function was noted. Removal of the spring from the oxygen inlet valve did not impair the function at an acceleration of 10 G. The clothing clip (6D-175) maintained its grip without slipping at forces equivalent to those resulting from an acceleration of 15 G.

5,112

Thomson, F.B. and W.K. Kerr 1943 THE EFFECTS OF G ON OXYGEN EQUIPMENT. (National Research Council, Canada) Report #C-2824, June 8, 1943

ABSTRACT: The R.A.F. type MK VIII A# oxygen regulator, R.C.A.F. type C3B, American Pioneer type A12, and American Aro type A12 oxygen demand valves all

function normally up to 10G, in the vertical position. The R.C.A.F. type C2 oxygen mask and type C2 suspension when adjusted comfortably does not slip on the face at less than 5 G and only slipped more than suspension when adjusted comfortably does not slip at less than 4 G, may slip grossly at 5 to 7 G and on two out of three tests was pulled off the nose at 7 1/2 G. In order to prevent slipping of the oxygen mask off the face under G it is important to limit the elasticity of the suspension to the lease amount compatible with comfort.

5,113

Thompson, W.C. 1956 MODEL DITCHING INVESTIGATION OF A JET TRANSPORT AIRPLANE WITH VARIOUS ENGINE INSTALLATIONS(National Advisory Committee for Aeronautics Langley Aeronautical Laboratory, Langley Field, Va.) NACA RM L56G10, 20 August 1956

ABSTRACT: The ditching characteristics of a jet transport airplane with various engine configurations were investigated in Langley tank No. 2. A dynamic model was used to determine the probable ditching behavior in calm water and the best ditching procedure. Various conditions of damage, engine installations, landing attitude, and speed were investigated. Data were obtained from visual observations, acceleration records, and motion pictures

5,114

Thompson, W.C. 1961 INVESTIGATION OF [illegible] DITCHING OF A DYNAMIC MODEL OF A JET TRANSPORT. [illegible] and Space Administration, Washington, D.C) [illegible] Memorandum D-732, ASTIA AD- 256 505, May 1961

ABSTRACT: An investigation was made to obtain data which would aid in determining the practicability of using a water-pond arresting system for airplane runway overrun. Tests were made with several water-pond configurations, water depths, and airplane entry speeds. The waterpond could stop the model for most of the test conditions, although there was some damage to the model at the higher water entry speeds. (Author)

5,115

Thompson, W. O., P. K Thompson, & M. E. Dailey 1928 THE EFFECT OF POSTURE UPON THE COMPOSITION AND VOLUME OF THE BLOOD IN MAN. J. Clin. Invest. 5:573-604

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Thorndike, R. L. 1951 THE HUMAN FACTOR IN ACCIDENTS, WITH SPECIAL REFERENCE TO AIRCRAFT ACCIDENTS. (USAF School of Aviation Medicine, Randolph Field, Texas) Project No. 21-30-001, Report No. 1, February 1951.

5,117

Thorner, M. W. 1942 QUESTIONNAIRE ANALYSIS OF THE PROBLEM OF AIRSICKNESS AS IT IS MET WITHIN STATIONS IN THE CONTINENTAL UNITED STATES (School of Aviation Medicine, USAF Randolph AF Base, Texas) Report No. 38-1, September 1942.

5,118

Tillman, J.M. 1956 NORTHWEST AIRLINES B-377 DITCHING, APRIL 2, 1956, NEAR SEATTLE, WASHINGTON
(CAB Hearing)

5,119

Tillman, J.M. 1956 CRASH SAFETY CONSIDERATIONS, UNITED AIRLINES DC-8. (United Airlines) September 10, 1956.

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Timakov, V. 1960 MAN AND THE COSMOS
Trans. of Sovetskii Kraanyi Krest (USSR) 10(1):12-13, 1960
(Office of Technical Services, Washington, D.C.)
April 3, 1962 62-24912

5,121

Timmons, D.E. 1954 NOTES ON HIGH ALTITUDE BAILOUT.
(Flight Test Engineering Division, Human Factors Branch)
18 Nov. 1954.

5,122

Titov, G.S. 1962 REPORT OF MAJOR GHERMAN S. TITOV AT FIFTH PLENARY MEETING OF COSPAR ON MAY 3, 1962
Committee of Space Research (COSPAR), The Hague (Netherlands) NASA N62-15330

ABSTRACT: Major Gherman S. Titov's speech, given at the Fifth Plenary Meeting of COSPAR, includes details of his flight on August 6-7, 1961, in the spacecraft Vostok II. Major Titov reviews the purpose and accomplishments of his flight. He indicates that reentry into the earth's atmosphere was accomplished by means of a parachute mechanism. The physical sensations he encountered during the flight are discussed.

5,123

Titov, G. 1962 MY DAY IN SPACE
Spaceflight, 4 (5): 146-150. Sept. 1962

ABSTRACT: This is an abridged version of the speech made by the Russian astronaut Gherman Titov on May 3, 1962, at the 3rd Space Science Symposium in Washington, D.C. Various aspects of his 17-orbit flight of August 6-7, 1961, discussed included launching, entering orbit, actual flight, re-entering the atmosphere, and landing. The basic physiological functions conformed well to flight loads and stresses. The flight indicated that man can withstand the effect of weightlessness for 24 hours. Some motion sickness was encountered which later abated, but eating, drinking, muscle coordination, and task performance remained good. The flight was preceded by two preparatory stages, a training program consisting of theoretical, special physical, medico-biological, technical, and flight factors; and an immediate preflight period.

5,124

Tkachuk, V.R. 1959 RASCHET GORIZONTAL'NYKH SOSTAVLIAIUSHCHIKH VETRA PRI UCHETE VNUTRENNEGO TRENIIA I NELIENINYKH CHLENOV USKORENIIA (COMPUTATION OF THE HORIZONTAL WIND COMPONENTS WHEN CALCULATING THE INTERNAL FRICTION AND NON-LINEAR TERMS OF ACCELERATION (American Meteorological Society, Boston, Mass.) Trans. no. T-R-220 of Akademiia Nauk SSSR, Izvestiia, Seriia Georizicheskaia, no. 12; Contract AF 19(604)1936) ASTIA AD 236 563.

ABSTRACT: The question of the distribution of wind velocity in the friction layer - the lower layer of the atmosphere which is up to 1 km high - is of great interest. The difference between the wind observed near the earth and in the free atmosphere, the vertical wind motions in the upper atmosphere (not only in the friction layer, but even much higher than it), the formation of low and frontal clouds, etc., are a function of this distribution.

5,125

Tobias, C.A. & J.V. Slater 1961 CERTAIN ASPECTS OF SPACE BIOLOGY (Space Sciences Laboratory & Donner Laboratory of Biophysics & Medical Physics, Univ. of Calif., Berkeley, Calif.) USAEC & NASA Series No. 2; Issue No. 7, August 1, 1961

ABSTRACT: In this publication, the authors reach the following conclusions: (1) Space flight for man involves a great many physiological and psychological stresses. It is imperative that we carry out further research to understand man's homeostatic responses to these stresses and their limits. (2) Acceleration forces greater than 1 "g" cause profound chronic alterations in animal longevity, development, and physiology. (3) The condition of weightlessness presents a challenge to the biophysicist, for it presents a new environment, previously untested. It will probably cause chronic alterations in: (a) growth, differentiation and development. (b) longevity and metabolic physiology, with perhaps beneficial effects. (4) Underlying physical causes for the effects of weightlessness probably involve alterations in convection patterns. These appear to change the mode of mixing and of phase changes and might also result in reduced cell division. (5) Radiation hazards, particularly from flares and from heavy primaries, present a serious problem. For long voyages shielding must be applied. For the most space radiations accelerators are available or could be built to evaluate biological effects. Two types of studies are of great interest: (a) neurological effects of radiation. (b) developmental effects in embryonic forms. (6) Knowledge in biology is gained slowly and many experiments need to be done. It would be useful if each satellite in the physical programs, particularly those that are to be recovered, would leave some space for a biological experiment. (7) Complete knowledge of planetary life will be gained only when man himself can go to the planets, hence the approaches described above are of some immediate significance. (Author)

5,126

Tobias, C. A. and J. V. Slater 1962 OUR VIEW OF SPACE BIOLOGY WIDENS Astronautics 7(1):20-22, 47-52. Jan. 1962

ABSTRACT: Putting a man safely into space requires knowledge concerning his ability to withstand the stresses resulting from acceleration-deceleration, weightlessness, temperature changes, vibrations, tumbling, artificial gas environments, and radiations. The importance of biological research in the space program is emphasized. For example, in radiobiology, two aspects under study are the neurological effects of radiation, and its developmental physicist. Underlying physical causes for the effects of weightlessness probably involve alterations in convection patterns of liquids and gases. These appear to change the mode of mixing and the phase changes and might also result in reduced cell division. Many examples are given of phenomena both observed and considered for future research.

5,127

Tobias, P., & J. P. ..cehan 1963 THE ACCELERATION PHOSPHENE
(Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 28 - May 2, 1963)

ABSTRACT: The investigation of phosphenes, or the sensation of light in the absence of light, dates back to antiquity. Recent investigations at the University of Southern California Human Centrifuge have produced a vivid visual phosphene, never before described nor reported during exposure to positive acceleration.

This report reviews the methods of producing phosphenes in general, and the acceleration phosphene in particular. A detailed and graphic description is presented; and the results of several experiments conducted with 60 subjects is reported. These experiments investigated the universality of this phenomenon, its G threshold, characteristics; and the effects on this threshold of (1) dark adaptation, (2) breathing 100 per cent oxygen, and (3) breathing 11 per cent oxygen

Finally, evidence for the relationship between the phosphene and the cardiac pressor response is presented, giving some explanation to the origin of this entopic sensation and indicating areas for future research.

5,128

Tobin, W. J., R. Cicconi, J. T. Vandover and C. S. Wohl 1943 PARACHUTE INJURIES
Army med. Bul. (66):202-221. 1943

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Tobin, W. J. 1944 PARACHUTE INJURIES
Milit. Surg. 94:222-224. 1944

5,130

Toda AIR SICKNESS RESEARCH REPORTS PARTS I, II, and III. (JAPANESE)
(Appendix 7 of ATIG Report No. 36)

In: J. G. B. Castor, "List and Disposition of Documents Collected by The Aero-Medical Section, Air Technical Intelligence Group," ATIG Report No. 241.

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Tolle, E.A. 1960 SIMULATED COMBINED VIBRATION, SUSTAINED ACCELERATION AND EXTREME TEMPERATURE ENVIRONMENTS. (Aeronautical Accessories Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TN 59-351, Feb. 1960. ASTIA AD 236 057.

ABSTRACT: A simulator believed to be the first of its kind to produce simultaneous steady acceleration, vibratory acceleration, and extreme temperature is described. It comprises a 450 pound force electro-dynamic vibrator and temperature box installed on a large-mass centrifuge. The combination of environments produced by this simulator makes possible more realistic testing of certain ballistic missile components than otherwise would be possible. Design and performance characteristics are presented, and component testing results are discussed. (Author)

5,132

Tolles, Walter E. & William J. Carbery 1959 A SYSTEM FOR MONITORING THE ELECTROCARDIOGRAM DURING BODY MOVEMENT. WADD TR 58-453; ASTIA AD 215 538.

ABSTRACT: This investigation was undertaken to develop a system for monitoring the electrocardiogram during body movement. Two new lead systems were devised that produced interpretable electrocardiograms and were insensitive to moderate body movements. A new stainless-steel mesh electrode designed for this investigation provided technically satisfactory electrocardiograms during all body movements. The best method of applying these electrodes to the skin was with adhesive tape. Good electrode-to-skin contact was obtained for as long as 6 hours. For monitoring of the electrocardiogram with the new lead system, a recording frequency band pass of 0.1 to 20 cps produced interpretable electrocardiograms during moderate body movement. With more strenuous activities, a recording frequency band pass of 0.8 to 10 cps produced interpretable electrocardiograms; however, the amplitude and shape of the characteristic waves were modified.

5,133

Tomcsak, S. L. 1960 DECELERATOR BAG STUDY (Wright Air Development Center, Wright Field, Ohio) WADC TR 59 775, June 1960.

5,134

Tompkins, V.H. 1956 THE SIGNIFICANCE OF THE ABNORMAL ELECTROENCEPHALOGRAM IN AIRCREW (Eighth AGARD Aeromedical Panel Meeting, Copenhagen, May 1956)

5,135

Topliff, E.D.L. A STUDY OF ENERGY ABSORBING MATERIALS FOR THE PREVENTION OF IMPACT INJURY. (Defence Research Medical Laboratories, Toronto, Canada) F-8.

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Torii, K., T. Tsuji & H. Ishii 1944 HEARING AND VESTIBULAR FUNCTION UNDER G STRESS. Kokuigaku 1:137

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Tourin, B. & S. Macri 1953 AIRCRAFT SAFETY BELTS: THEIR INJURY EFFECT ON THE HUMAN BODY. (Aviation Crash Injury Research)

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Tower, D. B. and D. McEachern 1948 ACETYLCHOLINE AND NEURONAL ACTIVITY IN CRANIO-CEREBRAL TRAUMA. J. Clin. Invest. 27:558.

5,139

Townsend, F. M., V. A. Stembridge & F. K. Mostofi 1957 THE ROLE OF THE PATHOLOGIST IN AIRCRAFT ACCIDENT INVESTIGATIONS. Aero. Eng. Rev. 16:65-67, July 1957.

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Townsend, F. M., 1957 THE PATHOLOGIC INVESTIGATION OF AIRCRAFT ACCIDENT FATALITIES. J. Aviation Med. 28(5):461-468.

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Townsend, Frank M. and Vernie A. Stembridge 1958
MODERN CONCEPTS IN INVESTIGATIONS OF AIRCRAFT FATALITIES
Jnl. of Forensic Sciences, 3:381-400, October, 1958.
ASTIA AD 205 786

ABSTRACT: Death or incapacitation of the crew may actually cause an accident rather than being only the result of the accident; therefore, a complete and thorough medical investigation of aircraft accident fatalities must be instituted. This study should include a correlation of injuries sustained with the mechanical aspects of the accident for the prevention of future injuries. A careful consideration must be given to environmental factors and pre-existing disease as the cause of air accidents. The military services have established a program for the investigation of aircraft investigation of aircraft accidents to include an intensive medical examination utilizing the practices of forensic sciences. (AUTHOR)

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Townsend, F. M. & V. A. Stembridge 1958 PREVENTION OF INJURY AND DEATH IN AIRCRAFT ACCIDENTS Arch. Indus. Health 17:111-117.

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Townsend, F. M., et al. 1959 MEDICAL ASPECTS OF FLIGHT SAFETY. (London: Pergamon Press, 1959) AGARDograph 30

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Townsend, Frank M. 1959 THE UTILIZATION OF PATHOLOGY IN AIRCRAFT ACCIDENT INVESTIGATION. Reprint from Medical Aspects of Flight Safety. AGARDograph 30.

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Townsend, F. M. and W. H. Davidson 1961 EXPERIENCE OF THE ARMED FORCES INSTITUTE OF PATHOLOGY IN AIRCRAFT ACCIDENT INVESTIGATION, 1956-1960.
(Armed Forces Inst. of Pathology, Army Medical Center, Washington, D.C.)
Reprint from Military Medicine 126:335-339, May 1961.

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Townsend, F.M and W.H. Davidson 1961 EXPERIENCE OF THE ARMED FORCES INSTITUTE OF PATHOLOGY IN AIRCRAFT ACCIDENT INVESTIGATION, 1956-1960.
(Army Medical Center, Washington, D.C.) ASTIA AD-258 526

5,147

Townsend, F.M., B.C. Doyle and W.H. Davidson 1961 TWO YEARS' EXPERIENCE IN COMBINED ENGINEERING AND PATHOLOGY INVESTIGATION OF AIRCRAFT ACCIDENTS.
(Paper, 32nd Annual Meeting of the Aerospace Medical Association in Chicago, Illinois, 24-27 April 1961)

ABSTRACT: The Aerospace Pathology Branch of the Armed Forces Institute of Pathology has assisted the Civil Aeronautics Board and the Federal Aviation Agency in the medical investigation of seventeen commercial and/or civil aircraft accidents since November 1957. The work of the Human Factors Committee of the CAB, combined with that of the pathology studies, has assisted greatly in reconstructing the mechanism of injuries sustained in passenger and crew fatalities. A review of this work again emphasizes the necessity of a rearward facing seat in future commercial aircraft with a better system of passenger "tie-down". A continuing effort to improve existing forward facing seats and installation of rearward facing seats on newly certificated transport aircraft will be discussed.
(Aerospace Medicine 32(3):250, March 1961)

5,148

Townsend, F. M., W. H. Davidson, & B. C. Doyle 1962 TWO YEARS' EXPERIENCE IN COMBINED ENGINEERING AND PATHOLOGY INVESTIGATION IN AIRCRAFT ACCIDENTS.
(Paper, 32nd Annual Meeting of the Aerospace Medical Association in Chicago, Illinois, 24 April 1961)
Aerospace Medicine 33:913-919, 1962

ABSTRACT: In the accidents in which crash injury played a major role, the findings indicate that there are certain factors that must be considered in the design of future aircraft.
The evidence is definite that there is a relationship between the injuries sustained by the passengers and the forward facings seats of present commercial

aircraft.
Much can be done by the airframe and equipment designer to eliminate and/or minimize injuries and fatalities resulting from aircraft accidents. First, it is essential that the occupants remain in the seats and the seats remain attached to the airframe structure. Assuming that the seat will remain attached and the passenger will remain in the seat, how can the designer eliminate the leg injuries sustained by passengers that are presently occurring in aircraft accidents? There are four alternatives: increase the seat spacing, eliminate the aft stretcher at the bottom of the seat, install leg retention devices, or, install a properly designed rearward facing seat. (CARI)

5,149

Trapp, R. F. 1963 AN EVALUATION OF SPACE RESEARCH REQUIREMENTS
(Am. Inst. of Aeron. and Astronautics, N. Y.)
AIAA Paper 63-131 May 2, 1963

ABSTRACT: The need for a manned space laboratory is discussed. The prime justification for this laboratory is for research on the physiological, psychological, and performance aspects of long-duration weightless manned flight and attendant problems, such as enduring reentry following prolonged weightlessness. Key among the secondary reasons for the manned laboratory is experimentation in the weightless environment in which man is an integral part or in which he adds measurably to the value of the experiment. The four possible future space missions which could profit by information obtained in the laboratory are: lunar base, operational space station, planetary flyby, and planetary lauding. (N63-18836)

5,150

Travis, R. C. 1944 PERCEPTION AND BODILY ADJUSTMENT UNDER CHANGING ROTARY ACCELERATIONS: A NEW TECHNIQUE. The American Journal of Psychology 57(4):468-481, Oct. 1944

ABSTRACT: "The primary purpose of this paper is to describe a new apparatus and technic for producing and recording accelerative movements in the rotation-chair and to record experiments carried out with it..." The apparatus permits the study of the accuracy of the observer's adjustment when instructed to keep his body motionless. Seven different periods of motion and 1 immobile period were used; the periods of motion varied in duration, magnitude, and acceleration. Three trials blindfolded and 3 with the eyes open were given

to determine the perception of direction. Subjects were 100 college men and 99 college women; scores were in percentage of a perfect score.

Results were: (1) blindfolded, men's mean =51, women's = 47, CR= 2.4; (2) with vision, men's mean = 81, women's = 77, CR = 2.9. Ten trials were made of S's accuracy in compensating for motion. The results showed a steady improvement during the 10 trials, with small sex differences in favor of the women and greater variability for the men. It is clear that these 2 performances demand different skills; r between maintaining bodily orientation and perception of motion without visual cues= —.13; with visual cues, -.06. It is suggested that these technics offer promise for the selection of flying personnel.

5,151

Travis, R.C. 1945 AN EXPERIMENTAL ANALYSIS OF DYNAMIC AND STATIC EQUILIBRIUM J. exp. Psychol. 35:216-234

ABSTRACT: An experimental analysis of the factors involved in the two kinds of equilibrium and of the interrelationship of their components yielded the following major results: The dynamic component of equilibration is unrelated to the static component. There is practically no correlation between balancing skill on the stabilometer and ability manually to maintain orientation of a rotation chair in continuous displacement. Weight is of relatively greater importance than height in dynamic stabilometer performance, and distance from the center of gravity to the foot base line shows high correlation with standing height. When weight is controlled, there is a small sex difference in favor of women's performance on the stabilometer. Both dynamic and static equilibrium show greatly superior performance when visual cues operate. While mild exercise increases body sway significantly as a result of increased respiration and therefore of head movements, it shows little effect on dynamic stabilometer performance. A correlation of 150 between eyemanual co-ordination and balancing skill is believed to show presence of a steadiness factor in the two performances.

5,152

Traylor, M.E., Jr. and R.L. Player 1959 A SUMMARY OF REPORTS PRODUCED UNDER ARDC PROJECT 1080; "PROTECTIVE CONSTRUCTION AND TARGET VULNERABILITY" AND ITS PREDECESSORS (Air Force Special Weapons Center, Kirtland AFB, N. Mexico) Rept. No. AFSWC-TN-59-11, March 1959, ASTIA AD 307 301.

ABSTRACT: The purpose of this report is to summarize the work of this structures Division, its predecessors, and its contractors in blast effects

research, in order that other interested agencies may be made cognizant of the results obtained far and, in turn, to effect closer coordination and cooperation. Some of the work mentioned was performed under tasks that are now terminated and not specifically mentioned. (Author)

5,153

Treat, W. C. 1955 MOTION SICKNESS.
(San Diego State College Foundation) ASTIA AD-95139, July 1955
Contract Nonr-1268(01)

ABSTRACT: Because those deaf persons who lack vestibular sensitivity have been demonstrated to be immune to motion sickness, the internal mechanism responsible for the malady has been defined as the semi-circular canals of the inner ear. The kinds of motion that most readily induce sickness have been found to be quite specific. Rotation, by itself, does not make subjects sick, but when accelerations and decelerations, separated by constant speed, are introduced into rotational apparatus, the subjects become sick. Furthermore, it has been shown that rotation in several planes favors sickness. It has been found that a variety of "minor' stimulus conditions help or hinder motion sickness. Visual disorientation, uncomfortable warmth, and unpleasant odors are reported to facilitate sickness. Where there is much to occupy the attention of a person, as in the case of an airplane pilot, motion sickness seldom occurs even under adverse conditions of motion. In the case of airsickness, Chinn and Milch have concluded that Phenergan is the most effective preventative yet discovered and produced the fewest annoying side-effects. For seasickness, Dramamine has long been the favorite of the Navy. It should be noted that no drug has yet been discovered that has no adverse effects.

5,154

Tremblay, H. G. 1961 THE CENTRIFUGE SIMULATION OF THE X-15
(Paper, Panel on Acceleration Stress of the Armed Forces-NRC Committee on Bio-Astronautics, 6-11 March 1961, NASA Ames Research Ctr., Moffett Field, Calif.)

5,155

Trilling, Leon 1950 THE IMPACT OF A BODY ON A WATER SURFACE AT AN ARBITRARY ANGLE
J. Appl. Phys., 21 (1): 161-170

ABSTRACT: This paper presents an approximate method of determining the pressure distribution during impact on the surdace of a body which strikes a horizontal water surface at an arbitrary angle. The effect of the splash is neglected and the pressure on the free boundary is assumed proportional to the potential, as if the process were an impulse. The shape of the submerged portion of the striking body is approximated by a semi-ellipse (two dimensions) a hemisphere, half an ellipsoid of revolution and half a general ellipsoid. Under those conditions explicit results for the pressure distribution are found.

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Tripp, R. C. H. 1945 RECENT ADVANCES IN RESEARCH ON PARACHUTES IN THE GERMAN AIR FORCE. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 635, July 1945.

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Trojan, S. and L. Jilek 1961 PROCEDURES AFFECTING THE RESISTANCE OF RATS TO POSITIVE ACCELERATION DURING ONTOGENY.
In Physiol. Bohemoslov 10:467-473, 1961.

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Trumbull, R., H.I. Chinn, C.H. Maag, L.J. Milch, S.W. Handford, R. Seibert, P. Sperling and P.K. Smith. 1960 EFFECT OF CERTAIN DRUGS ON THE INCIDENCE OF SEASICKNESS. Clin Pharmacol Ther 1:280-3, May-June 1960

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Tschermak-Seysenegg, A. 1932 PHYSIOLOGISCH-OPTISCHE BEOBACHTUNGEN IM FLUGZEUG UND IM ROTATORIUM (Physiological-Optical Observations in the Aircraft and in the Rotarium)
Forsch. Fortschr. dtsch. Wiss. (Berlin) 8: 72-73

5,160

Tsiolkovskii, K. E. 1911 INVESTIGATION OF OUTER SPACE BY JET PROPULSION Unedited rough draft trans. of mono.,Tsiolkovskii, K. E., Sobranie Sochinenii, v. 2: Reaktivnye Letatelnye Apparaty, 1954, p. 100-139, (Originally pub. in Airflight Herald, 1911, sic). (Office of Technical Services, Washington, D.C.) Oct. 25, 1960 61-27426

ABSTRACT: Tsiolkovsky's pioneer (1911) theoretical derivations for a "rocket" or jet-propulsion device for space flight are reprinted.

5,161

Tsuda, J. 1943 THE CARDIAC FUNCTION AND ACCELERATION. Kokuigaku 1:72

ABSTRACT: When positive G was applied, the pulse rate increased up to 39, then decreased slightly. Until negative 4G has reached, the pulse rate also increased but in higher G, it deteriorate rapidly and showed arrhythmia. In case of transverse G, it decreased slightly probably due to the vestibular reflex. The increased heart rate will suggest the augmentation of cardiac function.

5,162

Tsuji, T. 1943 EXPERIMENTAL STUDY ON THE EFFECT OF FORCE ON THE DISTURBANCE IN AUDITORY FUNCTION. Kokuigaku, 2(1,2):163, Oct. 1943.

5,163

Tsuzi, T. 1943 INVESTIGATION OF THE HEARING DISTURBANCES DUE TO ACCELERATION STRESS. Kokuigaku 1:112

ABSTRACT: The guinea pig weighing 400 to 500 g that has concha movement reflex for the acoustic stimulations was used for the experiment. The movement of the concha was recorded on the smoked paper by the tanbour. It is recognized that under positive G the hearing faculty decreased considerably being suggested by the decreased amplitude of the concha movement.

5,164

Turnbow, James W. 1961 U.S. ARMY H-25 HELICOPTER DROP TEST OCTOBER 22, 1960 (U.S. Army Transportation Research Command) Contract DA-44-177-TC-624 TREC Technical Report 60-76; AvCIR 2-TR-125.

ABSTRACT: This report presents the results of an exploratory, experimental study. A Piasecki Model H-25A helicopter has been employed in recreating a typical accident approximating an unsuccessful attempt to attain autorotation from a low altitude power failure. Relatively high (50G to 100G) vertical and longitudinal accelerations have been observed for periods in the order of 10 milliseconds in an impact leaving the cabin area of the airframe reasonably intact. Failure of all seats occurred without failure of either seat belts or shoulder harness.

The instrumentation and research techniques used in (1) the measurement of the impact forces and accelerations, (2) the determination of the feasibility of the utilization of on-board recorders, and (3) the evaluation of certain problems inherent in the dynamic crash testing of full-scale helicopter and VTOL aircraft were presented in an earlier preliminary report.

5,165

Turnbow, J.W., V.E. Rothe, G.M. Bruggink, & H.F. Roegner 1962 CRASH INJURY EVALUATION. MILITARY TROOP SEAT DESIGN CRITERIA. (U.S. Army Transportation Research Command, Fort Eustis, Va.) TREC TR 62-79, Nov. 1962.

ABSTRACT: This report was prepared by Aviation Crash Injury Research. It contains the results of a careful analysis of troop seat deficiencies conducted over the past three years. The analysis was made in light of accident experience with this seat, human tolerance as presently known, and accelerations and forces which may be anticipated in potentially survivable accidents involving army aircraft.

The analysis revealed that the strength requirements quoted in current military specifications are considerably lower than (1) those which would be dictated by the upper limit of accelerations which can be tolerated by the occupants of the seats; (2) they were also lower than the accelerations and forces which probably occur in many Army air-craft accidents. 22* This substantiates the observation by the Army that these seats fail under relatively minor accident conditions, thus subjecting the occupant to further hazards, especially to increased contact injuries.

On the basis of the detailed examination of current specifications, human tolerance, and impact acceleration data, it is recommended that the troop seat specifications be revised and that dynamic load factors of 25 G for 0.20 second plus 45 G for 0.10 second be adopted for troop seat design in the longitudinal and lateral directions and 25 G for 0.10 second for the vertical direction. In addition, an energy absorption capability must be incorporated into the seat system to reduce the vertical accelerations on the occupant, which would frequently exceed 25G, to a tolerable level.

5,166

Turnbow, J. W. 1962 A DYNAMIC CRASH TEST OF AN H-25 HELICOPTER. (Paper, National Aeronautic Meeting, April 3-6, 1962), Society of Automotive Engineers, New York, New York. No. 517A

ABSTRACT: An H-25A Piasecki helicopter has been employed in recreating a "typical" accident occurring with both longitudinal and vertical velocity components at impact. Acceleration patterns at various stations in the aircraft and in the dummy occupants have been found to be incomparable with the results of similar tests conducted for fixed-wing aircraft by NACA. For the helicopter, large magnitude, short duration, accelerations have been observed. By contrast, accelerations of smaller magnitude but with relatively longer duration were found for transport type aircraft by NACA. When the acceleration environment for the H-25 is compared with known tolerance limits for human subjects, evidence of the need for modification in crew and passenger seats to provide better crash protection for the aircraft's occupants becomes apparent.

5,167

Turnbridge, R. E. and J. V. Wilson 1943 BLAST INJURY: PATHOLOGIC AND CLINICAL FINDINGS Quart. J. Med. 12:169-184.

5,168

Turnbridge, R. E. 1945 CAUSE EFFECT AND TREATMENT OF AIR BLAST INJURIES War Med., (Chicago) 7:3-6.

5,169

Tuttle, A.D. and H.G. Armstrong 1939 THE ROLE OF AVIATION MEDICINE IN THE DEVELOPMENT OF AVIATION. Mil. Surgeon, 85:285-301

ABSTRACT: The outstanding problems in the field of aviation medicine are: effects of altitude; psycho-physiologic characteristics of the airman; effects of speed, vibration, noise, etc.; aside from selection of pilots and maintenance of fitness in the same. The pilot must possess a complex of psycho physiologic aptitudes relating to acuity of vision, depth perception, sense of motion, balance, orientation, and other reactions relating to the sense organs and the central nervous system.

Valuable data in aviation medicine with regard to ocular functions were furnished by Berens and Wilmer. The credit of furnishing the fundamental basis for blind flying should be attributed to Major Myers.

The upper limit for consciousness in unacclimatized men during short exposures appears to be between 23,000 and 25,000 feet.

During the first World War many pilots refused to use oxygen until reaching 17,000 to 20,000 feet. However, the "ceilings" were getting progressively lower as the war went on, indicating cumulative ill effects. The latter on mind and body were demonstrated by Barcroft, McFarland and Armstrong at an altitude of from 10,000 to 12,000 feet.

5,170

Tuttle, A. D., & G. R. Wendt 1946 STUDIES IN MOTION SICKNESS: II. AIRSICKNESS AMONG ONE HUNDRED EIGHTY-NINE AIRLINE STEWARDESSES AND ITS RELATIONSHIP TO PREVIOUS HISTORY OF MOTION SICKNESS. (Civil Aeronautics Administration, Washington, D. C.) April 1946; Rept. No. 60

SUMMARY: A questionnaire was administered to 189 United Air Lines stewardesses requiring them to report the frequency and degree to which they had been airsick, and the conditions under which it occurred. The questionnaire also included an inventory of motion sickness on boats, trains, autos, and other devices. The frequency of airsickness was: 42% had vomited from airsickness; 36% had experienced lesser degrees of sickness; 22% had been completely free of sickness. And a priori scoring key was applied to the inventory of motion sickness on devices. Two people rated the airsickness part of the questionnaire for amount of sickness. The correlation of inventory and airsickness scores was .53, showing that history of sickness on other devices yields some useful prediction of airsickness. Significant conditions of airsickness, according to the stewardesses, were: rough air, fatigue, illness at time of emplaning, psychological factors, gastric factors, high altitude, odors, and heat. (CAA)

5,171

Tyrer, J. and K.V. Robertson 1944 REPORT ON ANTI-G EQUIPMENT. (Report, Comm. Flying Personnel Research) RAAF -FR 95, 13 Aug. 1944

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Tyler, D. B. 1948-49 THE EFFECT ON MARKMANSHIP OF SOME MOTION SICKNESS PREPARATIONS CONTAINING BARBITURATES AND HYOSCINE. J. Appl. Physiol. 1: 737

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Tyler, D.B. and P. Bard 1949 MOTION SICKNESS.
Physiol. Rev., 29:311

ACCELERATION

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5,174

Unger, H. R. & L. J. Milch 1959 THE EFFICACY OF TRILAFON IN POTENTIATING BONAMINE MOTION SICKNESS PROPHYLAXIS IN DOGS. (School of Aviation Medicine, Randolph AFB) Rept. no. 59-78; ASTIA AD 226 474.

ABSTRACT: A standardized swinging procedure was utilized to induce vomiting in a group of normal mongrel dogs. Only dogs which exhibited emesis consistently within a 30-minute interval during a premedication control period were considered susceptible. The susceptible animals were randomly placed in three treatment groups - namely, placebo, bonamine^{R}, and the combination of bonamine^{R} with trilafon^{R}. Prolongation of vomiting time represents an elevated threshold of vestibular stimulation along the labyrinthine-vomiting center chain. Bonamine^{R} and the combination of bonamine^{R} with trilafon^{R} exhibited a protective effect against swing-induced emesis. Trilafon^{R}, a potent tranquilizer, has no protective effect when used alone and in combination with bonamine^{R} affords a degree of protection which is no greater than the effect shown by bonamine^{R} alone. It is therefore concluded (a) that the action of trilafon^{R} does not contribute to the protection afforded by bonamine^{R} against swing-induced vestibular stimulation and, therefore, (b) that stimuli arising from those brain centers affected by trilafon^{R} have not been shown to be contributing factors in the etiology of motion-induced emesis. (Author)

5,175

University of Florida 1956 ANALOG SIMULATOR SYSTEM (Department of Engineering Mechanics, Engineering and Industrial Experiment Station, University of Florida, Gainesville, Florida) Contract Number AF 08(616)-36, Task 2, August 1956, ASTIA AD-106 702

ABSTRACT: This Instruction Manual presents the theory, design, operation and maintenance of the Analog Simulator System, a special-purpose mathematical machine that gives the response acceleration of a single-degree-of-freedom mass-spring system whose support is subjected to some given shock excitation. The Simulator System is capable of arbitrary variations, within wide limits, of the two parameters of the mass-spring system, the natural frequency and damping coefficient. Also, the System mechanizes the application of the generalized spectrum criterion for the severity of shock, which was developed in a previous Phase Report.

5,176

MOTION PICTURE

University of Southern Calif., School of Medicine 1951 ESCAPE FROM HIGH-SPEED AIRCRAFT AND THE PROBLEM OF COMPOUND ACCELERATIONS: A LABORATORY STUDY. (Presented at the twenty-second meeting of the Aero Medical Association in Denver, Colorado, May 1951)

5,177

University of Virginia COMPARATIVE STRESS ANALYSIS FOR LARGE DYNAMIC ACCELERATORS
(Research Laboratories for the Engineering Sciences, University of Virginia) Contract AF 29(600)-3465, Phase I, 6571st Aeromedical Research Laboratory, Holloman AFB, New Mexico (Publication of Final Report expected in August 1963)

5,178

Uradnicek, R. K. 1961 EVALUATION OF A PRECISION CENTRIFUGE FOR USE IN LINEARITY CHECKING GUIDANCE ACCELEROMETERS. In 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D.C. (Mt. Prospect, Ill.: Institute of Environmental Sciences, P. O. Box 191) pp. 299-303

ABSTRACT: The purpose of this evaluation was to determine the operating characteristics of a precision centrifuge. Areas of most importance were precision platform excursions and angular velocity measurements. A second objective was to make modifications and recommendations to improve the centrifuge test facility. Results of the evaluation will be used to clarify performance characteristics of guidance accelerometers in an extensive linearity test program. (AUTHOR)

5,179

Urschel, D.L. 1962 MEDICAL FACTORS IN NON-FATAL AIRCRAFT ACCIDENTS. (Paper, 33rd annual meeting of the Aerospace Medical Association, Atlantic City, N.J., 9-12 April 1962)

5,180

Usachev, V.V. 1956 NA USLOVNYE SOSUDISTO-DVIGATEL'NYE REFLEKSY (Effects of Radial Acceleration on Conditioned Vasomotor Reflexes) Zhurnal Vysshei Nervnoi Deistel Nosti Imeni I.P. Palova 6(3):555-560, May-June 1956.

ABSTRACT: The effects of acceleration on the central nervous system were

studied by plethysmographic measurement of changes in the conditional vasomotor (vasoconstriction) reflexes to a bell and unconditional vasomotor reflexes to cold water stimulation. Five healthy males, 21 to 32 years of age, were subjected to positive acceleration in a centrifuge of 3.5 m. radius. Maximum force was exerted for 20 sec. The decline of both, cold-pressor reflex and the conditional vasomotor reflex, and the increase in the respective latencies during the first twenty to twenty-six minutes after rotation attest to the dominance of inhibition processes under acceleration in those parts of brain which regulate the vascular tonus.

5,181

Usachev. V. V. 1957 K VOPROSU O PRICHINEKH ZRITEL'NYKH NARUSHENIY PRI DLITEL'NYKH USKORENIYAKH. (THE PROBLEM OF VISUAL DISTURBANCES AT SUSTAINED ACCELERATIONS.) Voyenno-meditsinskiy Zhurnal (Military Medical Journal) 4:19-21, 1956. (Translation in USAF Air Intelligence Information Report "Acceleration and the Human Organism". IR-1282-57, 20 March 1957).

5,182

Usachev, V. 1958 ACCELERATION DURING SUPERSONIC FLIGHTS
Sovetskaya Aviatsiya (Moscow), 12 July 1958

ABSTRACT: Prolonged period of acceleration during flights faster than sound produces certain changes in the human organism. Inability of the human organism to withstand G-force even of comparatively low magnitude places a limit on the possibility of carrying out tactical air maneuvers. The human organism is capable of withstanding adverse effects of acceleration. Protective mechanism come into action as soon as the centrifugal forces appear and the vascular reflexes immediately begin to regulate the arterial pressure more effectively and to accomodate the activity of heart to new conditions. Blood pressure evens out and blood flow in the brain remains at sufficiently high levels. Muscle tension in the stomach and in the lower extremities, during acceleration hinder blood flow into the lower half of the body, thereby compensating to some degree any disturbance in circulation. It has been proven that a period of combat training and various physical exercises help to improve blood circulation. This helps the human organism to become more responsive to signals, thus limiting the adverse effects of G-forces. At present, fighter pilots wear anti-G suits which improve blood flow in the brain. (CARI)

5,183

Usachev. 1960 MAN IN FLIGHT AND CHANGE IN GRAVITY.
Sovetskaya Aviatsiya (USSR) p. 3, 22 August 1958
LC or SLA 60-23534

ABSTRACT: When head to foot accelerations of 4 G's last for 3-5 seconds,

contraction in peripheral vision usually results, and after 1-2 seconds only central vision remains unimpaired. Accelerations of 5 G's lasting 4-6 seconds causes the central vision to become hazy and finally lost. Consequently, acceleration of 5 G's, lasting 10-20 seconds, is the limit of tolerance for the majority ofhealthy people who have not been conditioned. However great magnitudes can be tolerated for brief times. In ejection from an aircraft 18-20 G's for 0.1-0.15 seconds can be well tolerated. Danger of significant G forces decreases with altitude because thinness of the atmosphere precludes violent maneuvers. Anti-G suits and an inclined position can help to increase tolerance. It is important to note that the main symptoms which alert the pilot are visual disturbances.

5,184

Usachev, V. V. 1961 VLIYANIE RADIAL'NYKH USKORENII NA DVIGATEL'NYE USLOVNYE REFLEKSY (Effect of Radial Acceleration on Motor-Conditioned Reflexes)
(Trans. of Zhurnal Vysshei Nervonoi Deyatel'nosti (USSR) 11(1):22-28, 1961)
(Office of Technical Services, Washington, D.C.) 61-27393

5,185

Useller, J.W., and J.S. Algranti 1960 PILOT REACTION TO HIGH-SPEED ROTATION (Lewis Research Center, Cleveland, Ohio, Presented at IAF Meeting, Stockholm, Sweden, August 1960) National Aeronautics and Space Administration Report No. E-990.

5,186

Useller, J. W., & J. S. Algranti 1960 PILOT CONTROL OF SPACE VEHICLE TUMBLING (Paper, Institute of Aeronautics & Space, National Specialists Meeting on "Guidance of Aerospace Vehicles", 25-27 May 1960, Boston, Mass.)

5,187

Uyemura, M. & A. Ishida 1940 HYDROMECHANISCHE UNTERSUCHUNGEN ÜBER DEN BLUTDRUCK DER NETZHAUTGEFÄSSE (Hydro-mechanical Studies Concerning the Blood Pressure of the Retinal Vessels)
Acta Societatis Ophthalmologicae Japonicae (Tokyo) 44(2): 1114-1130

5,188

Uyemera, M. and A. Ishida 1940 HYDROMECHANIC STUDIES ON THE BLOOD PRESSURE OF THE RETINAL BLOOD VESSELS. (Nippon Gankaga'kai Zassi.) Acta Soc. Ophth., (Japan), 44:1114-39. Abstract: J. Aviat Med., 12:266

ABSTRACT: Four healthy males were measured for the capillary blood pressure of the macula lutea in different body positions by means of Uyemura and Sugnanuma's ophthalmodynamometer. The retinal blood pressure in a horizontal position was higher than in a vertical position and increased by 3.9, 10.7, and 19.6 mm. Hg., respectively, when the body was tilted head downward at a certain speed to angles of 15, 30, 45, and 60 degrees.

The brachial blood pressure, which was measured simultaneaouly, did not change at any position. The rise of the retinal blood pressure was due to the stagnation of blood in the retinal capilaries brought about by centrifugal force. With repeated experiments the rise became less and less noticeable as a result of the adaptation of the subject. When the tilting was done at a slow and constant rate, no rise in the retinal blood pressure was observed. By contrast, when the tilting was done suddenly and rapidly, the retinal blood pressure rose twice as high as normal. Hence the blood pressure in the retinal capilaries is subject to hydrodynamic principles and is changed by centrifugal force when the body is in motion, unless compensated by physiologic adaptation.

5,189

U. S. Adjutant General's Office 1958 MILITARY ASPECTS OF SPACE EXPLORATION (A SELECTED LIST OF TITLES) (Adjutant General's Office, Washington, D. C.) Special Bibliography No. 16; ASTIA AD-220 815; 5 June 1958

ABSTRACT: This bibliographic survey has been made at the request of the Office, Chief of Research and Development, Department of the Army. Its aims and objectives are specific - to throw light on available unclassified literature which points up the military implications of space exploration. In the process of research it became evident to the analysts of the Army Library, that the scope of unclassified materials dealing exclusively with the military aspects of the subject were limited, and that the available materials tend to emphasize the subject indirectly rather than directly. Nevertheless, through careful selection, it was possible to assemble approximately 300 titles which should prove helpful to those who seek information on the military implications of space exploration. The broader aspects of space exploration, involving the overall scientific and nonscientific trends and activities, have been deliberately excluded from this compilation. (AUTHOR)

5,190

U.S.A.F., Aerospace Information Division 1961 SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS
(Science and Technology Branch, Aerospace Information Division) AID Work Assignment No. 22, Report / AID Report 61-168 December 20, 1961 ASTIA AD 271 154

ABSTRACT: This is the seventh in a monthly report series reviewing Soviet developments in life support systems as reflected in Soviet publications. This

report is based on materials made available at the Aerospace Information Division during October-November 1961. Items are selected from Soviet open literature and include scientific publications and literature of a popular type.

The materials in this report deal with the following topic: Space medicine and biology.

5,191

U.S. Aerospace Information Div. 1961 SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS (Science and Technology Branch, Aerospace Information Div, Washington, D.C.) AID Work Assignment No. 22, Report 6, AID Report 61-143, Oct 27, 1961. ASTIA AD 267 926

ABSTRACT: This is the sixth in a monthly report series reviewing Soviet developments in life support systems as reflected in Soviet publications. It reviews Soviet developments in space biology, medicine, vehicle ecology, and life support instrumentation. This report is based on materials made available at the Aerospace Information Division during September 1961. Items are selected from Soviet open literature and include scientific publications and literature of a popular type.

5,192

U.S. Air Information Division 1961 COMPREHENSIVE ANALYSIS OF SOVIET SPACE PROGRAM (BASED ON SOVIET OPEN LITERATURE 1958-61) (Science and Technology Section, Air Information Division) AID Rept. 61-72; 22 May 1961; ASTIA AD 260 501

ABSTRACT: This report is based on more than 200 articles, official (TASS) reports sketches, and books published in connection with the Soviet space program. The report reflects information on Soviet space technology covering a period of about 3 years (1958-61). The report consists primarily of comments published by Soviet specialists in astronautics and of opinions formed by the writer on the basis of his analysis of this information. In most cases, the Soviet comments and opinions are closely paraphrased, rather than directly quoted. In expressing his own opinions and conclusions, the writer has attempted to show the inferences on which they are based. The literature surveyed has led the writer toward several tentative conclusions which, if correct, may be of considerable significance. These opinions concern the launching and recovery systems used in the Soviet space programs.

5,193

U.S.A.F., Air Information Division 1961 FURTHER DETAILS ON GAGARIN FLIGHT (Science and Technology Branch, Air Information Division) AID Rept. 61-113 July 27, 1961 ASTIA AD 261 454

ABSTRACT: The present brief report recounts certain details found in three

articles published by USSR scientists and discusses the implications of this information. The first article was written by Professor G.V. Petrovich and published in the Vestnik of the Academy of Sciences USSR. The second is a TASS interview with Professor V.V. Dobronravov. The third was written by Inna Yavorskaya, scientific secretary of the Interplanetary Travel Commission of the Academy of Sciences USSR.

5,194

U.S.A.F., Air Information Div. 1961 SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS (Science & Technology Section, Air Information Division) AID Work Assignment No. 22, Rept. 4; AID Rept. 61-109; July 1961 ASTIA AD 261 452

ABSTRACT: This is the fourth in a monthly report series reviewing Soviet developments in life support systems as reflected in Soviet publications. This report is based on materials made available at the Air Information Division during June 1961. Items are selected from Soviet open literature and include scientific publications and literature of a popular type.
The materials in this report deal with the following topics:

I. Space Medicine and biology
II. Space physiology
III. Space psychology
IV. Space vehicle ecology

5,195

U.S. Air Information Division 1961 SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS Science and Technology Section, Air Information Division AID Rept. 61-41 March 24, 1961 ASTIA AD 254 410

ABSTRACT: This is the first in a monthly report series reviewing Soviet developments in life support systems as reflected in Soviet publications. In this series, materials will be grouped according to the following topics: I. Space medicine and biology; I. Space physiology; III. Perceptual physiology; IV. Space psychology; V. Space vehicle ecology; VI. Survival conditions; and VII. Instrumentation. This report is based on source materials made available at the Air Information Division during February, 1961. Items are selected from Soviet open literature and include scientific publications and literature of a popular type. Materials in this report deal with topics I, II, V, and VI.

5,196

U.S. Aerospace Information Division 1961 SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS. (Science and Technology Branch, Aerospace Information Division) AID Report 61-156, 30 Nov. 1961. ASTIA AD 269 794.

CONTENTS:
Ecological System

Stress Factors - Acceleration, Noise, Vibration
Weightlessness
Radiation Effects
Training and Biotelemetry

5,197

U.S. Aerospace Information Division. 1962 SOVIET MANNED SPACE FLIGHT INDIVIDUALS AND COMPONENTS OF THE USSR SPACE COMMAND SYSTEM-SUPPLEMENT (BASED ON SOVIET OPEN LITERATURE 1961-1962). (Aerospace Information Division, Science and Technology Branch, Wash., D.C.) AID rept. no. 62-129; ASTIA AD-285 329; 12 Sept. 1962

5,198

U.S.A.F. Aerospace Information Division 1962 SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS (Aerospace Information Division, Washington, D.C.) AID Report 62-95, 3 July 1962. ASTIA AD 288 432

ABSTRACT: The first 18 paragraphs of this article (pp. 1217-1219) deal with the achievements of Soviet space science, the discovery of the three "cosmic speeds" progress in rocketry, planned aspects of the Soviet space program, the rise of space biology, the space-flight factors which affect life, the role of telemetry, the hazards of space flight, and space medicine. These are dealt with in general terms and have been published earlier in many Soviet publications.

5,199

U.S. Aerospace Information Div. 1962 SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS (Aerospace Information Div., Washington, D.C.) AID-62-28, NASA N62-14686, Feb. 1962

ABSTRACT: This report reviews Soviet developments in space biology, medicine, and physiology. (AUTHOR ABSTRACT)

5,200

U. S. Aerospace Information Div. 1962 SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS (Aerospace Information Div., Washington, D.C., Jan. 1962) AID-62-17, NASA N62-14685

ABSTRACT: This report reviews Soviet developments in space physiology. (AUTHOR ABSTRACT)

5,201

Aerospace Information Division 1962 SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS A. BIOSCIENCES
Aerospace Information Division, AID Work Assignment No. 22, AID Report 62-61 March 31, 1962 ASTIA AD 276 171

ABSTRACT: This is the tenth in a monthly report series reviewing Soviet developments in life support systems as reflected in Soviet publications. This report is based on materials made available at the Aerospace Information Division during March 1961. Items are selected from Soviet open literature and include scientific publications and literature of a popular type. The materials in this report deal with the following topics: I. Space medicine and biology and II. Space physiology.

5,202

U.S.Aerospace Information Div. 1962 SOVIET MANNED SPACE FLIGHT LIFE SUPPORT SYSTEMS: MEDICAL AND BIOLOGICAL ASPECTS OF THE VOSTOK-3 AND VOSTOK-4 FLIGHTS. (Aerospace Information Division, Washington, D.C.) AID Report No. 62-191, November 1962. ASTIA AD 291 911.

ABSTRACT: The medical and biological aspects of the Vostok-3 and Vostok-4 flight, including selections of orbits, physical and psychological preparation, medical monitoring, radiation protection, diet, cabin ecology, and projected problems for interplanetary flight, were reviewed. The sources are from Soviet open-literature, chiefly newspapers, published in the period August-October 1962.

5,203

Aerospace Information Div. 1962 PRINCIPLES OF LIFE SUPPORT IN SPACE BASED ON SOVIET OPEN LITERATURE PUBLISHED IN CONNECTION WITH THE VOSTOK-3 AND VOSTOK-4 LAUNCHINGS
Aerospace Information Div., Washington, D.C. 5 Dec. 1962 ASTIA AD 291 910

ABSTRACT: Descriptions of the principles of life support in space used b Soviet specialists at the present time for orbital flights, and those which are being discussed and developed for future long-range missions have been extracted from more than two hundred articles and TASS reports published predominantly in Soviet newspapers in connection with the launching of the Vostok-3 and Vostok-4 spaceships. The articles were written by various specialists in the field of space technology, including academicians, corresponding members of the Academy of Sciences, professors, doctors of biological sciences, doctors of medical sciences, candidates of medical and technical sciences and physics and mathematics, engineers, science reporters, and cosmonauts. Primary emphasis was placed on the discussions of data which describe the design elements of equipment used in space application, including the spaceship cabin, automatic devices, equipment used in the cosmonaut training program. Psychological and physiological conditioning and responses and safety factors are included. (Author)

5,204

Aerospace Information Division 1963 SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS. A. BIOSCIENCES (Aerospace Information Division, Library of Congress, Washington, D.C.) AID Report P-63-45, 29 March 1963.

ABSTRACT: This is the thirteenth in a series reviewing Soviet developments in life support systems. It is based on materials made available at the Aerospace Information Division through December 1962. Items are selected from Soviet open literature.

The materials in this series are grouped according to the following topics:

Part A (Biosciences)
- I. Space medicine and biology
- II. Space physiology
- III. Perceptual physiology
- IV. Space psychology
- V. Space vehicle ecology
- VI. Survival conditions

Part B (Instrumentation).

Materials in this report deal with topics I, II, and V.

5,205

U.S. Aerospace Information Division 1963 SOVIET BIOMEDICAL MONITORING IN SPACE FLIGHT METHODS, TECHNIQUES, AND EQUIPMENT (Aerospace Information Division, Library of Congress) AID Work Assignment No. 22 AID Report P-63-42 March 27, 1963 ASTIA AD 402 620

ABSTRACT: This report consists of eleven abstracts, one of an article in Etudes sovietiques and ten of articles in two recently published Soviet collections, Pervyye kosmicheskiye polety cheloveka (First space flights of man) and Problemy kosmicheskoy biologii (Problems of space biology).

5,206

Aerospace Medical Association 1960 PRESENT ACTIVITIES IN THE LIFE SCIENCES. (Life Sciences Committee, Aerospace Medical Association, Washington, D.C.)

ABSTRACT: This publication contains a list of the present research activity in the field of life sciences with a corresponding list of laboratory names and locations and chief investigators who are doing research work in the fields listed.

5,207

USAF Aerospace Medical Center 1960 LECTURES IN AEROSPACE MEDICINE, 11 - 15 JANUARY 1960. (School of Aviation Medicine, USAF Aerospace Medical Center (ATC), Brooks AFB, Texas)

ABSTRACT: This lecture series includes twenty-four lectures presented to an audience composed of distinquished foriegn representatives, U.S. military officers, and outstanding research and university representatives.

5,208

USAF Aerospace Medical Center Jan. 1961 LECTURES IN AEROSPACE MEDICINE, 16-20 JANUARY 1961. (Conducted at the School of Aviation Medicine, Brooks AFB, Texas)

ABSTRACT: This lecture series includes twenty-six lectures presented to an audience composed of distinquished foreign representatives, U.S. military officers, and outstanding research and university representatives.

5,209

U.S. School of Aviation Medicine 1962 BIOASTRONAUTICS. ADVANCES IN RESEARCH. (School of Aviation Medicine, Randolph Air Force Base, Tex.) March 1959. ASTIA AD 226 473

CONTENTS:

Definitions and subdivisions of space (bioastronautical aspect) by H. Strughold

Bio-paks: Instrumentation and biomedical research Primates in space

Center of gravity and moments of inertia measurements for seat plus a rhesus monkey, by H.G. Clamann

Summary of immunochemical analyses on sera from humans exposed in a simulated altitude chamber, by W.G. Glenn

Survival terrestrail micro-organism under simulated Martian conditions, by J.D. Fulton.

Photosynthetic gas exchangers and recyclers used in closed ecological system studies, by W.A. Kratz

Man in Space, by B. Balke

Physiological instrumentation of man during light, by C.H. Kratochvil

Carbon monoxide phenomena in green plants systems, by S.S. Wilks, R.M. Adams, J.A. Green and E.G. Shaw

5,210

U.S. Aerospace Technical Intelligence Center 1961 DETAILS OF THE LEGENDARY FLIGHT

Aerospace Technical Intelligence Center, Wright-Patterson AFB, Ohio
Trans. No. MOL-1035 16 April 1961 ASTIA AD 261 805
Original Source: Komsomol'skaya Pravda 91(11031): 1-3

5,211

U.S. Air Forces War Dept., 1943 EFFECT OF ACCELERATION ON ESCAPE FROM AIRCRAFT. Appendix J. TSELA-3-697-11, 28 Feb. 1943.

5,212

U.S. Air Force 1945 EFFECT OF ACCELERATION ON ESCAPE FROM AIRCRAFT (Paper, Conference on "Human Factors in the Design and Operation of Aircraft" Aero Medical Laboratory, Engineering Division, Wright-Patterson AFB, Ohio, 19, 20 Jan. 1945) ASTIA ATI 12 729

5,213

U.S. Air Force 1948 VENOUS PRESSURE IN THE HEAD UNDER NEGATIVE ACCELERATION (Aeronautical Medical Laboratory, Wright-Patterson AFB, Ohio) 15 Jan. 1948.

5,214

U.S. Air Force 1949 SYNOPSIS OF THE AERO-MEDICAL ASPECTS OF JET-PROPELLED AIRCRAFT. (USAF Air Material Command, Wright-Patterson AFB, Ohio) Jan. 1949. ASTIA ATI 56 134.

ABSTRACT: This publication contains brief summaries of aero medical problems arising today from the use of jet aircraft. Specifically, there are sections concerning the problems of high altitude flight, problems of high speed flight, and problems concerning flight safety. In many sections nothing new has been added since the war, except a better understanding of human requirements. In others, much new material has been included and many new problems clarified.

5,215

U.S. Air Force Air Materiel Command 1950 HIGH ALTITUDE BAIL-OUTS. (USAF, AMC, Holloman AFB, N.M.) Memorandum Report MCREXD-695, Sept. 1950.

ABSTRACT: Experimental results are presented of fourteen human tests accomplished at Holloman Air Force Base, which prove the feasibility of escape at high altitude from a physiological standpoint and demonstrate the practicability of automatic equipment for ejection seat and free bailout methods of escape.

5,216

U.S. Air Force 1950 BACK INJURY IN JET-AIRCRAFT ACCIDENTS; 28 CASES-HARD LANDINGS. (USAF Flying Safety, Norton AFB, Calif) Informal Report.

5,217

USAF 1950 GERMAN AVIATION MEDICINE, WORLD WAR II.
(School of Aviation Medicine, Wash. D.C.)

5,218

U.S. Air Force 1951 PARACHUTE HANDBOOK
(Parachute Branch, Equipment Lab., Wright Air Development Ctr., Wright-Patterson AFB, Ohio) 1 March 1951. ASTIA ATI 35532.

5,219

U.S. Air Force 1952 THE BEGINNINGS OF RESEARCH IN SPACE BIOLOGY AT THE AIR FORCE MISSILE DEVELOPMENT CENTER, HOLLOMAN AIR FORCE BASE, NEW MEXICO, 1946-1952
Air Force Missile Development Ctr., Holloman AFB, N. Mex. ASTIA AD 208 018

ABSTRACT: The first installment toward fulfilling the need for examining the history of Air Force participation in space-biology research. A serious study of the origins of biological projects, their gradual evolution, and their scientific and technical contributions is of considerable value in avoiding old mistakes or duplicating previous effort, and for suggesting new paths of endeavor in the planning and pursuit of the more complex programs required in the immediate future. The V-2 and Aerobee rocket experiments and balloon flights are reviewed, with emphasis upon the biomedical information obtained therefrom. Experiments included fungus spores, fruit flies, mice, hamsters, cats, dogs, and monkeys as subjects. The effect at high speed and altitude of G forces, subgravity, and cosmic radiation were major factors explored. Experience gained in rocket and balloon launching, instrumentation and recovery techniques, and the growing collection of scientific data particularly related to cosmic radiation and sub-gravity problems marked the practical beginnings of Air Force research in space biology.

5,220

USAF 1952 PHYSICS AND MEDICINE OF THE UPPER ATMOSPHERE.
(School of Aviation Medicine, Randolph Field, Texas)

5,221

U.S. Air Force 1953 PROJECT PHYSIOLOGY OF ROCKET FLIGHT, MX NO.2. (Holloman (Air Development Center, Holloman Air Force Base, N. Mexico)

5,222

U.S. Air Force 1953 PROJECT PHYSIOLOGY OF ROCKET FLIGHT, MX NO. 1450-R. (Holloman Air Development Center, Holoman AFB, N. Mex.)
Weekly test status report for week ending 24 Feb. 1953.
Report No. HDT 319.1/27

5,223

U.S. Air Force 1953 PHYSIOLOGY OF FLIGHT: USAF Manual 160-30. (Washington, D.C. : U.S. Government Printing Office, 1953)

5,224

USAF 1954 FLIGHT SURGEON'S MANUAL. (Manual 160-5, Dept AF, Oct. 1954)

5,225

U. S. Air Force 1954 HADC SEMI-ANNUAL PROGRESS REPORT, "ABRUPT DECELERATION" JULY-DECEMBER, 1954. (Aeromedical Field Laboratory, AFMDC, Holloman AFB, N. Mex.)

5,226

U. S. Air Force June 1955 SEMI-ANNUAL PROGRESS REPORT --- PROJECT 7850, January-June 1955 (Aeromedical Field Laboratory, Air Force Missile Development Center, Holloman AFB, New Mexico)

5,227

U.S. Air Force 21 June 1955 TEST REPORT ON ESCAPE FROM AIRCRAFT AT HIGH SPEED AND ALTITUDE. (Aeromedical Field Laboratory, Air Force Missile Development Center, Holloman AFB, New Mexico) Rept. No. 2, 21 June 1955

5,228

U. S. Air Force July 1956 - Nov. 1956 OPERATIONAL REPORT ... 1 JULY 1956 THROUGH 28 NOVEMBER 1956. (Air Force Missile Development Center, Holloman AFB, N. Mex.)

5,229

USAF Air Force 1956 ARDC SLED TESTS EJECTION IMPACT FORCES. Aviation Week 65(24):81-83, 10 Dec. 1956.

ABSTRACT: The new catapult sled "Daisy Track" installed at the Holloman Air Development Center is described. Some of the studies on the effects of abrupt deceleration and on the best body position for emergency ejection are mentioned briefly.

5,230

U.S. Air Force, trans. P.P. Batrechenko 1956 OPYT MEDITSINSKOGO OBESKENKENIYA TRASIROVKI A PROTIVOPEREGRUZOCHNYN USTROYSTVOM LETNOGO SOSTAVA CHASTI. (Experience with Medical Supervision During the Training of the Flying Personnel of the Unit in the Use of Pressure Suit Equipment) Voyenno-meditsinskiy Zhurnal (Military Medical Journal) 3:64-65, 1956. USAF Translation: IR-1037-57. 1957

5,231

U.S. Air Force 1956 UNITED STATES AIR FORCE PARACHUTE HANDBOOK. (Wright Air Development Center, Air Research and Development Command, Wright-Patterson AFB, Ohio) WADC Technical Report 55-265, Dec. 1956. ASTIA AD 118036.

ABSTRACT: The United States Air Force Parachute Handbook is a collection of information, test results, and other technical data pertaining to the application, design, construction, and testing, of parachutes, parachute systems, and accessories. The contents of the Handbook represent the state-of-the-art of parachute development, design, fabrication, and testing, and will be amended as the state-of-the-art advances.

5,232

U.S. Air Force, trans. 1956 AT THE AEROMEDICAL SECTION OF THE LEARNED MEDICAL COUNCIL ATTACHED TO THE CHIEF OF THE MAIN MILITARY MEDICAL ADMINISTRATION. (V Sektsii Aviatsionnoy Meditsiny Ughenogo Medits Irskogo Fri Machal'Nike Gvmi) compiled from two sources: Voyenno-Meditsinskiy Zhurnal (Military Medical Journal) 5:95-96 (1956) and Vestnik Vezdushnogo Flota (Herald of the Air Fleet) 5:83-84 (1956). (Trans. in, USAF Air Intelligence Information Report IR-1621-56. 13 Aug. 1956)

5,233

U. S. Air Force 1956 U. S. A. F. SUPERSONIC AIR RESEARCH TEST TRACK: PROJECT SMART. Shell Aviation News 221:12-14, Nov. 1956

ABSTRACT: The Air Force supersonic military air research track (SMART), 12,000 feet long, across the flat top of Hurricane Mesa, Utah, terminates at the brink of a 1,500 foot escarpment. Test vehicles can be accelerated to supersonic speeds along this track and escape devises such as ejection seats released from them to continue over the cliffs, their descent being checked by the same parachutes used in high performance aircraft. Illustrations are included of the rocket sled, dummy, and ejection seat, and of test ejections.

5,334

U. S. Air Force Sept. 1957 DAISY TRACK TESTS. (Air Force Missile Development Center, Holloman AFB, New Mex.) Test Report No. 6, 10 Sept. 1957, p. 4

5,335

U. S. Air Force 1957 AUTOMOTIVE CRASH TEST PROGRAM. (Aeromedical Field Laboratory, Air Force Missile Development Center, Holloman AFB, N. Mex.) 17 May 1957

5,336

U. S. Air Force 1957 SYMPOSIUM NO. 3 PHYSICAL STANDARDS AND SELECTION, AVIATION MEDICINE RESIDENCY TRAINING PROGRAM, 19-20 FEBRUARY 1957 (School of Aviation Medicine, Randolph AFB, Texas). ASTIA AD-144 144

CONTENTS:
The philosophy of physical standards for military service;
The history of physical standards in the USAF
Pulmonary function standards
Cardiovascular standards
The electrocardiogram in the selection of flying personnel
Serum lipoprotein and pilot selection
Eye standards for visual acuity, depth perception, and muscle balance
Visual standards -- color vision
Discussion of papers
Eye, nose, and throat standards
The establishment of norms
Conservation of the trained airman
The stability of the nervous system
Psychiatric standards
The significance of loss of consciousness
Specific requirements of the Strategic Air Command
Physiological selection;
Standards for acceleration;
Job requirements and matching standards
The job of flying high-performance aircraft
Physical standards for high-altitude indoctrination
Selection and the man-machine complex

5,337

U.S. Air Force 1957 PROJECT 91- MX -981 - AERO MED SLED RUN DATA--HOLLOMAN TRACK. ISSUE III. (Air Force Missile Development Center, Holloman AFB, New Mexico) 1 May 1957.

5,338

U.S. Air Force 1957 VERTIGO/DISORIENTATION.
(Headquarters Tactical Air Command, Langley AFB, VA.)
Tactical Air Command Surgeon's Bull. 7(2):14-17, Feb. 1957.

ABSTRACT: A review of human factors involved in major aircraft accidents for the period of January-September 1956, reveals that vertigo and/or disorientation accounted for 32 of the 116 major accidents. Most typical cases of vertigo are transient and usually of short duration and consist of illusions of pitch, sensations of turning while in straight and level flight and vice versa. These are usually overcome by strict instrument interpretation. The Coriolis reaction, however, is more dangerous and causes more severe reactions in pilots leading to uncontrollable flight situations immediately after changing radio channels.

5,339

U.S. Air Force 1957 THE HOLLOMAN TRACK.
(Air Research & Development Command, Air Force Missile Development Ctr., Holloman AFB, New Mexico) AFMDC TR 57-1, Sept. 1957. ASTIA AD 150 248.

ABSTRACT: A means for testing which permits the dynamic loads of free-flight tests, and yet insures recovery of the test object, was born of this necessity. Supersonic tracks allow proper programming. The Holloman Track, at the Air Force Missile Development Center of the Air Research and Development Command, USAF is the largest track facility in the Department of Defense. It is the purpose of this booklet to acquaint prospective track users with the potentialities of the Holloman Track.

5,340

USAF Air Intelligence, trans. 1957 ACCELERATION AND THE HUMAN ORGANISM. (USAF Air Intelligence Report) IR-1282-57. See V. I. Babushkin, V. V. Malkin, & V. V. Usachev; and V. V. Usachev, 1957.

5,341

USAF Air Intelligence, trans. 1957 PHYSIOLOGY OF ACCELERATION: A CONTROVERSY BETWEEN D. YE. ROZENBLYUM AND G. L. KOMENDANTOV. (USAF Air Intelligence Information Report) IR-1407-57. See D. Ye. Rozenblyum; G. L. Komendantov; K. M. Shalay et al.; and A. P. Popov. 1956

5,342

USAF Air Intelligence, trans. 1957 TWO PROBLEMS IN ACCELERATION: CUMULATIVE EFFECT AND X-RAY EXAMINATIONS. (USAF Air Intelligence Information Report) IR-1600-57. See S. A. Gozulov; and A. R. Manzurov, 1956.

5,343

USAF Office of Scientific Research 1957 ASTRONAUTICS SYMPOSIUM, 1st - 2nd 1957-1958 (New York: Symposium Publications Division, Pergamon Press)

5,344

U. S. Air Force 1957 ASTRONAUTICS SYMPOSIUM, SAN DIEGO, CALIFORNIA, FEBRUARY 18-20, 1957, SUMMARY SESSION. (Air Force Office of Scientific Research) AFOSR-TR-57-14

5,345

USAF, Wright Air Development Center 1958 SPACE TRAVEL: PROBLEMS AND PROSPECTS (Wright Air Development Center, Wright-Patterson AFB, Ohio) December, 1958

ABSTRACT: This publication is a bibliographical listing of books and articles dealing with space travel. Much of the material was originally presented by the American Rocket Society, the Institute of the Aeronautical Sciences, and the Society of Automotive Engineers.

5,346

U. S. Air Force 1958 RESEARCH ACCOMPLISHMENTS IN BIODYNAMICS: DECELERATION AND IMPACT AT THE AIR FORCE MISSILE DEVELOPMENT CENTER, HOLLOMAN AIR FORCE BASE, NEW MEXICO, 1955-1958. (Air Force Missile Development Ctr., Holloman AFB, N. Mex.) ASTIA AD-208 015

ABSTRACT: In the monograph here presented, Dr. David Bushnell, of the Air Force Missile Development Center's Historical Office, presents a carefully documented account of the successes and failures encountered in biodynamics research programs other than escape physiology. He has endeavored to place these accomplishments within the larger context of such work undertaken elsewhere by the United States Air Force, the United States Navy, industrial corporations and academic institutions of the United States, plus some consideration of related efforts in Canada, Germany, and the Soviet Union. This is the sixth of the series of monographs published this year devoted to aspects of the history of research in space biology and biodynamics in the Aeromedical Field Laboratory.

5,347

U.S. Air Force 1958 REPORTS ON SPACE MEDICINE - 1958
Air University, School of Aviation Medicine, Randolph AFB, Texas Feb. 1958

ABSTRACT: This publication contains the following papers: "Human Performance in the Space Travel Environment" by G.T. Hauty; "Supersonic and Hypersonic

Human Flight" by J.E. Ward, S.J. Gerathewohl and G.R. Steinkamp; "Human Engineering of the Sealed Space Cabin" by G.R. Steinkamp; "Fatigue, Confinement, and Proficiency Decrement" by G.T. Hauty and R.B. Payne; "The Feasibility of Recycling Human Urine for Utilization in a Closed Ecological System" by W.R. Hawkins; "Space Cabin Requirements as Seen by Subjects in the Space Cabin Simulator" by W.R. Hawkins and G.T. Hauty; and "Weightlessness - The Problem and the Air Force Research Program" by S.J. Gerathewohl.

5,348

U.S. Air Force Special Weapons Center PROCEEDINGS OF THIRD SHOCK TUBE SYMPOSIUM 10 - 12 MARCH 1959. (Air Force Special Weapons Center, Air Research and Development Command, Kirtland AFB, New Mexico) ASTIA AD-230333

5,349

USAF 1959 ANNOTATED BIBLIOGRAPHY OF SOVIET AIR AND SPACE PROJECTS (AEROMEDICAL ASPECTS)
Trans. from Soviet open sources, 1951-1959.
(Office of Technical Services, Washington, D.C.)
May 19, 1959 59-16479

ABSTRACT: Abstracts are given for over 100 papers on problems in space flight. The papers are listed alphabetically by author under the headings: (1) aeromedical program; (2) air personnel: selection and training; (3) human engineering; (4) manned weapon system; (5) space projects; (6) space vehicle life support systems: algae photosynthesis.

5,350

USAF 1959 HIGH ALTITUDE SCOUTS (AND) RESEARCH OF PARAMOUNT IMPORTANCE (Razvedchiki Bol'shikh Vysot (and) Issledovaniya Pervostepennogo Znacheniya)
Trans from Pravda (Moscow) 1959, No. 189, P. 6, 1 and a summary trans of 3 articles on the same subject from Izvestiya (USSR) 1959, No. 160, p. 3.
(Office of Technical Services, Washington, D.C.)
Aug. 3, 1959 59-19716

ABSTRACT: The scouts are 2 dogs and a rabbit, test animals used in experiments on weightlessness. The ballistic rocket which served as a vehicle for the animals is not described. There is nothing specific on physiological findings.

5,351

USAF 1959 PROSPECTORS OF GREAT HEIGHTS (Razvedchiki Bol'shikh Vysot) Trans. of Pravda, Moscow (USSR) no. 189(14948) p. 6., 1959. (Office of Technical Services, Washington, D.C.) Jan. 1960 60-19078

ABSTRACT: The scouts are 2 dogs and a rabbit, test animals used in experiments on weightlessness. The ballistic rocket which served as a vehicle for the animals is not described. There is nothing specific on physiological findings.

5,352

U. S. Air Force 1959 BIBLIOGRAPHY ON AEROMEDICAL RESEARCH WITH ABSTRACTS. (Wright Air Development Div., Wright-Patterson AFB, Ohio) ASTIA AD-247 101, Dec. 1959

5,353

U.S. Air Force 1959 DISCOVERER III BIOMEDICAL DATA REPORT. (Directorate of Bioastronautics Projects, Air Force Ballistic Missile Division, Headquarters ARDC, Los Angeles, Calif.) WDZPB Report No. 2 ASTIA AD 241 853

ABSTRACT: Four C-57 black mice lived through the stresses of launch and accelerative forces produced by the two stage Discoverer vehicle and through more than 500 seconds of weightlessness. Speciment activity correlated with ignition and burn-out of each stage and marked activity occurred during weightlessness. Speciment activity correlated with ignition and burn-out of each stage and marked activity occurred during weightlessness. The life support system of the Mark I biomedical recovery capsule functioned satisfactorily from lift-off to 790 seconds. The atmosphere, continuously moved through a ducted gas control system, varied between 330 mm Hg oxygen partial pressure, maintained a low pCO_2 and low relative humidity (below 60%) with a constant but relatively low temperature of 56° F. During flight, no leaks occurred in the capsule or oxygen system and the latter functioned normally to maintain a satisfactory cell pressure between 6.3 to 7.0 psia from an oxygen cylinder maintaining approximately 1200 psig.
The primary biomedical mission objective was not achieved because of failure of the Discoverer III vehicle to gain sufficient velocity, resulting in a prolonged ballistic trajectory, rather than the programmed orbit. However, part or all of secondary mission objectives were achieved.

5,354

U. S. Air Force 1959 BIOASTRONAUTICS - ADVANCES IN RESEARCH
(Air University, School of Aviation Medicine, Randolph AFB, Texas)
ASTIA AD-226 473

ABSTRACT: In this publication fifteen special progress reports are published which deal with problems applicable in rocket flight and satellite flight (chapters on "Bio-Paks" and "Primates in Space"). Others report about progress in fields which will be of usefulness in more advanced space operations (chapters on "Photosynthetic Gas Exchanges...." and "Man in Space").

5,355

U. S. Air Force 1960 AEROMEDICAL FIELD LABORATORY MEETS THE CHALLENGE OF BIOASTRONAUTICS. Holloman Monthly News Bulletin 5(1):6, 8, 11-12, Nov. 1960

ABSTRACT: The research problems in this field presently under consideration and development by Holloman's Aeromedical Field Laboratory are discussed in this article.

5,356

U.S. Air Force 1960 PROCEEDINGS OF WADC SPACE TECHNOLOGY LECTURE SERIES, VOLUME I, TECHNICAL AREAS
Wright Air Development Ctr., Wright-Patterson AFB, Ohio WADC TR 59-732
ASTIA AD 235 424

ABSTRACT: This report is a consolidation of the papers presented by members of the WADC laboratories at its Space Technology Lecture Series between 7 Oct. 1958 and 11 Dec. 1958. The papers were prepared for the purpose of cross-education and therefore are directed toward an audience representing many disciplines of science and engineering. The presentations contained basic technical as well as state-of-the-art information in at least sixteen unique technical areas and subsystems directly related to space technology. The topics covered in this report are as follows: Propulsion; Flight Mechanics and Structures; Flight Control; Guidance; Communications; Secondary Power; Supporting Subsystems; Reconnaissance; and Vehicle Defense, technical areas: International Geophysical Year - The Ground Work for Space Flight; Environment of Space; Mechanics of Space Flight; Electromegnetics; Space Medicine; and Materials.

5,357

U.S. Air Force 1960 PROCEEDINGS OF WADC SPACE TECHNOLOGY LECTURE SERIES, VOLUME 2 SUBSYSTEMS-PART I. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 59-732, April 1960. ASTIA AD 236 641.

ABSTRACT: This report is a consolidation of the papers presented by memebers of the WADC laboratories at its Space Technology Lecture Series between 7 Oct 1958.

and 11 Dec. 1958. The papers were prepared for the purpose of cross-education and therefore are directed toward an audience representing many disciplines of science and engineering. The presentations contained basic technical as well as state-of-the-art information in at least sixteen unique technical areas and subsystems directly related to space technology. Areas covered in this report are the following: Propulsion; Flight Mechanics and Structures; Flight Control; Guidance; Communications; Secondary Power; Supporting Subsystems; Reconnaissance; Vehicle Defense.

5,358

U.S. Air Force Missile Development Center 1960 HOLLOMAN TRACK CAPABILITIES (Air Force Missile Development Center, Holloman AFB, New Mexico) AFMDC Technical Report 60-24, Nov. 1960. ASTIA AD 250 057.

5,359

U.S. Air Force Missile Development Center 1960 THE BEGINNINGS OF RESEARCH IN SPACE BIOLOGY 1946-1952 (Holloman AFB, New Mexico)

5,360

U.S. Air Force 1960 OPERATIONAL SUITABILITY TEST OF THE MODEL 66C PENDANT SUPPORT SYSTEM FOR THE BAK-6/F27A AIRCRAFT ARRESTING SYSTEM (WATER SQUEEZER) (4750th Test Squadron, Tyndall AFB, Fla.) (Tactics & Application Engineering) Proj. Rept. ADC/73AD/59-18. April 1960. ASTIA AD 252 617.

SUMMARY (a): The Model 66C Pendant Support System provides a retractable runway pendant cable for the BAK-6/F27A Aircraft Arresting System. The system is pneumatically powered and can be controlled electrically from the control tower or manually from the side of the runway. The pendant cable is raised and lowered on eight leaf spring type supports spaced twenty feet apart. A semaphore at the side of the runway gives a visual indication of the system position.

The test was conducted at Kincheloe AFB, Michigan, during March and early April 1960. The three test phases included twelve F-102A high speed tire versus pendant support damage investigation taxi runs, ten F-106A high speed tailhook versus pendant support damage investigation engagements and four system freezing effects investigation tests. The Model 66C in the raised postition was found to be a satisfactory pendant cable supporting system to insure successful engagements without damage to aircraft tires or tailhooks. The system was rendered inoperative by freezing in the retracted position and all major systems deficiencies resulted from the effects of cold weather.

Recommendations are made that an operative heating system be provided for cold weather locations and that certain design changes be incorporated if reliance is to be placed on ice removal chemicals only. Additional design changes or construction deficiency corrections are recommended for the actuator solenoid valves, actuator pit, semaphore and pendant cable groove.

5,361

U.S. Air Force Air Information Div. 1961 PHENOMENA IN THE UPPER ATMOSPHERE. REVIEW OF SOVIET LITERATURE. (Science and Tech. Sect., Air Information Div., Washington, D.C.) AID Rept. 61-69, 31 May 1961. ASTIA AD 257 913.

ABSTRACT: Materials in this analysis deal with the following topics; (1) Solar radiation and the ionosphere, (2) Van Allen belts and cosmic rays, (3) Telluric currents, (4) atmospheric electricity, and (5) Satellite and missile data. (Author)

5,362

USAF 1961 FIRST FLIGHT OF MAN INTO SPACE (SOME DETAILS ON PREPARATIONS FOR THE FLIGHT AND THE FLIGHT ITSELF ON THE SATELLITE."VOSTOK"). Trans. from Ekonomicheskaya Gazeta (USSR) no. 89(951) p. 3, 1961. July 27, 1961 ASTIA AD 261 826

5,363

United States Air Force 1961 FIRST ARTICLE FUNCTIONAL TEST OF THE BAK-9/F48A AIRCRAFT ARRESTING BARRIER
(4750 Test Squadron, Tyncall AFB, Florida) Project ADC/73AD/61-5, Final Report July 10, 1961 ASTIA AD 261746

ABSTRACT: The BAK-9/F48A Aircraft Arresting Barrier is a rotary friction brake type energy absorber. The distressed aircraft's tailhook engages a runway pendant cable which pulls two nylon tapes from storage reels mounted on a common shaft between two disc type brakes. The reels revolve and drive a hydraulic pump which supplies pressure to a control unit. The control unit applies constantly varying pressure to the reel brakes so as to stop the aircraft in 1000 feet regardless of engaging speed. An electric motor retrieves the system in 3½ minutes. The system will stop a 45,000 pound aircraft at 161 knots or a 55,000 pound aircraft at 141 knots without exceeding 2.0 G deceleration or conservative tape strengths.

The first article functional test was conducted at Seymour Johnson Air Force Base, North Carolina, for MOAMA and ASD. Fifteen F-106A and two F-101B arrestments were made at speeds of 52 to 106 knots and aircraft weights of 28,500 to 43,500 pounds. The system was tested at ambient, +120°F and - 30°F temperatures. On-centerline and 75 foot off-center engagements were made. A barrier intercoupling disconnect feature was tested.

The system performed very satisfactorily under these conditions. A tendency for tape twisting during retrieval was corrected. Recommendations for immediate operational use, reduction of runout distance to 950 feet, and certain crash crew and air crew training were made.

5,364

USAF 1961 DETAILS OF THE LEGENDARY FLIGHT Komsomol'skaya Pravda (Aerospace Technical Intelligence Center, Wright-Patterson AFB, Ohio) Trans. no. MCL-1035 27 July 1961. ASTIA AD 261 805.

5,365

USAF 1961 THE FIRST MANNED SPACE FLIGHT Trans. from Pravda (Moscow) (USSR) no. 115(15605) p. 1, 3-4, 1961. July 27, 1961 ASTIA AD 261 822.

5,366

U. S. Air Force 1961 PUBLICATIONS OF THE SCHOOL OF AVIATION MEDICINE, INDEX, FISCAL YEAR 1960 (School of Aviation Medicine, USAF Aerospace Medical Ctr. (ATC) Brooks AFB, Texas) ASTIA AD 250 040, Jan. 1961

5,367

U.S. Air Force 1961 AT SUPERSONIC VELOCITY. (Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio) Trans. No. FTD-TT-61-203, 27 November 1961. ASTIA AD 268 072 From Sovetskaya Litva, p. 3. 28 July 1961.

ABSTRACT: New types of ejection seats were developed in recent years. Instead of pyrotechnic cartridges, they use rocket engines. The most perfect samples allow ejections at velocities up to 24000 km/hr. Developed also were the first samples of special safety capsules. They are like small cabins formed by extensive walls. Such a capsule closes automatically and becomes hermetically sealed prior to catapulting, offering protection against counter stream of air, and safe landing. In addition, it serves as a container for rescue devices (Parachutes, emergency supply, oxygen equipment, etc.) and as a rescue raft in case of falling into the water. (Author)

5,368

U.S. Air Force 1961 A STUDY OF USAF SURVIVAL ACCIDENTS 1 JANUARY 1958 THROUGH 31 DECEMBER 1961. (Directorate of Flight Safety Research, Norton AFB, Calif.) Study no. 17-62, Dec. 31, 1961. ASTIA AD 285 130.

ABSTRACT: Major USAF aircraft accidents resulting in survival situations continue to occur in significant numbers. A survival accident is defined as any accident resulting in a water landing or any accident where rescue was delayed for one or more hours. During the period 1 Jan 1958- 31 Dec. 1961, one in every ten USAF major aircraft accidents resulted in a survival situation. In a great many of

these, excessive delays in the location and recovery of downed crewmembers were indicated. These delays resulted in the loss of highly trained crewmembers and presented definite hazards to the survival of many others. The survivors are frequently subjected to exposure and adverse conditions for long periods of time in remote, uninhabited areas. The physical and mental stresses attributed to exposure in survival situations, though difficult to evaluate, undoubtedly are major factors in the eventual outcome of these cases. It becomes increasingly apparent that the existing search and rescue effort, as well as survival training, must be improved to reduce the incidence of post accident conditions from which crew survival is a matter of chance. An urgent requirement exists for an improved personal locator device.

5,369

U.S. Air Force 1961 ITEMS OF INTEREST: NEW INDICATIONS IN SOVIET SPACE TECHNOLOGY. (Air Information Division, Science and Technology Section, Washington, D.C.) AID Report 61-40, 28 March 1961. ASTIA AD 254 409.

ABSTRACT: Academician N.M. Sisakyan discusses certain biological data obtained in experiments with animals during vertical and orbital flights.

5,370

U.S. Air Force 1961 PERIODICAL REPORT ON AEROMEDICINE: BIOPHYSICAL ASPECTS OF GAGARIN'S FLIGHT. (1126th USAF FAG, Arlington Hall Station, Arlington, Va.) Rept. 1452517

ABSTRACT: The authors point out that the design of the spacecraft "Vostok I" incorporated many years of work by numerous groups of scientists and engineers. It takes into consideration the data yielded by probes on geophysical, ballistic, and space rockets, satellites, and space ships as well as the data on properties of space surrounding the earth.

The problems discussed by the authors are varied. The problem of meteorite danger was investigated in particular detail. Radiation danger was examined with equal zeal. The problem of temperature conditions arose because of the exposure of the spacecraft to extreme heat. Gagarin's solution to the problem of acceleration is reviewed. Although the authors avoid stating Gagarin's reaction to weightlessness, they do include it as a very real problem in space flight. The authors then give a brief description of the interior of the space cabin and the function of television cameras throughout the flight. (CARI)

5,371

U.S. Air Force 1961 PERIODICAL REPORT ON AEROMEDICINE IN THE U.S.S.R.; 61-24 (1126th USAF FAG, Arlington Hall Station, Arlington, Va.) Rept. 1452577.

ABSTRACT: This is a report dealing with: (a) Contents of a book entitled Psychology of the Flying Profession; (b) Comparative Physiological study of tolerance to radial acceleration; (c) The Sixth Congress of the Ukr. Society of Physiologists, and (d) Astronaut training and manned space flights. It gives a description of Gagarin's training prior to his space flight. The author places emphasis on the fact that fear about the adverse effect of transition to g's upon reentry proved groundless. (CARI)

5,372

U.S. Air Force, trans. 1961 SOVIET AVIATION (SELECTED ARTICLES) (Aerospace Technical Intelligence Center, Wright-Patterson AFB, Ohio) Trans. No. MCL-405, 21 Dec. 1961. ASTIA AD 258 497.

CONTENTS:

Optical orientation device on the voyage to the Cosmos, by V. Arsent'yev
How the speed of the rocket was changed, by B. Maksimachev
Cosmic rocket planes of the future, by S.S. Ustinov
Problems of science and technology transport rockets, by G. Petrovskiy

5,373

U.S. Air Force 1961 REVIEW OF AERONAUTICAL AND SPACE MEDICINE. (SELECTED ARTICLES). (Aerospace Technical Intelligence Center, Wright-Patterson AFB, Ohio) Trans. No. MCL-787, 25 April 1961. ASTIA AD 259 594.

CONTENTS:

Pulmonary volume reports on 124 athletes ranging in ages from 20 to 39 years, by G. Fumagalli, R. Serra, and S. Berzolla
Modification of the electrocardiogram of albino rats subjected to tangential (transversal) acceleration before and after splenectomy, by C. Vacca & L. Vacca
Behavior of body weight, heart rate and arterial pressure in 1,000 Italian pilots in relation to their age and performance, by A. Scano
Quantitative evaluation of the ballistocardiogram after muscular strain
Effect of low barometric pressure and of some tranquilizers on the spontaneous motorial activity of mice, by F. Sparvieri
Symposium on medical radiobiology.

5,374

U.S. Air Force 1961 FROM MAN-MADE SATELLITES TO INTERPLANETARY FLIGHTS. (Ot Iskusstvennykh Sputnikov K Mekplanetnym Poletam) (Aerospace Technical Intelligence Ctr., Wright-Patterson AFB, Ohio) Trans. No. MCL-1301, 18 Sept. 1961. ASTIA AD 264 626.

5,375

USAF 1962 FIRST IN THE WORLD GROUP FLIGHT IN COSMIC SPACE (BASIC RESULTS) Trans. from Pravda (Moscow) (USSR), no. 295(16151) p. 1-3, Oct. 22, 1962. (Office of Technical Services, Washington, D.C.) Nov. 29, 1962 63-13906

5,376

U.S. Air Force 1962 LECTURES IN AEROSPACE MEDICINE JANUARY 8-12, 1962. (Held at the School of Aerospace Medicine, USAF Aerospace Medical Division (AFSC) Brooks AFB, Texas)

ABSTRACT: The complete text of lectures presented at the School of Aerospace Medicine. Also included is an introduction to each of the speakers and a welcome address by Brig. Gen. Theodore C. Bedwell, Jr.

5,377

U.S. Air Force 1962 TECHNIQUES OF PHYSIOLOGICAL MONITORING, I. FUNDAMENTALS. (Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio) Final Report. AMRL-TDR-62-98. Sept. 1962. ASTIA AD 288 906

ABSTRACT: This volume is the first of a three-volume handbook covering the applications of electronics in monitoring bioelectric physiological responses. The fundamental concepts and methods presented in this volume form a foundation for the detailed technical discussions in the succeeding volumes and, it is hoped, to provide a common language and basis of understanding between the physiologist and electronic engineer engaged in this field. The data obtained by monitoring physiologist and electronic engineer engaged in this field. The data obtained by monitoring physiological responses in varied environments can be used to improve the efficiency and increase the safety of a human subject in aircraft and spacecraft.

5,378

USAF 1962 FEASIBILITY STUDY OF HYPERSONIC PARACHUTE FREE FLIGHT TEST CAPABILITY (Phase I)
(Flight Accessories Laboratory Aeronautical Systems Div. Air Force Systems Command Wright-Patterson Air Force Base, Ohio) ASD-TR-61-600. ASTIA-275578

ABSTRACT: A study has been conducted to determine the feasibility of establishing a free-flight test capability for aerodynamic decelerators at supersonic and hypersonic velocities. Methods for boosting test vehicle weights of 250,500, 800, and 2000 pounds to various altitudes and Mach numbers utilizing presently available rocket motors and range facilities and evaluated. Test altitudes vary from 2000 to 250,000 feet for a Mach number range of 1.0 to 10. Instrumentation requirements for measuring decelerator performance characteristics and vehicle flight parameters are investigated. Methods for water and land recovery of the payload section of the vehicles are presented. The results of the study indicate that presently available vehicle design and instrumentation techniques, as well as existing range facilities, may be employed.

5,379

U. S. Air Force 1962 THE EFFECTS OF EXPOSURE TO SIMULATED LAUNCH AND RE-ENTRY PROFILES ON CHIMPANZEE PERFORMANCE. (6571st Aeromedical Research Lab., Holloman AFB, N. Mex.) Rept. ARL-TDR-62-1; March 1962

ABSTRACT: Five chimpanzees trained to perform a continuous avoidance task were exposed to the acceleration profiles simulating the conditions of launch and re-entry which exist when a capsule is placed into orbit. Performance during launch and re-entry differed from the base-line period which immediately preceded each of the three launches. However, performance immediately following launch and re-entry indicated that the animals recovered rapidly and tolerated the insults well.

5,380

U. S. Air Force Missile Development Center 1962 HOLLOMAN TRACK CAPABILITIES (Air Force Missile Development Center, Holloman AFB, N. Mex.) MDC-TDR-62-9; ASTIA AD-286 761; Sept. 1962

ABSTRACT: Because the Holloman Track can closely simulate missile free flight environment and allow closer observation during and after a run, it is an ideal development facility for use between laboratory and free flight tests of guidance and other missile systems.
The Holloman Track is the longest and most precisely aligned test track in the free world. The design and construction was based on experience gained at Holloman and the other major tracks. Track testing has been in progress here since 1950, when the SNARK missile was tested. Since this time, dozens of varied programs have been successfully accomplished, building a valuable reservoir of experience.

The test sled brings together the payload, propulsion, instrumentation, and other accessory equipment, and is of major importance in the test program. The AFMDC Track Test Division has pursued a long-range sled development program which has resulted in the following: (1) a dual-rail sled than can carry a 200-lb. payload to 3,600 ft. per second at 56 g maximum acceleration, (2) a monorail sled that can carry a 150 lb. payload to over 3,800 ft. per second, and (3) various liquid-fueled sleds which, with a long thrust duration, can achieve relatively high velocities with a large payload and low accelerations.
A similar development program has produced a high-quality instrumentation support capability as follows: (1) operational FM/FM, PCM, and PDM telemetry systems in the 800 mc region, (2) miniaturized, rugged, dependable sled-borne tape recorders, (3) a velocity-measuring system with an error of less than one part in 20,000, (4) the most advanced timing and programming system in existence, and (5) sufficient numbers and types of data collection cameras to furnish practically any optical coverage required. (AUTHOR)

5,381

U. S. Air Force 1962 EFFECTS OF ACCELERATIVE FORCE
In Flight Surgeon's Manual, Air Force Manual No. 161-1, Chap. 5, 17 Jan.1962

5,382

U.S. Air Force 1962 STUDY OF A DRAG BRAKE SATELLITE RECOVERY SYSTEM, VOLUME I (Aeronautical Systems Division, Wright-Patterson AFB, Ohio) ASD TR 61-348, Vol. 1. ASTIA AD 274 087.

ABSTRACT: Research and development on the Drag Brake Satellite System, advanced to preliminary design stage for structure and subsystems, are fully documented. Included are preliminary designs and the preceding research and engineering, specifications, text planning and requirements, peripheral supporting studies and problem areas. Significant advances in coated wire mesh skin development and nominal tajectory follower type of control systems are reported. In this 4-volume report, Vol. I contains general introductory material and discusses the Drag Brake System and mission, and structure.

5,383

U.S. Air Force 1962 STUDY OF A DRAG BRAKE SATELLITE RECOVERY SYSTEM, VOLUME II (Aeronautical Systems Division, Wright-Patterson AFB, Ohio) ASD TR 61-348, Vol. 2. ASTIA AD 275 253.

ABSTRACT: Research and development on the Drag Brake Satellite System, advanced to preliminary design stage for structure and subsystems, are fully documented. Included are preliminary designs and the preceding research and engineering, specifications, text planning and requirements, peripheral supporting studies and problem areas. Significant advances in coated wire mesh skin development and nominal trajectory follower type of control systems are reported.

5,384

U.S. Air Force Academy 1962 SYMPOSIUM ON BALLISTIC MISSILE AND SPACE TECHNOLOGY, SEVENTH, August 13-16, 1962. TRANSACTIONS. (Aerospace Corp., Los Angeles) MX-3

5,385

U.S. Air Force 1962 STUDY OF A DRAG BRAKE SATELLITE RECOVERY SYSTEM, VOLUME III. (Aeronautical Systems Division, Wright-Patterson AFB, Ohio) ASD TR 61-348, Vol. 3. ASTIA AD 274 088.

ABSTRACT: Aerospace dynamics (Aerodynamics, aeroelasticity, and upper atmosphere physics); Ground support (Mechanical and electrical maintenance ground equipment, electrical test support equipment, and balloon and orbital test programs); and System tests (Laboratory test and quality assurance program, wind tunnel tests, flight test program, operational support, and hot tests).

5,386

U.S. Air Force 1962 STUDY OF A DRAG BRAKE SATELLITE RECOVERY SYSTEM, VOLUME IV (Aeronautical Systems Division, Wright-Patterson AFB, Ohio) ASD TR 61-348, ASTIA AD 274 089.

ABSTRACT: Research and development on the Drag Brake Satellite System, advanced to preliminary design stage for structure and subsystems, are fully documented. Included are preliminary designs and the preceding research and engineering, specifications, text planning and requirements, peripheral supporting studies and problem areas. Significant advances in coated wire mesh skin development and nominal trajectory follower type of control systems are reported.

5,387

U.S. Air Force 1962 TECHNICAL PROGRAM SUMMARY (6571st Aeromedical Research Laboratory Aerospace Medical Division, Holloman AFB, New Mexico) March 1962.

5,388

U.S. Air Force 1963 NEW GERMANY (SELECTED ARTICLES) Translation Services Branch, Foreign Technology Division, WP-AFB, Ohio FTD-TT-62-1584/1+4 Jan. 17, 1963 ASTIA AD 295 769 Original Source: German Newspaper, Neues Deutschland, August 14, 1962, Pp. 1 & 2

ABSTRACT: This publication contains a group of articles praising the flights of spaceships Vostok III and Vostok IV.

5,389

U.S. Air Force 1963 A DIGITAL READOUT TECHNIC APPLICABLE TO LABORATORY AND AEROSPACE MEDICAL MONITORING OF PHYSIOLOGIC DATA.
(USAF School of Aerospace Medicine, Brooks AFB, Texas)
Technical Report No. SAM-TDR-62-139, Feb. 1963. ASTIA AD 403 481

ABSTRACT: This report describes a technic for digital readout of systolic and diastolic blood pressure, heart rate, and respiratory minute volume, applicable to wire telemetry in the laboratory as well as wireless telemetry from aerospace vehicles. General description of the technic and specific construction details are given.

5,390

U. S. Air Force 1963 INVESTIGATION OF CREW ESCAPE SYSTEM SURFACE IMPACT TECHNIQUES FOR ADVANCED AEROSPACE VEHICLES.
(Aeronautical Systems Division, Dir/Aero-mechanics, Flight Dynamics Lab., Wright-Patterson AFB, Ohio) Final Report ASD-TDR-63-173, May 1960.

ABSTRACT: This report describes the results of a four-part study related to the parachute landing impacts of a manned capsule. A survey of literature, with the objective of establishing human tolerance to rapidly applied acceleration, revealed a substantial discrepancy among the data published by investigators in this area. The tolerance limits published in HIAD were accepted as the parametric limits for the present study, pending the completion of advanced studies in this area. Analyses of typical parachute landings revealed that horizontal velocities of up to 56 fps and vertical velocities of up to 33 fps are possible. Secondary impacts resulting from toppling are likely. Active and passive attenuation methods were quanitatively evaluated in an effort to determine an optimum attenuator. From the results of this evaluation, it was recommended that an active type system be developed to negate the horizontal velocity and that a conventional passive type system be employed to alleviate the vertical impact. A study of experimental techniques indicated that part-scale model testing is feasible and advantageous for a program in which prototype attenuators are validated. Methodologies were derived for dynamic scaling of the results obtained from small model experiments to permit prediction of full size model performance.

5,391

U.S. Air Force ACCELERATION STUDIES ON MERCURY ASTRONAUT CANDIDATES.
(WADC Tech. Report in preparation.)

5,392

MOTION PICTURE

U. S. Air Force Film Library Ctr. 1956 HUMAN FACTORS IN RESEARCH AND DEVELOPMENT. (Air Force Film Library Center, St. Louis, Mo.) (Proj. 50/6/S-82) Film No. ER-64

ABSTRACT: Depicts five areas of investigation performed on the Human Factors program by ARDC, showing personnel equipment, explosive decompression, Air Force clothing research, downward ejection, and wind blast and deceleration at high speeds.

5,393

U.S. AAF Air Technical Service Command 1947 NOTES ON DECELERATION AT BAIL-OUT OF AIRCRAFT. Memorandum Reel -C 262. A.T.I. 7236 10 April 1947.

ABSTRACT: In this report the results are presented of considerations and calculations covering deceleration, velocity, and time during bail-out of high speed aircraft. As a result of the high speed the air forces on a human body leaving a plane without opened parachute are very high and can increase to such an extent that the limit a man can withstand may be surpassed. The decelerations were investigated for velocities from 300 mph to 600 mph, for altitudes from sea level to 40,000 ft and for drag areas from the largest and smallest cross-section of a human body, for average drag area obtained from human free-falling tests, and for a human body leaving a plane with ejection seat.

5,394

U.S. Air Force Air University Library 1958 EARTH SATELLITES Special Bibliography No. 118. Supplement No. 1, Maxwell AFB

ABSTRACT: Lists 127 selected references in Air University Library including books, documents, and periodicals.

5,395

USAF Foreign Tech. Div. 1962 AVIATSIYA I KOSMONAVTIKA (Aviation and Cosmonautics) (Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio) FTD Rept. No. ST 62 9, Sept. 1962. ASTIA AD 409 050.

5,396

U.S.A.F., Foreign Tech. Div. 1962 EARTH-SPACE-EARTH (SELECTED ARTICLES) (Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio) Trans. No. FTD-TT-62-1416 Oct. 11, 1962 ASTIA AD 292-224 Original Source: Zemlya-Zosmos-Zemlya, (Sbornik Materialov, Opublukovannykh V Gazete "Pravda" Izdatel'stvo "Pravda", (Moskva), 24, Pp. 10, 13, 14, 27, 30, 31 45-47, 51, 52, 56, 57 and 61. 16 Aug. 1962

ABSTRACT: This publication contains articles by the following titles: "Vostok-3 in Outer Space"; "News from Outer Space"; "Vostok-4 in Orbit"; "News from Outer Space"; "Research Program is Being Executed Successfully"; "Conversation in Outer Space"; "Food of Gods"; "Precisely According to Program";"Before the Completion of a Historical Flight"; and "Good Wishes to Nations of the World."

5,397

USAF, Foreign Technology Division 1962 (U) AVIATION AND COSMONAUTICS (Foreign Technology Division, Wright-Patterson AFB, Ohio) FTD-ST-62-9, 44(9) 1962.

ABSTRACT: A translation of the special issue of the Russian periodical, Aviation and Cosmonautics, commemorating the dual flight of Andriyan Nikolayev and Pavel Popovich in August 1962. Includes official communiques released before, during, and after the flight and speeches and statements by Soviet officials and cosmonauts.

5,398

USAF, Foreign Technology Division 1963 AVIATION REVIEW (Selected Articles) (Foreign Technology Division, Wright-Patterson AFB, Ohio) FTD-TT-63-219/1. Letecky Obzor, 6(8):625 268,269. 1962. ASTIA AD 409 271.

This publication contains articles on the following subjects: Modification of jet passenger aircraft TU-104A; a new airfield in Moscow; and true flying saucers.

5,399

U.S. AAF Headquarters 1945 INTERROGATIONS OF GERMAN PERSONNEL INTERESTED IN GERMAN AVIATION. (U.S. AAF Headquarters, U.S. Strategic Air Forces in Europe, Aero-medical Research Section) 15 Aug. 1945

ABSTRACT: The work on catapult seats started in 1939 for the Ju-88. The original stimulus for the work was the necessity for getting pilots out of a test plane which was being used in a study of the critical value of flutter and engine pressures. This first development was an ejection seat, activated

by rubber cords that gave a calculated clearance over the rudder of 1/2 meter at 600 kilometers per hour speed of the aircraft. This seat was to have had a maximum acceleration of 10 g.

As the speed of military aircraft was increased, the German statistics showed that there were more and more accidents involved in escape from the plane and this provided a further stimulus to the development of ejection seats was the conservation of oxygen during escape at high altitudes. He stated that at the heights which they were flying the oxygen reserve was not enough to make it possible for a man to get out of the plane if he had to do any appreciable amount of work. It is his present opinion that all aircraft capable of speeds of over 500 kilometers per hour should have ejection seats.

5,400

U. S. Air Force Missile Development Center 1957 MAJOR ACHIEVEMENTS IN SPACE BIOLOGY AT THE AIR FORCE MISSILE DEVELOPMENT CENTER, 1953-1957. (Air Force Missile Development Center, Holloman AFB, N. Mex.) ASTIA AD 208 016

ABSTRACT: This historiographical effort was prepared as part of a larger history of aeromedical research at Holloman AFB. Important technological advances, discussed in the initial portion of this study, contributed to outstanding accomplishments in two broad fields of space biology research - cosmic radiation and controlled artificial environments. Scientific and engineering progress in these latter fields is the main theme of this publication, which culminates with a review of the record-making Manhigh II flight.

5,401

U. S. Air Force School of Aviation Medicine n.d. AIR SICKNESS - CAUSES AND PREVENTION. (School of Aviation Medicine, Randolph AFB, Texas) ATI-117 794

ABSTRACT: Airsickness among air crew personnel, or among those carried by aerial transport, represents a wastage of military efficiency. Each airsick member of an air crew, whether he be pilot, bombardier, gunner, navigator, or engineer, is unable to perform his duties with alertness and zeal if his attention is focused upon his physical condition. Airborne troops who are unable to disembark and accomplish their missions with dispatch because of airsickness, are to that degree casualties, and therefore do not justify their selection for an important combat mission. Furthermore, the student pilot, who because his instructor thinks it necessary to "wring him out" on his first ride, may develop a distaste for flight and be lost forever to the flying training program. This small pamphlet has been written to point out how the knowledge which has been gleaned from Army Air Forces experience and research may be applied to make military forces more efficient. (AUTHOR)

5,402

USAF School of Aviation Medicine 1958 EPITOME OF SPACE MEDICINE (Randolph AFB, Tex: U.S.A.F. School of Aviation Medicine) ASTIA AD 159052

ABSTRACT: Forty-one papers prepared by SA, personnel on various aspects of space medicine. The first ten are "Research Reports," the remainder are offprints of articles from scientific journals.

5,403

U.S. School of Aviation Medicine 1960 PUBLICATIONS OF THE SCHOOL OF AVIATION MEDICINE, Index, Fiscal Year 1959
School of Aviation Medicine Brooks Air Force Base, Texas

ABSTRACT: This publication lists the research reports and aeromedical reviews from the School of Aviation Medicine during the fiscal year, 1959.

5,404

U.S. School of Aviation Medicine 1960 ADVANCED COURSE IN AVIATION MEDICINE CURRICULUM (School of Aviation Medicine, Brooks AFB, Tex.) AF-SAM-Q-12, Course OAR 9356-1, 24, Aug. 1960

5,405

U. S. Air Force School of Aerospace Medicine 1962 PUBLICATIONS OF THE SCHOOL OF AEROSPACE MEDICINE, FISCAL YEARS 1961 AND 1962. (School of Aerospace Medicine, Brooks AFB, Texas) June 1962

5,406

School of Aerospace Medicine 1962 LECTURES IN AEROSPACE MEDICINE (School of Aerospace Medicine, Brooks Air Force Base, Tex)

5,407

U.S. School of Aviation Medicine 1962 BIOASTRONAUTICS. ADVANCES IN RESEARCH. (School of Aviation Medicine, Randolph Air Force Base, Tex.) March 1959. ASTIA AD 226 473

CONTENTS:

Definitions and subdivisions of space (bioastronautical aspect) by H. Strughold

Bio-paks: Instrumentation and biomedical research Primates in space

Center of gravity and moments of inertia measurements for seat plus a rhesus monkey, by H.G. Clamann

Summary of immunochemical analyses on sera from humans exposed in a simulated altitude chamber, by W.G. Glenn

Survival terrestrail micro-organism under simulated Martian conditions, by J.D. Fulton.

Photosynthetic gas exchangers and recyclers used in closed ecological system studies, by W.A. Kratz

Man in Space, by B. Balke

Physiological instrumentation of man during light, by C.H. Kratochvil

Carbon monoxide phenomena in green plants systems, by S.S. Wilks, R.M. Adams, J.A. Green and E.G. Shaw

5,408

U. S. American Bosch Arma Corp. 1961 LOW RANGE ACCELEROMETER (U) (American Bosch Arma Corp., Garden City, New York) ARMA RN DR-62-E653-1; Document no. 20,043; Contract AF 33(616)7308, Proj. 4431, Jan. 1962, ASTIA AD-329 646

ABSTRACT: Efforts were continued to produce feasibility models of an ultra-sensitive accelerometer suitable for inertial navigation of space vehicles with low thrust propulsion systems. All assembly and detail drawings were made and a large portion of the fabrication work was carried out. This includes the making of matched sensitive vibrating tapes. Work was initiated toward assembling the equipment required for the evaluation of the experimental models. Because of the high accuracy requirements, certain precise optical reference blocks are needed. Design and fabrication of the necessary mechnaical fixtures was continued. (U) (AUTHOR)

5,409

U. S. Armed Services Technical Information Agency 1959 BIO-ASTRONAUTICS: AN ASTIA REPORT BIBLIOGRAPHY (U) (Armed Services Technical Information Agency, Arlington, Va.) ASTIA AD-306 007; Feb. 1959

ABSTRACT: This bibliography covers the subject matter from 1952 through 1958 insofar as report literature, represented by ASTIA holdings, is concerned.

5,410

U. S. Armed Services Technical Information Agency 1960 BIO-ASTRONAUTICS: AN ASTIA REPORT BIBLIOGRAPHY (U) (Armed Services Technical Information Agency, Arlington, Va.) ASTIA AD-315 200 (Suppl. to AD-306 007); Feb. 1960

ABSTRACT: Previous bibliographies have covered the literature on bio-astronautics thru 1958. This supplemental bibliography brings the subject matter up to date through 1959 insofar as report literature, represented by ASTIA holdings, is concerned.

5,411

U. S. Armed Services Technical Information Agency 1962 TECHNICAL ABSTRACT BULLETIN. (Armed Services Technical Information Agency, Arlington, Va.) Bulletin No. U62-2-6; June 1962

5,412

U. S. Armed Services Technical Information Agency 1962 TECHNICAL ABSTRACT BULLETIN. (Armed Services Technical Information Agency, Arlington, Va.) Bulletin No. U62-3-1; 1 July 1962

5,413

U.S. Armed Services Technical Information Agency 1962 TECHNICAL ABSTRACT BULLETIN (Armed Services Technical Information Agency, Washington, D.C.) Bulletin No. U62-3-2, 15 July 1962

5,414

U. S. Armed Services Technical Information Agency 1962 TECHNICAL ABSTRACT BULLETIN. (Armed Services Technical Information Agency, Arlington, Virginia) Bulletin No. U62-4-4; 15 Nov. 1962

5,415

U. S. Armed Services Technical Information Agency 1962 TECHNICAL ABSTRACT BULLETIN (Armed Services Technical Information Agency) Bulletin No. U62-4-5; 1 Dec. 1962

5,416

U.S. Armed Services Technical Information Agency 1962 TECHNICAL ABSTRACT BULLETIN (Armed Services Technical Information Agency, Washington, D.C.) Bulletin No. 62-3-3, 1 August 1962

5,417

U. S. Armed Services Technical Information Agency 1962 TECHNICAL ABSTRACT BULLETIN. (Armed Services Technical Information Agency, Arlington, Virginia) Bulletin No. U62-4-6; 15 December 1962

5,418

U. S. Armed Services Technical Information Agency 1962 TECHNICAL ABSTRACT BULLETIN
(Armed Services Technical Information Agency, Department of Defense)
Bulletin No. U62-3-4 Pages 1-173 August 15, 1962

ABSTRACT: This issue contains AD numbers 275 350 thru 275 899 and 329 350 thru 329 549.

5,419

U. S. Armed Services Technical Information Agency 1963 TECHNICAL ABSTRACT BULLETIN (Armed Services Technical Information Agency, Washington, D. C.) Bulletin No. U63-1-6, 15 March 1963

5,420

U. S. Army Air Force 1942 INSTRUMENTS ON THE HUMAN CENTRIFUGE AT RCAF NO. 1 INITIAL TRAINING CENTER, TORONTO, CANADA. (Wright Field) Memo Rept. Exp-M-49-695-16A; 21 Sept. 1942

ABSTRACT: Description of Canadian equipment including color motion picture cameras, signal system, accelerometers, and electroencephalographs.

5,421

U. S. Army 1944 INJURIES ASSOCIATED WITH PARACHUTE ESCAPES
Air Surg. Bull 1(5):8-9.
(U. S. Army, Office of Flying Safety, Medical Division) 1944

5,422

Army Department 1957 THESES AND DISSERTATIONS IN THE HOLDINGS OF THE ARMY LIBRARY (The Army Library, The Adjutant General's Office, Department of the Army) 18 July 1957; ASTIA AD143 963

ABSTRACT: This compilation of theses and dissertations in the holdings of The Army Library is being presented upon consultation with the Officers Assignments Division (formerly Career Management Division) of The Adjutant General's Office which coordinates the "training of military personnel at civilian educational, commercial, and industrial institutions."

The present compilation, some of which have been received from sources other than those covered by AR 350-200, contains approximately 350 titles, arranged functionally by title in an alphabetical order within major and subordinate subject classes. Such an arrangement should offer an easy method of locating needed materials.

5,423

U.S. Dept. of the Army 1958 MISSILES, ROCKETS AND SATELLITES (U.S. Government Printing Office, Washington, D.C.) Pamphlets 70-5-1-70-5-5 Five volumes

ABSTRACT: The bibliography includes the following titles: (I) U.S.S.R. (II) United States (III) Great Britain, France and Other Free Countries of the World (IV) Technology, Means and Methods (V) Earth Satellites and Space Exploration.

This bibliographic survey covers the period 1957 through March 1958 and includes about 1,500 unclassified titles, parts abstracted and annotated, selected from periodicals, books and studies.

Materials are arranged in alphabetical order, by title, within major and subordinate subject groups.

5,424

U.S. Army Airborne & Electronics Board 1959 PARACHUTE JUMPING FROM ARMY AIRCRAFT. (Army Airborne and Electronics Board, Fort Bragg, N.C.) 10 December 1959. ASTIA AD 230 498

ABSTRACT: This publication reviews the experiments conducted to determine safe procedures for parachute jumping from Army aircraft, except command type airplanes and reconnaissance helicopters (H-13 and H-23). It was found that the H-34 Helicopter, when modified by installation of the anchor cable with the addition of certain safety measures, is suitable for parachute delivery of a maximum of 10 combat equipped parachutists in temperate climates. When so modified, the H-34 Helicopter is suitable for consecutive parachute delivery of standard type aerial delivery containers from the door or from the cargo hook followed by combat equipped parachutists in temperate climates. The outlined procedures included in this report are suitable for parachute delivery of combat equipped parachutists and standard type aerial delivery containers from the H-34 Helicopter.

5,425

U. S. Department of the Army, Headquarters 1960 MISSILES, ROCKETS, AND SATELLITES, 1958 TO 1960. (Department of the Army, Headquarters, Washington, D. C.) Pamphlet No. 70-5-1 to 8

ABSTRACT: Eight annotated bibliographies, for the period 1957-Sept. 1960, covering various aspects of the subject, and titled as follows: I. "USSR", II. "United States," III. "Great Britain, France, and Other Free Countries of the World," IV. "Technology: Means and Methods," and V. "Earth Satellites and Space Exploration." This bibliography is continued as follows: Missiles, Rockets, and Space in War and Peace (70-5-6), Missiles, Rockets, and Space Vehicles 1959-1960 (70-5-7), and USSR: Missiles, Rockets, and Space Effort, A Bibliographic Record 1956-1960 (70-5-8).

5,426

U.S. Army 1960 ARMY AVIATION SAFETY WITH REFERENCE TO CRASH INJURY AND CRASH WORTHINESS PROGRAMS. (U.S. Army Transportation Research Command, Ft. Eurtis, Va) Tech. Rept 60-77, 30 Dec. 1960.

5,427

U. S. Army 1960 ABSTRACT BIBLIOGRAPHY TECHNICAL REPORTS PUBLISHED FISCAL YEAR 1960 (Quartermaster Field Evaluation Agency, U. S. Army Quartermaster Research and Engineering Command, Fort Lee, Virginia) ASTIA AD-241 381; July 1960

CONTENTS:
Research & Engineering Program
Applications Engineering Program
Airborne Program
Methods Research Program

5,428

U.S. Army 1963 BIBLIOGRAPHY OF REPORTS ACQUIRED BY CHABA. (Armed Forces - NRC Committee on Hearing and Bio-Acoustics, Wash., D.C.) ASTIA AD-298 057, January 1963

5,429

U.S. Army Air Force n.d. EFFECT OF MODERATE POSITIVE ACCELERATION ON ABILITY TO READ AIRCRAFT-TYPE INSTRUMENT DIALS. (USAAF, AMC, Wright Field, Ohio) Memo Rept. No. TSEAA-694-10

5,430

U. S. Army Air Force 1942 INSTRUMENTS ON THE HUMAN CENTRIFUGE AT RCAF NO. 1 INITIAL TRAINING CENTER, TORONTO, CANADA. (Wright Field) Memo Rept. Exp-M-49-695-16A; 21 Sept. 1942

ABSTRACT: Description of Canadian equipment including color motion picture cameras, signal system, accelerometers, and electroencephalographs.

5,431

U.S. Army Air Force 1943 A COMPARISON OF THE CHANGES IN PULSE RATE AND IN BLOOD PRESSURE RESULTING FROM ANOXIA, INCREASED INTRATHORACIC PRESSURE AND CHANGE IN POSTURE. (USAAF School of Aviation Medicine, Randolph Field, Texas) Project 115, Report No. 1, 2 Feb. 1943.

ABSTRACT: Fourteen male subjects exposed to anoxia for 30 minutes at a

simulated altitude of 18,000 feet had an average pulse rate of 89 as compared to 75 at sea level. There was no consistent change in blood pressure.

Rising suddenly from a lying to a standing posture caused the pulse rate to increase from 70 to 90. There was also a decrease in both systolic and diastolic blood pressure at the end of 2 minutes which had no relation to the change in pulse rate.

The Valsalva experiment (40 mm Hg pressure) caused the pulse rate to increase from 82 to 115. Blood pressures could not be measured.

5,432

U. S. Army Air Forces 1943 ARMY AIR FORCES CONFERENCES ON ACCELERATION AT THE MONTREAL NEUROLOGICAL INSTITUTE. (Wright Field) Memo Rept. Eng-49-696-4B, 14 June 1943

PURPOSE: To report conferences on the effects of radial acceleration on the physiology of animals, held by Dr. H. Jasper (Montreal Neurological Institute) and Lt. C. A. Maaske (Wright Field).

(a) Safety of human subjects can be greatly promoted by preliminary centrifuge studies of animals. It was concluded that animal experimentation is vital to the elucidation of physiological changes occurring under "g".

(b) In animals the normal cardiac response to "g" unprotected is tachycardia superseded by bradycardia when "g" is removed. Failure to obtain tachycardia indicates poor or depressed cardiac reflexes and is a very grave sign. However, bradycardia with protection under "g" is a usual though not invariable response. With protection, form of the ECG is the best index of the subject's condition.

(c) Results of animal experimentation indicate that physiological events immediately following "g" exposure are as significant as results obtained under "g". Furthermore, these events vary with the duration of the exposure. The important indices are blood pressure, ECG, EEG, and respiration. Therefore all centrifuge studies should conform in "g"-time relationships to flight maneuvers.

(d) Three type of episodes are seen in monkeys under high positive "g".

(a) Cortical fit associated with sensitization of the cerebral cortex by ischemia followed by return of enough blood to produce convulsions. (This response is frequently seen where external anti-"g" protection is used.)

(b) Decerebrate attack--complete abolition of cortical brain waves. Extensive clonic spasms followed by decerebrate rigidity lasting many hours.

(c) Gasp reflex initiated by medullary anoxia. This can be differentiated from a cortical fit by its occurrance during rather than after "g" exposure

(e) Movies show that there is no drainage of blood from brain vessels under "g" unless air is allowed to enter the skull artificially.

(f) Where skull defects exist, the brain is pressed down on its base under "g" and an unusual type of blackout occurs produced by blockage of the optic nerve at the geniculate level.

(g) Animals immersed in water to the neck are partially protected from "g". The same amount of protection is conferred by immersion only to the xiphoid process, but if the water is lowered further, protection decreases sharply.

(h) The feasibility of raising intra-pulmonary pressure as a protective device was discussed. This project is especially important because Dr. Jasper has noted right heart failure and pulmonary engorgement of animals exposed to high "g" while protected.

5.433

U.S. Army Air Force 1946 INTERNAL INJURIES PRODUCED BY ABRUPT DECELERATION OF EXPERIMENTAL ANIMALS. (Army Air Force, School of Aviation Medicine) Rept. No. 1, Project No. 401, 15 Jan. 1946.

5.434

U.S. Army Air Force 1946 THE CURRENT CONTINENTAL USAAF ACCIDENT SITUATION. Medical Investigators' Accident Bulletin 2(10): October 1946. (AAF Flying Safety Service, Medical Safety Division)

5.435

U.S. Army Air Forces 1946 CERVICAL FRACTURE DESPITE THE USE OF THE SHOULDER HARNESS. In Accident Bulletin for Medical Investigators Page 2. (Continental U.S. Army Air Forces, Hq. AAF, AC/AS-3 Flight Operations Div., Flying Safety Branch) February 1946.

5.436

U.S. Army Air Force 1946 EFFECTS OF ABRUPT DECELERATION ON THE ELECTRO-CARDIOGRAM LEAD IN THE CAT IN THE SUPINE POSITION. Rept. No. 1, SAM Proj. No. 459, 21 Jan. 1946.

5.437

U.S. Army Air Force 1946 REQUIREMENTS FOR PILOT EJECTION IN FIGHTER AIRPLANES (U.S. AFF, Air Materiel Command, Eng. Div., Aircraft Laboratory) TSEAC11-4534-7-2, add. no. 1, 1 May 1946.

5.438

U.S. Army Air Force 1946 A METHOD FOR CALCULATING THE TRAJECTORY OF A MAN EJECTED FROM AN AIRPLANE (U.S. AAF Air Materiel Command, Eng. Div., Aircraft Lab.) MR TSEAC3-4534-1-1, 29 July 1946

5.439

U.S. Army Air Force 1946 ACCIDENT TYPES AND GENERAL CAUSE FACTORS: A. SUMMARY OF "REPORT ON THE HAZARDS OF ESCAPING FROM AIRCRAFT IN COMBAT" (R.A.F. Inst. of Avn. Med. - March 1946); B. SEAT FAILURES IN HIGH-SPEED AIRCRAFT. (AAF Flying Safety Service, Medical Safety Division) Medical Investigators' Accident Bulletin 2(10): October 1946.

5,440

U.S. Army Air Force 1947 ACCIDENT INVESTIGATING AND REPORTING. (AAF Flying Safety Service, Medical Safety Division) Medical Investigators' Accident Bulletin 3(5): May-June 1947.

5,441

U.S. Army Air Force 1947 VERY YOUNG PILOTS. (AAF Flying Safety Service, Medical Safety Division) Medical Investigators' Accident Bulletin 3(1): January 1947.

5,442

U.S. Army Air Forces 1947 NOTES ON DECELERATION AT BAIL-OUT OF AIRCRAFT. (Army Air Forces Air Technical Service Command) Memorandum Reel C262 10 April 1947. ASTIA ATI 7236

5,443

U.S. Army Air Force 1947 SET: RESEARCH AND EXPERIMENTAL, PHYSIOLOGICAL ASPECTS OF ORIENTATION AS THEY RELATE TO AVIATION. (Superintendent of Documents, Washington, D.C.) PB 87452

5,444

U.S. Army Air Force 1947 CURRENT CONTINENTAL USAAF ACCIDENT SITUATION. (AAF Flying Safety Service, Medical Safety Division) Medical Investigators' Accident Bulletin 3(1): January 1947.

5,445

U.S. Army Air Force 1947 CURRENT CONTINENTAL USAAF ACCIDENT SITUATION. (AAF Flying Safety Service, Medical Safety Division) Medical Investigators' Accident Bulletin 3(5): May-June 1947.

5,446

U.S. Army Air Force 1947 ACCIDENT INVESTIGATION AND REPORTING. (AAF Flying Safety Service, Medical Safety Division) Medical Investigators' Accident Bulletin 3(1): January 1947.

U.S. Army Aviation 1959 SPECIAL BIBLIOGRAPHY NR. 1 (REVISED)
(United States Army Aviation School, Fort Rucker, Alabama) April 6, 1959
ASTIA AD 216 999

ABSTRACT: This bibliography supersedes Special Bibliography (No. 1), Army Aviation, dated June 1958. AD 209035

5,448

USA Board for Aviation Accident Research 1961 ACCIDENT SUMMARIES AND SEMINAR REPORTS.
(USA Board for Aviation Accident Research, Fort Rucker, Ala.) Dec. 1961

ABSTRACT: This letter contains aviation accident summaries and seminar reports of interest to the flight surgeon. Included are papers on disorientation due to subclinical vestibular pathology, the graveyard spiral, vestibular stimulation and blood flow, high intensity noise and disorientation, pathology of fear, post mortem search, Navy ejection seat experience, principles of crash protective restraint, survey of helicopter accidents, and fatal aircraft accidents and disease of aircrew. (Tufts)

5,449

U. S. Army Transportation Research Command 1961 FACTOR ANALYSIS OF LIGHTPLANE ACCIDENT IMPACT AND DAMAGE VARIABLES. (U.S. Army Transportation Research Command, Fort Eustis, Virginia) TREC Technical Rept. 61-122, August 1961.

5,450

U.S. Army Transportation Research Command 1961 RELATIONSHIP BETWEEN IMPACT VARIABLES AND INJURIES SUSTAINED IN LIGHTPLANE ACCIDENTS. (U.S. Army Transportation Research Command, Fort Eustis, Virginia) TREC Tech. Rept. 61-95, August 1961.

5,451

U.S. Central Intelligence Agency 1962 CHINESE SCIENCE
(Central Intelligence Agency, Washington, D.C.)
Scientific information rept., 5 Nov. 1962. ASTIA AD 332 795.

ABSTRACT: Chinese Science is a serialized report consisting of unevaluated information prepared as abstracts, summaries, and translations from recent Chinese publications falling under the subject headings Biological and Medical Sciences, Technical Sciences, Earth Sciences, Chemistry and Chemical Technology, mathematical and Physical Sciences.

5,452

U. S. Central Intelligence Agency 1962 BIOLOGY AND MEDICINE (Central Intelligence Agency, Washington, D.C.) Summary rept. no. 3924, Oct. 1962, ASTIA AD-332 657

This is a serialized report consisting of unevaluated information prepared as abstracts, summaries, and translations from recent publications of the Sino-Soviet Bloc countries. (U) (AUTHOR)

5,453

U.S. Central Intelligence Agency 1963 CONSOLIDATED TRANSLATION SURVEY Foreign Documents Division, Central Intelligence Agency Number 63 for March 1963 ASTIA AD 402 915

ABSTRACT: This Survey is prepared monthly by Foreign Documents Division, CIA, from lists received through cooperation of US government agencies and includes translations of such agencies, private industry, universities, research institutions, and commercial translation organizations. It is a compilation of foreign documentary projects, completed or started during the month preceding this publication. Translations are listed by area and subject category. Scientific projects are grouped as a section regardless of geographic area. Title in English, author, foreign language title of source of material, date and data of publication, and publication identification of the completed project are given when available.

5,454

U.S. Civil Aeromedical Research Institute 1961 F.A.A. FACILITIES AND PROGRAMS AS RELATED TO IMPACT ACCELERATION RESEARCH. Organization chart; program objectives, P&S Branch; present staffing, CARI: Facilities. (Federal Aviation Agency, Civil Aeromedical Research Institute, Oklahoma City, Okla.) 1 Nov. 1961.

5,455

U.S. Civil Aeronautics Board 1953 ACCIDENT INVESTIGATION REPORT - LAKE CENTRAL AIRLINES, INC. - INDIANAPOLIS, INDIANA, AUGUST 21, 1952. File No. 1-0061, CAB, 10 April 1953.

5,456

U.S. Civil Aeronautics Board 1956 EASTERN AIRLINES M-404 ACCIDENT, HUNTINGTON, WEST VIRGINIA, JANUARY 15, 1956 (Civil Aeronautics Board, Washington, D.C.)

5.457

U.S. Civil Aeronautics Board 1957 OVERSHOOT ACCIDENTS IN U.S. SCHEDULES AND IRREGULAR AIR CARRIER OPERATIONS: TRANSPORT TYPE AIRCRAFT, 1950-1955. (Civil Aeronautics Board, Bureau of Safety, Washington, D.C.) 8 March 1957.

5.458

U.S. Civil Aeronautics Board 1959 AIRCRAFT ACCIDENT REPORT-PIPER MODEL PA-22, N 2945P, NEAR DOVER, DELAWARE, SEPTEMBER 23, 1958. File No. 2-0124, CAB, 10 Oct. 1959.

5,459

U.S. Civil Aeronautics Board 1960 GENERAL AVIATION ACCIDENTS, A STATISTICAL REVIEW, CALENDAR YEAR 1960. (Civil Aeronautics Board, Washington, D.C.)

ABSTRACT: This report furnishes certain statistical factors and related data pertaining to all general aviation by (non-air carrier) aircraft accidents (incident to flight which occurred during the year 1960. (CARI)

5,460

U.S. Civil Defense Adm. 1952 WINDOWLESS STRUCTURES, A STUDY IN BLAST-RESISTANT DESIGN. (Federal Civil Defense Administration) Technical Manual TM-5-4, June 1952.

5,461

U.S. Committee on Aeronautical & Space Sciences 1960 SPACE RESEARCH IN THE LIFE SCIENCES: AN INVENTORY OF RELATED PROGRAMS, RESOURCES AND FACILITIES, (86th Congress, Second Session, Washington, July 15, 1960)

5.462

U.S. Congress 1958 SPACE HANDBOOK: ASTRONAUTICS AND ITS APPLICATIONS (U.S. Congress, 85th, Second Session) December 29, 1958

ABSTRACT: An exhaustive report on the technology and applications of space probes and satellite vehicles is presented together with a discussion of general space research. Details are given of space environment, trajectories, and orbits, rocket vehicles, propulsion systems, propellants, internal power source, structures and materials, flight path and orientation control, guidance, communication, observation and tracking, atmospheric flight, landing and recovery, environment of manned systems, space stations and extraterrestrial bases, nuclear-weapons' effects in space, cost factors and ground facilities,

and current technology programs in the United States. Specific flight possibilities are discussed, and a wide variety of applications for satellite vehicles is outlined. The applications of scientific space exploration are reviewed. Also included is a description of progress in astronautics in other countries.

5,463

U.S. Congress Committee on Space & Astronautics. 1958 COMPILATION OF MATERIALS ON SPACE AND ASTRONAUTICS. (85th Congress, Second Session, Washington, 1958)

5,464

U. S. Continental Air Command 1956 PRELIMINARY REPORT ON A SUBSTANTIATED SUPERSONIC EJECTION. (Continental Air Command, Mitchell Air Force Base, N.Y.) Med. Training Bull. 3(3):1-5, Feb. 1956

5,465

U.S. Continental Army Command 1956 ARCTIC TEST OF PARACHUTE JUMPING FROM ARMY AIRCRAFT (L-20 AIRPLANE). (Continental Army Command, Arctic Test Branch, Big Delta, Alaska) Project AB 2354 (Arctic) Partial Rept. No. 1, 13 Nov. 1956. ASTIA AD 115 447

ABSTRACT: Effort is made to determine safe procedures for making parachute jumps from the L-20 aircraft under arctic winter conditions. Jump techniques were developed from temperate climate jump techniques. A total of 32 jumps were made without difficulty at ambient temperatures of 27 degrees to 14 degrees F, in sticks of 1 and 2 parachutists. Over-all results indicated that, after modification, the L-20 airplane will be suitable for consecutive aerial delivery of parachutists and equipment at ambient temperatures below 0 degrees F.

5,466

U.S. Continental Army Command 1956 PARACHUTE JUMPING FROM ARMY AIRCRAFT (H21C HELICOPTER). (Continental Army Command Board No. 5, Ft. Bragg, N.C.) Project No. AB 2354, Partial Rept. No. 3, 5 Sept. 1956. ASTIA AD 113 658

ABSTRACT: Jumps were performed by parachutists to determine safe procedures for the H-21C helicopter. The H-23C forward door was concluded to be suitable for the aerial delivery of a maximum of 10 parachutists wearing combat equipment. Safe jump procedures are outlined. (ASTIA)

5,467

U.S. Dept. of Commerce CATALOG OF TECHNICAL REPORTS
(U.S. Department of Commerce, Office of Technical Services, Washington, D.C.) CTR-358

5,468

U.S. Department of Commerce 1962 MEDICAL AND BIOLOCICAL ASPECTS OF USSR SPACE FLIGHTS
(U.S. Department of Commerce, Office of Technical Services, Joint Publications Research Service) JPRS: 16,277 16 Nov. 1962 ASTIA AD 400 411

ABSTRACT: This publications contains translations of articles from the Russian-language newspaper Meditsinskiy rabotnik (Medical Personnel), 17 August 1962, page 3. Complete bibliographic information accompanies each article.

5,469

U.S. Dept. of Defense & U.S. Atomic Energy Com. 1950 THE EFFECTS OF ATOMIC WEAPONS. (Prepared by the U.S. Department of Defense & the U.S. Atomic Energy Commission) Sept. 1950.

5,470

U.S. Department of Defense 1957 THE EFFECTS OF NUCLEAR WEAPONS
(Prepared by U.S. Dept. of Defense, Published by U.S. Atomic Energy Commission) June 1957.

5,471

U. S. Department of Health, Education & Welfare 1958 BIBLIOGRAPHY OF SPACE MEDICINE (U. S. Dept. of Health, Education & Welfare, Public Health Service, National Library of Medicine, Reference Division, Washington, D. C.) Public Health Service Publication No. 617; Public Health Service Bibliography Series No. 21

CONTENTS:
This bibliography contains information on the following topics:
Sealed Cabin Problems
Acceleration/Deceleration
Fractional and Zero Gravity
Cosmic Radiation
Survival Problems
Psychological and Social Problems
Ground Crew Problems
Extra-Terrestrial Aspects

5.472

U.S. Department of Health, Education, and Welfare 1959 MEDICINE AND THE ALLIED PROFESSIONS - SOURCES OF CAREER INFORMATION FOR STUDENTS (U.S. Department of Health, Education, and Welfare, Washington D.C., Nov, 1959)

ABSTRACT: Students seeking career guidance in health and medical fields can usually obtain information from professional societies or national organizations for each occupation. These agencies offer a variety of pamphlets describing the nature of the work involved, the educational and other qualifications required, the availability and cost of training, and current opportunities and prevailing salaries.

Some medical occupations have been described in books and pamphlets independently published; these vary greatly in usefulness and timeliness. Those cited here have been chosed for their general availability in public and school libraries.

Under the first heading: GENERAL, are listed organizations and publications giving information on several occupations. The second heading: MEDICINE, is confined to the study of medicine exclusively. Following these, in alphabetical order, are the allied or ancillary professions and occupations.

5.473

U.S. Directorate of Research and Development 1960 FUNDAMENTALS OF ASTRONAUTICS (Directorate of Research and Development, Headquarters U.S.A.F., Washington, D.C.) ASTIA AD 252 825

ABSTRACT: This paper is intended to serve as a brief refresher for some of the physics and physiology of space flight. It will also define some of the more important astronautical terms and concepts. The author defines the separate layers of the Earth's atmosphere including the troposphere, stratosphere, ionosphere, and exosphere. He then discusses the solar system including the planets, satellites, asteroids, and sun. The physics of space flight is discussed with particular emphasis on rocket propulsion, thrust, specific impulse, mass ratios, thermal efficiency, and propulsion efficiency. The subject of human factors in space flight concentrates largely on the aspects of cabin environment requirements, waste disposal, weightlessness, isolation and sensory deprivation, cosmic radiation and limited G forces.

5.474

US FAA 1961 FAA HEADQUARTERS LIBRARY LIST OF UNPUBLISHED RESEARCH REPORTS, LISTED BY AD NUMBER CATALOGED BY AUTHOR, TITLE, SERIES AND CORPORATE ENTRY. December 1961. ASTIA Doc. No. AD-270 025

5,475

U. S. Federal Aviation Agency 1962 BIBLIOGRAPHIES OF TECHNICAL REPORTS INFORMATION RETRIEVAL LIST NO. I (Office of Management Services, Administrative Services Div., Library Branch, Federal Aviation Agency, Washington, D.C.) ASTIA AD-282 111; July 1962

ABSTRACT: This list of references has been compiled for the purpose of providing a quide to the basic bibliographies, subject indexes, and publications lists that are currently in the technical report collection of the Information Retrieval Section. The references vary from extensive bibliographies covering several hundred items to special reports with brief bibliographies. The following subjects are covered: Acoustics; Aerodynamics; Aeronautics; Air Traffic Control; Airports; Antennas; Aviation Medicine; Control Systems; Data Processing; Documentation; Electronics; Fuels and Power Supplies; Human Engineering; Infrared; Instrumentation; Logistics; Lubrication; Materials; Metals and Alloys; Meteorology; Microminiaturization; Microwave; Military Aviation; Noise; Operations Research; Radio and Radar; Reliability; Safety; Science (General); Semiconductors; Snow and Ice; Thermodynamics; Training. (CARI)

5,476

U. S. House of Representatives, 84th Cong., 2nd Session 1956 HEARINGS ON INVESTIGATION OF HIGHWAY TRAFFIC ACCIDENTS. (Wash. D. C.: U. S. Govt. Printing Office, 16, 23 July; 8-10 Aug.; 27-31 Aug.; 25-28 Sept. 1956.) Pp. 909, 921-22.

5,477

U.S. Inter-Service Committee on Technical Facilities, Sourtheastern USA SURVEY OF TECHNICAL FACILITIES
ASTIA AD 228 872

ABSTRACT: The Inter-Service Committee on Technical Facilities, Southeastern USA, was established in 1955 to promote the cooperative use of facilities and to interchange technical information among its member agencies. A significant portion of the Committee's responsibility is the dissemination of information about specialized facilities, equipment, and knowledge available at each station represented on the Committee.

A list of present members of the Committee is included. Requests for information should be addressed directly to the appropriate Committee member.

5,478

U. S. Joint Committee on Aviation Pathology 1956 AUTOPSY PERFORMED ON AN AIRCRAFT FATALITY (Joint Committee on Aviation Pathology, Washington, D. C.) Memorandum No. 1, Feb. 1956

ABSTRACT: The need for carrying out full autopsies on all aircrew and passenger

casualties as a result of an aircraft accident is emphasized in order to elucidate the cause of accident, be it a pre-existing or acquired lesion of the pilot or defective or damaged aircraft. Steps for the pathologist to follow during accident analysis include (1) familiarization with the internal structure, seating arrangement, ejection mechanism and general layout of the plane involved; (2) observation of body position in relation to total wreckage, and condition in which body was found; (3) meticulous examination of exterior of the body and viscera, with necessary close-up photographs and X-rays, and removal of tissue for chemical, toxicological and histopathological examination; and (4) study of report of the accident itself.

5,479

U.S. Joint Publications Research Service 1962 THE EFFECTS OF CHANGES IN THE GRAVITATIONAL FIELD ON THE COORDINATION OF MAN'S VOLUNTARY MOVEMENTS (Joint Publications Research Service, Washington, D.C.) JPRS-15539, 2 Oct. 1962. NASA N 62-17962

ABSTRACT: A study is made of the effect of changes in the gravitational field on the coordination of man's voluntary movements. The coordination of man's voluntary movements is disturbed by heightening of the gravitational field. Limits of the disturbances depend upon the condition and training of the person appearing in the field and are proportional to the logarithm of acceleration of force of weight. Systematic execution of the disturbed movement habit in a heightened gravitational field will lead to the restoration of coordination of movements. The indicated restoration will depend on the condition and training of the person appearing in this field, on the magnitude of gravitation and, in separate periods, is proportional to the logarithm of the time of the fulfillment of the movement. These deductions may be applied to the case of zero gravitation.

5,480

U.S. Joint Publications Research Service 1962 THE EFFECT OF OXYGEN DEFICIENCY AND PROLONGED RADIAL ACCELERATION ON AN ANIMAL ORGANISM (Joint Publications Research Service, Washington, D.C.) JPRS-15346, 19 Sept. 1962; NASA N62-17780 (BYULL. EKSPTL. BIOL. I MED. (MOSCOW) 53(4):42-46, 1962)

ABSTRACT: Animal studies are conducted to determine the effects of oxygen deficiency on conditioned reflex reactions of respiration and cardiac activity and the effects of acceleration on the organs of the thoracic cavity. Pressure chamber experiments were conducted at ground conditions as well as at simulated altitudes of 2000 to 10,000 meters. The dogs used in the tests were conditioned by the techniques of V.P. Protopopov. The acceleration tests were conducted in a centrifuge with a radius of 3.66 meters. The X-ray equipment was attached to the centrifuge for taking photographs during acceleration.

5,481

U.S. Joint Publications Research Service 1962 THE QUESTION OF PHYSICAL HYGIENIC EVALUATION OF PULSE OSCILLATIONS (Joint Publications Research Service, Washington, D.C.) JPRS-14974, 27 Aug. 1962. NASA N 62-17969

ABSTRACT: The study of physical-hygienic evaluation of pulse oscillations in the human organism is discussed. The most important factors in such studies is the establishment of indices which do not cause pathologic changes in the organism and their quantitative expression. For the accomplishment of this task, it is necessary on the widest scale to set up experimental models, primarily using sinusoidal oscillations. It is also necessary to carry out clinical studies using physiological and biochemical methods for the establishment of the early changes which cannot be detected by ordinary clinical methods. The hardness, the duration, the number of shocks per second, and the amplitude of the pulse oscillations should be obtained. It is especially necessary to determine the changes of acceleration with respect to time, since this is a combined index of hardness and is the most stable index.

5,482

U. S. Liaison Office, Technical Information Center 1961 TRANSLATION, ANNUAL REPORT OF THE GERMAN AERONAUTICAL TEST LABORATORIES, 1958 (Liaison Office, Technical Information Center, MCLTD, Wright-Patterson AFB, Ohio) Rept. MCL-136/III; ASTIA AD-257 111, Jan. 1961

CONTENTS:

Ulbricht, G., Aircraft Radio Institute;
Quick, A. W., Institute for Control and Regulating Engineering;
Ruff, S., Aeromedical Institute;
Goertler, H., Institute for Applied Mathematics and Mechanics;
Spies, R., Testing Station for Aeronautical Instruments;
Gdaniec, O., Department for Scientific Reporting and Documentation;
Ulbricht, G., Institute for Microwaves;
Spengler, G., Institute for Aircraft Fuels and Lubricants;
Luerenbaum, K., Institute for Engine Dynamics;
Schmidt, F. A. F., Test Stand in Garmisch-Grainau;
Leist, K., Institute for Jet Propulsion;
Dehn, K., Institute for Thermodynamics and Combustion;
Eber, H., Institute for Strength Investigations;
Wille, R., Institute for Turbulence Research;
Oswatitsch, K., Institute for Theoretical Gas Dynamics;
Fingado, H., Institute for Flight Mechanics;
Naumann, A., Institute for Applied Gas Dynamics;

5,483

U.S. Marine Corps n.d. Aviation Equipment Office, Marine Aircraft Group 91, 9th Marine Aircraft Wing, Fleet Marine Force, USMCAS, Cherry Point, N.C.

ABSTRACT: A total of 14 tests of the current anti-"g" suit (G-4) were made by Marine aviators. It was found to prevent blackout under high "g" and to reduce pilot fatigue. The suit is uncomfortable only if improperly fitted. Sticking of the pressure regulator valve may occur in new equipment but is easily corrected. It is concluded that the G-4 is a valuable and practical piece of equipment.

Tables of the pressure provided by the valve from 2 to 8 "g" and of the permissable maximum acceleration of the F4U and 10,000 to 30,000 feet are included.

5,484

U.S. Marine 1960 MARINE PHYSICAL LABORATORY BIBLIOGRAPHY JULY 1946 - JUNE 1960. (Marine Physical Laboratory of the Scripps Institution of Oceanography, San Diego 52, Calif.) ASTIA AD-240 420, 25 July 1960

5,485

National Advisory Committee for Aeronautics LOAD ASSUMPTIONS FOR THE LANDING IMPACT OF SEAPLANES. (National Advisory Committee for Aeronautics, Washington, D.C.) Technical Memorandum 643.

5,486

National Advisory Committee for Aeronautics 19 GENERALIZED THEORETICAL AND EXPERIMENTAL INVESTIGATION OF MOTIONS AND HYDROLOADS EXPERIENCED BY V-BOTTOM SEAPLANES DURING STEP-LANDING IMPACTS. (National Advisory Committee for Aeronautics, Washington, D.C.) Technical Note 1493.

5,487

U.S. National Advisory Committee for Aeronautics 1909-1932 BIBLIOGRAPHY OF AERONAUTICS. Wash., D.C., Government Printing Office, 1921-36

Bibliography of aeronautics (1909-1916) inclusive is presented by Paul Brockett, quoting the titles of current publications, together with the

periodicals in which they had been published (in English and foreign languages) the second volume treating titles of articles published during or after the First World War. The third volume is dated 1922, and so on (in rotation) until 1932. In the first volume no subdivision is devoted to medicine, but there are articles mentioned on "orientation." From the second volume, articles on medicine are indexed only occasionally.

5,488

National Advisory Committee for Aeronautics 1940 INDEX OF REPORTS ON AERONAUTICAL RESEARCH. (National Advisory Committee for Aeronautics, Washington, D. C.) Sept. 1940

5,489

National Advisory Committee for Aeronautics 1953 REPORT OF CRASH DATA TO INDUSTRY. Aviation Week 59(21):26-28, 30, Nov. 23, 1953.

5,490

National Advisory Committee for Aeronautics 1956 NACA CONFERENCE ON AIRPLANE CRASH-IMPACT LOADS, CRASH INJURIES AND PRINCIPLES OF SEAT DESIGN FOR CRASH WORTHINESS
(Lewis Flight Propulsion Laboratory, Cleveland, Ohio, April 17, 1956)

ABSTRACT: This volume contains copies of the technical papers presented at the NACA Conference on "Airplane Crash-Impact Loads, Crash Injuries, and Principles of Seat Design for Crash Worthiness" on April 17, 1956 at the Lewis Flight Propulsion Laboratory. A list of invitees and attendees is included.

5,491

U.S. National Advisory Committee for Aeronautics 1957 ACCELERATIONS IN FIGHTER AIRPLANE CRASHES (Lewis Flight Propulsion Lab., Cleveland, Ohio) NACA RM E57G11

5,492

NASA 1960 CONFERENCE ON MEDICAL RESULTS OF U.S. MANNED SUB-ORBITAL SPACE FLIGHT (Government Printing Office, Washington, D.C., 6 June 1961)

5 493

National Aeronautics and Space Administration. 1960 FIRST PLANNING CONFERENCE ON BIOMEDICAL EXPERIMENTS IN EXTRATERRESTRIAL ENVIRONMENTS, HELD UNDER THE AUSPICES OF NASA, WASHINGTON, D.C., 20 JUNE 1960. TN D-781, ASTIA AD-250 068

ABSTRACT: Thirty of the nations leading experimental biologists conferred with the staff of the NASA Office of Life Science Programs. The group recommended emphasis on the following: extraterrestrial life, effects of simulated extreme environments, cellular and biological systems in space conditions, decontamination of space probes and vehicles, effects of space on biological rhythms and animal orientation, and photosynthesis in ecosystems.

5,494

NASA 1960 MAJOR ACTIVITIES IN THE NASA PROGRAMS
(The National Aeronautics and Space Administration, Washington 25, D.C.)
October 1, 1959 - March 31, 1960

ABSTRACT: Herein are recounted major activities of the National Aeronautics and Space Administration from October 1, 1959, through March 31, 1960, the third half-year period since NASA came into being.

This publication comprises: (1) an intorductory chapter which summarizes the status of current NASA programs and briefly outlines long-range planning; (2) a detailed, 17-chapter discussion of progress in NASA aeronautics and space research and development; and (3) fourteen appendices that include memberships of principla Congressional and NASA committees, an analysis by the NASA Bioscience Advisory Committee of the role of the life sciences in space exploration, lists of research grants and contracts and research and development contracts, and the NASA financial statement for the period.

5,495

National Aeronautics and Space Administration. 1960 ARTIFICIAL EARTH SATELLITES NO. 3 1959. Transl. from: Iskusstvennyye Sputniki Zemli, No. 3 , NASA Techn. Transl. F-8

CONTENTS: Presented are abstracts of 13 articles on artificial earth satellites and related subjects, which comprise the third of a series of publications by the Academy of Sciences USSR, titled "Iskusstvennyye Sputniki Zemli," no. 3, 1959.

5,496

U S. NASA 1961. RESULTS OF THE FIRST US MANNED SUBORBITAL SPACE FLIGHT.
(National Aeronautics and Space Administration, Washington, D.C.)
June 6, 1961. ASTIA AD 259 061

ABSTRACT: This document is a record of the proceedings of a conference on the

results of the first U.S. manned suborbital space flight. This conference was held by the NASA, in cooperation with the National Institutes of Health and the National Academy of Sciences, at the U.S. Department of State auditorium on June 6, 1961. The papers presented were prepared by representatives of the NASA Space Task Group in collaboration with personnel from various Department of Defense medical installations, the University of Pennsylvania, and McDonnell Aircraft Corp.

5,497

National Aeronautics and Space Administration 1961 NATIONAL WIND-TUNNEL SUMMARY. (National Aeronautics and Space Administration, Wash., D.C.) ASTIA AD-262 938, July 1961

ABSTRACT: A ready reference is provided on current wind-tunnel facilities for governmental, industrial and institutional organizations that employ wind tunnels in the U.D. The tables contain data on major wind tunnels owned by the Department of Defense, the National Aeronautics and Space Administration (NASA), industrial organizations, and universities. The information was obtain ed from questionnaires completed and returned by the operators of the wind tunnels. Included are facilities that are now in operation or being constructed and those that are currently authorized. The wind tunnels reported in this survey are classified according to their size and speed range. (Author)

5,498

U. S. National Aeronautics and Space Administration 1961 RESULTS OF THE SECOND U. S. MANNED SUBORBITAL SPACE FLIGHT, JULY 21, 1961 (National Aeronautics and Space Administration, Washington, D. C.) ASTIA AD-270 539; 21 July 1961

CONTENTS: Spacecraft and flight plan for the Mercury-Redstone 4 flight;
Results of the MR-4 preflight and postflight medical examination conducted on astronaut Virgil I. Grissom
Physiological responses of the astronaut in the MR-4 space flight
Flight surgeon's report for Mercury-Redstone Missions 3 and 4
Results of inflight pilot performance studies for the MR-4 flight; and
Pilot's flight report.
(ASTIA)

5,499

U. S. National Aeronautics and Space Administration 1961 PROCEEDINGS OF A CONFERENCE ON RESULTS OF THE FIRST U. S. MANNED SUBORBITAL SPACE FLIGHT. (National Aeronautics and Space Administration, Washington, D. C.) 6 June 1961. ASTIA AD 259 061

CONTENTS:
Kraft, C. C., Jr., Flight Plan for the MR-3 Manned Flight;
Bond, A. C., Mercury Spacecraft Systems;

White, S. C., Review of Biomedical Systems for MR-3 Flight;
Jackson, C. B., Jr., Results of Preflight and Postflight Medical Examinations;
Henry, J. P., Bioinstrumentation in MR-3 Flight;
Augerson, S., Physiological Responses of the Astronaut in the MR-3 Flight;
Slayton, D. K., Pilot Training and Preflight Preparation;
Voas, R. B., J. J. van Bockel, R. G. Zedekar, & P. W. Backer, Results of In-Flight Pilot Performance;
Shepard, A. B., Jr., Pilot's Flight Report, Including In-Flight Films.

5,500

U.S. National Aeronautics & Space Administration 1962 ORBITAL FLIGHT OF JOHN H. GLENN, JR. (A text of the hearings before the committee on Aeronautical and Space Sciences, U.S. Senate, February 28, 1962) Available from U.S. Printing Office (35 cents)

CONTENTS: Contains testimony of three NASA officials and three astronauts basic statistics of Glenn's flight; chronology of Glenn's day, February 20, 1962; transcript of all public-address announcements during Glenn flight; transcripts of Glenn post-flight press conferences and Glenn message to joint meeting of Congress, February 26.

5,501

U. S. National Aeronautics & Space Administration 1962 RESULTS OF THE FIRST UNITED STATES MANNED ORBITAL SPACE FLIGHT, FEBRUARY 20, 1962. (National Aeronautics & Space Administration, Washington, D. C.)

ABSTRACT: This document presents the results of the first United States manned orbital space flight conducted on February 20, 1962. The prelaunch activities, spacecraft description, flight operations, flight data, and postflight analyses presented form a continuation of the information previously published for the two United States manned suborbital space flights conducted on May 5, 1961, and July 21, 1961, respectively, by the National Aeronautics & Space Administration. (NASA)

5,502

NASA 1962 RESULTS OF THE SECOND U.S. MANNED ORBITAL SPACE FLIGHT, MAY 24, 1962 (National Aeronautics and Space Administration, Washington, D.C. 1962)

ABSTRACT: Discussions are presented of performance of the spacecraft and launch systems, the modified Mercury Network, mission support personnel, and the astronaut (M. Scott Carpenter), together with analyses of observed space phenomena and the medical aspects of the mission. These form a continuation of the information previously published for the first United States manned orbital flight, conducted on February 20, 1962, and the two manned sub-orbital space flights. An appendix is included of MA-7 air-ground voice communication. Pertinent papers are abstracted separately.

U. S. National Aeronautics & Space Administration 1962 PROCEEDINGS OF THE SECOND NATIONAL CONFERENCE ON THE PEACEFUL USES OF SPACE, SEATTLE, WASHINGTON, MAY 8-10, 1962. (National Aeronautics & Space Administration, Washington, D. C.) NASA SP-8

CONTENTS:

Newell, H. E., Space Science--Earth, Sun, and Stars;
Cortright, E. M., Space Science--Moon and Planets;
Ames, M. B., Jr., Space Vehicle Research;
Finger, H. B., Nuclear Energy: The Space Exploration Energy Source;
Tepper, M., Meteorological Satellites;
Jaffe, L., NASA Communications Satellite Program;
Buckley, E. C., Tracking and Data Acquisition;
Gilruth, R. R., Projects Mercury & Gemini;
Low, G. M., Project Apollo;
von Braun, W., Launch Vehicles & Launch Operations;
Johnson, D. S., Satellites & Weather Forecasting;
Kreuzer, B., Low-Altitude Repeater Satellites;
Felker, J. H., Telstar Project;
Adler, F. P., Synchronous-Orbit Communications Satellites;
Paglin, M. D., Regulatory Aspects of Satellite Communications Systems;
Furnas, H., Some Foreign Policy Implications of Space Science;
Meckling, W. H., The Economic Importance of Space Technology;
Gordon, D., Panel Discussion: How Will Space Research Affect Youth's Future?
Beck, Jack, Panel Discussion: Impact of Space Programs on Society;
Simons, D. G., Manhigh Balloon Flights in Perspective;
Kittinger, J. W., Jr., Discussion of Project Excelsior;
Ross, M. D., A Consideration of the U. S. Navy Strato-Lab Balloon Program and its Contributions to Manned Space Flight;
Armstrong, N. A., J. A. Walker, F. S. Petersen, & R. M. White, The X-15 Flight Program;
Glenn, J. H., Jr., Astronaut's Report on Project Mercury

5,503

National Aeronautics and Space Administration 1962 ASTRONAUTICS INFORMATION VOL. V NO. 4. (Jet Propulsion Laboratory California Institute of Technology Pasadena, California) April 1962, NAS 7-100, ASTIA AD-275 020

ABSTRACT: Coverage of Astronautics Information Abstracts is restricted to the subject of spaceflight and to applicable data and techniques. Areas currently being reported by other information agencies are usually excluded. However, data and techniques arising from other technologies are reported if the relationship to astronuatics is clear. For example, coverage is given to propulsion when related to specific space travel missions and to meteorology when related to the envelope beyond the stratosphere. Aeronautics, communications, guidance, instrumentation, materials, vehicle engineering, etc., are treated similarly, the intent being to give full coverage to astronautics but to exclude peripheral material.

5,504

U. S. National Aeronautics & Space Administration 1962 RESULTS OF THE THIRD UNITED STATES MANNED ORBITAL SPACE FLIGHT, OCTOBER 3, 1962. (National Aeronautics & Space Administration, Washington, D. C.) NASA SP-12

ABSTRACT: This document presents the results of the third United States manned orbital space flight conducted on October 3, 1962. The performance discussions of the spacecraft and launch-vehicle systems, the flight control personnel, and the astronaut, together with a detailed analysis of the medical aspects of the flight, form a continuation of the information previously published for the first two United States manned orbital flights, conducted on February 20, and May 24, 1962, and the two manned suborbital space flights. (AUTHOR)

5,505

U. S. National Aeronautics and Space Administration 1962 BIOASTRONAUTICS (National Aeronautics and Space Administration, Washington, D. C.) NASA SP-18; Dec. 1962

CONTENTS:

Smith, G. B., Jr., Environmental Biology
Gerathewohl, S. J., & B. E. Gernandt, Physiological and Behavioral Sciences,
Johnston, R. S., Bioengineering,
Young, R. S., Exobiology

5,506

National Aeronautics and Space Administration 1963 ASTRONAUTICAL AND AERONAUTICAL EVENTS OF 1962. REPORT TO THE COMMITTEE ON SCIENCE AND ASTRONAUTICS, U.S. HOUSE OF REPRESENTATIVES, EIGHTY-EIGHTH CONGRESS, FIRST SESSION.
(NASA, Washington, D. C.) N63-19071

ABSTRACT: A chronology of astronautical and aeronautical events occurring in 1962 is presented. Two appendices are included, one on the satelities, space probes, and manned spaceflights launched during the year, and the other on the major NASA launchings from 1958 to 1962. (N63-19071)

5,507

National Aeronautics & Space Administration 1963 SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS. (National Aeronautics & Space Administration, Washington, D.C.) Vol. 1, No. 8, April 23, 1963.

ABSTRACT: Contents include Life Sciences, human and space vehicle data.

5,508

National Aeronautics and Space Administration 1963 THE TRIUMPH OF ASTRONAUT L. GORDON COOPER, JR. AND THE FAITH 7, MAY 15-16, 1963. (NASA , Manned Spacecraft Center, Houston, Tex.) N63-18852

ABSTRACT: The flight of astronaut L. Gordon Cooper in the Faith 7 space capsule is discussed. Included are the prelaunch preparations, the launch itself, orbit, experimental aspects of the flight, aeromedical studies, the flashing beacon experiment, satellite instrumentation, astronaut protection systems, and the recovery mechanism. (N63-18852)

5,509

National Aeronautics & Space Administration 1963 SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS. (National Aeronautics & Space Administration, Washington, D.C.) Vol. 1, No. 7, April 8, 1963.

ABSTRACT:
Contents include life sciences and space vehicle data.

5,510

National Aeronautics & Space Administration 1963 SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS. (National Aeronautics & Space Administration, Washington, D.C.) Vol. 1, No. 4, Feb. 23, 1963.

ABSTRACT:
Contents include: Life Sciences, stresses and loads, launch and space vehicles and human behavior.

5,511

National Aeronautics & Space Administration 1963 SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS. (National Aeronautics & Space Administration, Washington, D.C.) Vol. 1, No. 2. Jan. 23, 1963.

CONTENTS: Life sciences and space vehicle data

5,512

NASA 1963 PROCEEDINGS OF THE CONFERENCE ON SPACE-AGE PLANNING: A PART OF THE THIRD NATIONAL CONFERENCE ON THE PEACEFUL USES OF SPACE, CHICAGO, MAY 1-9, 1963. (National Aeronautics and Space Administration, Wash., D.C.) NASA SP-40

5,513

National Aeronautics & Space Administration 1963 SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS. (National Aeronautics & Space Administration, Washington, D.C.) Vo. 1, No. 5, March 8, 1963.

ABSTRACT: Contents include Life Sciences, human behavior, and space vehicle data.

5,514

U.S. National Bureau of Standards 1946 PORTABLE CALIBRATOR OF "PULSE" TYPE FOR HIGH FREQUENCY ACCELEROMETERS. Progress Report 13, NBS Lab No. 65128, BuAer TED NBS 4025, 12 September 1946.

5,515

U.S. National Bureau of Standards 1949 TEST OF OMNIDIRECTIONAL ACCELEROMETER FOR OFFICE OF NAVAL RESEARCH. National Bureau of Standards Laboratory Rept. No. 6.4/1-238, 3 Aug. 1949

5,516

U. S. National Library of Medicine 1958 BIBLIOGRAPHY OF SPACE MEDICINE (Department of Health, Education and Welfare, Public Health Service) No. 617, Bibliography Series No. 21

ABSTRACT: References for this bibliography have been selected from a search of the indexes and catalogs of the National Library of Medicine, and from examination of the principal aviation, aviation medicine, and astronautical publications; they are arranged in broad subject classes, in inverse chronological order, alphabetically by author within the years.

5,517

National Research Council 1942 MINUTES OF THE 1ST MEETING OF THE SUBCOMMITTEE ON ACCELERATION. (National Research Council, Washington, D. C.) 28 Sept. 1942

5,518

National Research Council 1942 BIBLIOGRAPHY OF AIR SICKNESS AND SEA SICKNESS (National Research Council, Committee on Aviation Medicine, Washington, D.C.) C.A.M. Report No. 82, Nov. 1942.

5,519

National Research Council 1942 MINUTES OF THE SECOND MEETING OF THE SUBCOMMITTEE ON ACCELERATION. (National Research Council, Washington, D. C.) 2 Dec. 1942

5,520

National Research Council 1943 MINUTES OF THE FOURTH MEETING OF THE SUBCOMMITTEE ON ACCELERATION. (National Research Council, Washington, D.C.) 17 Sept. 1943

5,521

National Research Council 1943 MINUTES OF THE THIRD MEETING OF THE SUBCOMMITTEE ON ACCELERATION. (National Research Council, Washington, D. C.) 29 March 1943

5,522

National Research Council 1943 REPORT ON BLAST INJURIES (National Research Council, Division of Medical Sciences, Washington, D.C.) June 1943.

5,523

National Research Council 1944 MINUTES OF THE FIFTH MEETING OF THE SUBCOMMITTEE ON ACCELERATION (Mayo Aero Medical Unit, Rochester, Minn., Feb. 23-24, 1944)

5,524

U.S. National Research Council 1944 THIRD CRASH INJURY CONFERENCE, ARMY, NAVY, C.A.A. AND N.R.C. 15 - 16 May 1944.

ABSTRACT: The subject of this conference will be the safer cockpit. The first two crash injury conferences were largely devoted to basic information. We have now reached the stage where many of the questions can be answered with sufficient accuracy to permit applications in cockpit design. It seems advisable at this meeting to confine the discussion to the cockpit. We hope to secure (a) recommendations for changes that can be made in the near future without radical alteratio s in structure, and (b) suggestions for radical changes that will eventually provide a cockpit that is "ideal" for comfort, ease of control, and safety in case of crash.

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National Research Council 1944 MINUTES OF THE SIXTH MEETING OF THE SUBCOMMITTEE ON ACCELERATION (National Academy of Science Building, Washington, D.C., 7 June 1944)

5,526

National Research Council 1946 BIBLIOGRAPHY ON AVIATION MEDICINE (National Research Council, Division of Medical Sciences) Vol. I. ASTIA ATI 208 592.

5,527

National Research Council 1946 BIBLIOGRAPHY ON AVIATION MEDICINE. (National Research Council, Division of Medical Sciences) Vol. II. ASTIA ATI 208 593.

5,528

National Research Council 1958 SOME OF THE RESULTS OF SCIENTIFIC RESEARCHES ON THE FIRST TWO SOVIET ARTIFICIAL EARTH SATELLITES (National Academy of Sciences, Washington, D.C.) Memo TP-21, June 10, 1958

ABSTRACT: This report is a translation of a communication from the USSR on the scientific results of the first two Soviet artificial earth satellites launches on October 4, 1957 and November 3, 1957.

Data is given on results of radio and optical observations of the satellites. The doppler effect was utilized to determine the parameters of the satellites orbits. Optical observations were made with special photocinetheodolites and photographs of the satellites' tracks were obtained with modernized aerophoto cameras. The most successful method of photographing was the operation with electro-optical interferometers.

Air-density and temperature measurements were obtained from observations of the satellites' orbits. The rate of decrease in density is characterized by a "height of homogeneous atmosphere," which is proportional to air temperature and inversely proportional to its molecular weight. Density measurements proved 5 to 10 times greater than the values originally assumed. Air temperature derived from the received data is greater than had been theoretically assumed.

Data received in the observations of radio signals transmitted from the satellites indicated that electron-density values in the outer ionosphere (above the main maximum) decreases with altitude 5 to 6 times slower than it increases below the maximum. Cosmic ray data showed that from an altitude of 225 to 700 km the intensity of radiation increases by approximately 40%.

Data from the biological investigation carried out in Sputnik II indicated that the animal withstood the physiological effects of acceleration without too much difficulty; however, the phenomenon of weightlessness prevented it from returning to normal as quickly as in laboratory experiments.

5,529

National Research Council 1961 HUMAN ACCELERATION: BIBLIOGRAPHY, TERMINOLOGY, ACCELERATION ENVIRONMENTS.
(National Academy of Sciences, National Research Council, Washington, D.C.) Publication 913, Library of Congress Catalog Card No. 61-60079.

CONTENTS:
Bates, G., A Bibliography Index for Cataloging the Acceleration Literature;
Clark, C.C., J.D. Hardy, & R.J. Crosbie, A Proposed Physiological Acceleration Terminology with an Historical Review;
Hessberg, R.R., Acceleration Environments Pertinent to Aerospace Medical Research.

5,530

National Academy of Sciences 1961 THE TRAINING OF ASTRONAUTS. REPORT OF A WORKING GROUP CONFERENCE
National Academy of Sciences - National Research Council, Washington.,D.C
Publ. no. 873, 1961
ASTIA AD 263 763

CONTENTS:
Training aspects of the X-15 program.
Man's integration into the Mercury capsule.
Project Mercury astronaut training program.
Some implications of Project Mercury.
Experience for future astronaut training programs.
Dyna-Soar pilot training.

5,531

U. S. National Research Council 1961 THE TRAINING OF ASTRONAUTS. REPORT OF A WORKING GROUP CONFERENCE. (National Academy of Sciences, National Resear Council, Washington, D. C.) Publication No. 873; ASTIA AD-263 763
Library of Congress Catalog Number 61-60021

CONTENTS:
Training aspects of the X-15 Program;
Man's Integration into the Mercury Capsule;
Project Mercury Astronaut Training Program;
Some Implications of Project Mercury;
Experience for Future Astronaut Training Programs;
Dyna-Soar Pilot Training.

5,532

National Research Council 1961 SPACE SCIENCE BOARD ABSTRACTS: SYMPOSIUM ON IMPACT ACCELERATION STRESS. Presented at Brooks AFB, Tex by Man in Space Committee, Space Science Board, Nat. Acad. of Science and NASA, 27-29 Nov. 1961.

5,533

U.S. National Research Council 1961 REPORTS ON HUMAN ACCELERATION (National Research Council, Committee on Bio-Astronautics) Publication 901 ASTIA AD 266 077

ABSTRACT: This publication contains papers on the following subjects: "Safety Monitoring" by Edwin P. Hiatt; "Physiologic Endpoints" by J.P. Meehan; "Psychological Testing" by Robert Galambos. Taken together, these reports summarize what is known about physiological and psychological testing under acceleration stress, and point to ways by which we can discover still more.

5,534

National Research Council 1962 IMPACT ACCELERATION STRESS: PROCEEDINGS OF A SYMPOSIUM WITH A COMPREHENSIVE CHRONOLOGICAL BIBLIOGRAPHY (National Academy of Sciences, National Research Council, Washington, D.C.) Publication No. 977

ABSTRACT: The purpose of the symposium is twofold: (1) the exchange of research information, plans and future programs among scientists in the field of acceleration stress, with particular emphasis on impact acceleration, and (2) the development of authoritative recommendations regarding the goals for impact research and development in the United States in terms of the programs, facilities, personnel, and funding necessary to attain these objectives.

This book contains the text of all formal papers and panel discussions presented at this meeting. A bibliography has been included with this publication to provide readers with fairly comprehensive information on literature relating to the biological effects of impact acceleration.

5,535

U. S. Naval Air Development Ctr. 1954 ACCOMPLISHMENT SUMMARY OF AVIATION MEDICAL ACCELERATION LABORATORY. (Naval Air Development Ctr., Johnsville, Pa.) ASTIA AD-52 476

ABSTRACT: A brief account is given of the various studies in aviation medicine undertaken at the Aviation Medical Acceleration Laboratory. A 50-ft centrifuge was employed in studying human tolerance to acceleration. An acceleration chart was prepared summarizing the type of acceleration, direction of body movement, aircraft maneuver, and maximum human and animal exposures. Other studies involved the simulation of uncontrolled aircraft, the evaluation of acceleration-protective devices, and the effect of simulated high-altitude, high-velocity, or high-performance flying on various physiological, biochemical, psychophysical, and pathological conditions. Consideration was given to the use of X-ray motion pictures in studying circulatory and visceral movements under acceleration stress. (ASTIA)

5,536

U.S. Naval Air Development Center 1955 THE EFFECTS OF TONIC ELECTRICAL STIMULATION AS A MEANS OF COMBATING ADVERSE CIRCULATORY DISTURBANCES CAUSED BY ACCELERATION (Naval Air Development Center, Johnsville, Pa.) NADC-MA-5501. 25 January 1955.

5,537

U.S. Naval Air Development Center 1955 INFLIGHT PHYSIOLOGICAL AND PSYCHOLOGICAL REACTIONS TO THE SUPINE POSITION. (U.S. Naval Air Development Center, Johnsville, Pa.) 31 Dec. 1955.

5,538

U.S. Naval Air Development Ctr. 1955 AVIATION MEDICAL ACCELERATION LABORATORY RESEARCH PROGRESS REPORT 31 DECEMBER 1955 (Naval Air Development Ctr., Johnsville, Pa.) ASTIA AD 83 499

ABSTRACT: With the advent of high-altitude, high-velocity, high-performance flying in military aircraft, it has become necessary to intensively engage in research in aviation medicine to determine the physiological limits imposed on the body by such aircraft. The Human Centrifuge at the Aviation Medical Acceleration Laboratory, Johnsville, Pennsylvania, was specifically designed and is particularly suited for research in aviation medicine having the above objectives,and simulation of high-altitude, high-velocity, high-performance aircraft can be made with this device under controlled conditions, and with performance. This report reviews some of the important contributions related to the above objectives.

5,539

U. S. Naval Air Development Ctr. 1955 ANTI-BLACKOUT EQUIPMENT, DETERMINATION OF LIMITATIONS OF EQUIPMENT AND PERSONNEL. (Naval Air Development Ctr., Johnsville, Pa.) Project TED ADC AE-5201.3; 31 Dec. 1955

ABSTRACT: Experimental work on G protection and limitations of G suits, the integrated suit, the full pressure half suit, supination, and a combination of G suit and supination has been completed. The maximum protection against blackout was provided with the subject wearing a Z-2 anti-blackout suit and straining while supinated 65 degrees. One hundred percent of the subjects withstood 7 G for 30 seconds without peripheral light loss.

5,540

U.S. Naval Air Development Center 1957 ACCELERATION PROBLEMS IN SPACE FLIGHT. (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-5909, Dec. 1957.

5,541

U.S. Naval Air Development Ctr. 1958 STATUS REPORT ON ANIMAL SATELLITE (Naval Air Development Center, Johnsville, Pa.) NADC Letter Report AE-1412

ABSTRACT: Progress which has been made in the biosatellite program since its initiation on February 27, 1958, is listed. The preparations for this animal satellite which has not been put in orbit were made with cooperation of the Franklin Institute.

5,542

U.S. Naval Air Development Ctr. 1958 COMPARATIVE EVALUATION OF A STANDARD FACE CURTAIN AND AN EXPERIMENTAL D-RING LOCATED ON THE SEAT FRONT AS MODES OF ACTUATING EJECTION DURING EXPOSURE TO ACCELERATION. (Naval Air Development Ctr., Johnsville, Pa.) NADC AE5205, MA 3-3585, 5 May 1958.

5,543

U. S. Naval Air Development Ctr. 1959 EVALUATION OF THE TORSO-HEAD RESTRAINT SYSTEM AND THE INTEGRATED HARNESS RESTRAINT SYSTEM UNDER CONDITIONS OF ACCELERATION. (Naval Air Development Ctr., Johnsville, Pa.) MA-82-2621; ASTIA AD-257 375; 2 Apr 1959

ABSTRACT: An investigation was carried out at the Aviation Medical Acceleration Laboratory to evaluate the torso-head restraint system developed under BuAer research contract Nos. 57-737 with respect to its ability to restrain the pilot under conditions of sustained and fluctuating patterns of acceleration. A model F4H-1 aircraft ejection seat equipped with the torso-head restraint system was used for this investigation. In addition, the integrated harness restraint system used with the Martin-Baker G-5 ejection seat was also evaluated under conditions of sustained acceleration. This report presents the results of the investigation.

5,544

U.S. Naval Air Development Ctr. 1959 TORSO-HEAD RESTRAINT SYSTEM FOR THE MODEL F4H-1 AIRPLANE. (Naval Air Development Ctr., Johnsville, Pa.) Rept. No. MA-82-1390, 20 Feb. 1959. ASTIA AD 257 374

ABSTRACT: A study was conducted to evaluate an experimental torso-head restraint system to be used in the flight tests of the Model F4H-1 airplane. This study was concerned with the adequacy of the restraint offered by the system with respect to protection of the pilot during exposure to acceleration. Three specific acceleration patterns representing extreme conditions which

might occur during the course of the flight tests were investigated. Also determined in the course of the study was the ability of subjects to operate the stick and rudder pedals, the aircraft drogue chute, and both ejection controls under these conditions of acceleration while using the torso-head restraint. Results indicated that to the degree that the conditions of flight of the F4H-1 were simulated in this study the pilot will be adequately restrained by this seat and restraint system and will be able to operate the stick control, rudder pedals, drogue chute control, and the ejection controls under actual flight conditions. (Author)

5,545

U.S. Naval Air Development Center 1960 NADC BIOLOGICAL INSTRUMENTATION SYMPOSIUM OF DECEMBER 10, 1958: SEVENTH LETTER REPORT CONCERNING (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-16021, July 12, 1960. ASTIA AD 242 449.

ABSTRACT: This is a preliminary report of tests carried out on the Aviation Medical Acceleration Laboratory (AMAL) Bioinstrumentation package during which six channels were transmitted on an assigned frequency of 232.4 megacycles from the package mounted in the AMAL centrifuge gondola to the AMAL monitoring and recording system.

Aircraft operation of the package using either tape recording or direct telemetry will be the subject of a subsequent paper. Work is continuing on the modification of various sensor subpackages which will interchangeable fit in the AMAL bio-instrumentation package to allow versatility in the selection of psychiological and environmental parameters to be studied for a particular program. A complete report of detailed specifications on all components is in preparation.

5,546

U.S. Air Naval Air Development Center 1960 NADC BIOLOGICAL INSTRUMENTATION SYMPOSIUM OF DECEMBER 10, 1958: SIXTH LETTER REPORT CONCERNING (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-16018 July 5, 1960. ASTIA AD 242 448.

ABSTRACT: The report constitutes a summary of the investigations carried out on three types of respiration sensor systems which have been developed and evaluated at the Aviation Medical Acceleration Laboratory (AMAL) during the past nine months. The three types of respiration sensor systems are: (a) strain gauge chest strap (2) respiratory gas flow rates with calibrated spirometer tracings (3) AMAL lip mike thermistor.

Development and evaluation of respiratory sensors is continuing. Under current study are a respiratory rate meter, an isothermal thermistor mean flow sensor and a respiratory gas sampling and analysis system. A complete report of detailed specifications of all components is in preparation.

5,547

U.S. Naval Air Development Ctr. 1960 BIOPROBE, DEVELOPMENT AND STUDY WITH, (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA 16007

ABSTRACT: Some technical details of the bioprobe and the results of test runs with rats are described.

5,548

U.S. Naval Air Development Center 1961 NAVY CENTRIFUGE AND NORTH AMERICAN AVIATION G SEAT SIMULATIONS OF LOW ALTITUDE FLIGHT, PROGRAM 2 (U.S. Naval Air Development Center, Johnsville, Pa.) Progress Report. NADC-MA-L6128, Rept. No. MA-2, 18 July 1961. ASTIA AD 327-415L (Confidential Report)

5,549

U.S. NAMC BODY RESTRAINT AND HEAD PROTECTION. NAMC.

5,550

U.S. Naval Air Materiel Center DEFENSE THROUGH RESEARCH. (U.S. Naval Air Materiel Ctr., Philadelphia, Pa.)

ABSTRACT: This publication is an illustrated resume of the phases of work conducted by the Naval Air Materiel Center.

5,551

U.S. Naval Air Material Center 1960 DETERMINATION OF TEST INSTRUMENTATION REQUIREMENTS FOR BIOLOGICAL AIRBORNE AND ASTRONAUTICAL TESTS. (U.S. Naval Air Material Center, Philadelphia, Pa.) Project TED NAM AE-1403.1, ASTIA AD 234 091.

ABSTRACT: A description of electrodes suitable for obtaining ECG records when worn under protective clothing during prolonged exposures in adverse environmental conditions has been given. The manner in which these electrodes were applied to the surface of the body was also indicated.

5,552

U.S. Naval Air Materiel Ctr. 1960 A BIBLIOGRAPHY OF PSYCHOPHYSIOLOGICAL STUDIES RELEVANT TO SPACE AND ORBITAL FLIGHT (U.S. Naval Air Materiel Ctr., Air Crew Equipment Laboratory, Philadelphia, Pa.) NAMC-ACEL-441

ABSTRACT: Lists 582 entries (on 3 x 5 inch file-card forms) based on a literature review through April, 1960 of psychological, physiological, and environmental reports pertinent to man's role in space and orbital flight.

5,553

U.S. Naval Air Material Center 1961 PROGRAM FOR SYMPOSIUM ON BIOMECHANICS OF BODY RESTRAINT AND HEAD INJURY. (Sponsored by the Office of Naval Research, The Bureau of Naval Weapons and the Air Crew Equipment Laboratory. Naval Air Material Center, Philadelphia. 14-15 June, 1961)

ABSTRACT: The objectives of the Symposium were to (1) review and bring up-to-date the theoretical biological knowledge on acceleration injuries, (2) review and bring up-to-date engineering progress in the design of protective devices, and (3) foster the interchange of ideas between the two disciplines with the hope of eventually developing better protection against linear acceleration.

This Compendium contains a copy of the program, those abstracts of papers which were submitted for inclusion herein and a complete list of attendees.

5,554

U.S. Naval Air Test Center 1959 TYPICAL ACCELERATION LOADS IMPOSED ON PILOTS DURING CATAPULTING AND ARRESTING. (Naval Air Test Center, Patuxent River, Md.) Final Rept. Proj. TED PTR SI-43108, FT35-149, Rept. No. 1, 3 Apr. 1959 ASTIA AD 214 749

ABSTRACT: Tests were conducted to find the time histories of cockpit accelerations during catapulting and arresting with three current airplane models. The airplanes used for the tests were the F4D-1, F11F-1, and F6U-1. The F8U launch from the steam catapult resulted in severe tracking oscillations as evidenced by the lateral acceleration. This acceleration was not uncomfortable to the pilot, however. Pilots consider H8 catapult launches extremely severe and disorienting compared to steam catapult launches. This is attributed to the rapid build-up to a sustained high longitudinal acceleration associated with H8 launches. The high transient g onset rate of the steam catapult produces no uncomfortable effect because of the short duration of initial peak longitudinal acceleration. Free-flight arrested landings subject the cockpit to high normal accelerations. This is particularly true of F11F and F4D airplanes which often engage the wire at a high angle of attack, resulting in rapid pitch rate. High-sink landings impose accelerations which sometimes result in critical situations.

5,555

U.S. Naval Aviation Safety Ctr. 1956 EJECTION SEAT STUDY: A REPORT OF EJECTIONS AND BAILOUTS, AUGUST 1949 THROUGH MAY 1956. (Naval Aviation Safety Ctr., Norfolk, Va.) ASTIA AD 125 052

ABSTRACT: A study is presented on the ejection seat in emergency escape from naval aircraft from the first ejection in August 1949 through May 1956. The findings demonstrate an increase in the ejection rate per unit hours flown, and a pronounced relationship between successful ejection and altitude and speed. Successful bailouts may be made at lower altitudes and slower speed than can ejections. Ejecting from F9F, F7U and TV model aircraft is significantly more dangerous than from F2H and FJ models. Bailing out from FAU model aircraft is more dangerous than that from AD and SNJ models. Injuries sustained during ejections occur mainly upon landing, by the forces involved in ejecting the seat and the pilot, and by the shock of the opening parachute. Injuries sustained during bailouts occur upon landing, in the cockpit, upon the fuselage, and by parachute shock. A large and significant difference was found in the number of injuries between trained parachute jumpers and untrained ones. (Author)

5,556

U.S. Naval Gun Factory 1957 OPERATION AND MAINTENANCE INSTRUCTIONS FOR POWDER TYPE STORES CATAPULT
(U.S. Naval Gun Factory, Washington 25, D.C.) NAVORD Report 5519 NGF-T-30-57 ASTIA AD 143 563

ABSTRACT: The purpose of this publication is to provide instructions for test personnel for the operation and maintenance of the powder type stores catapult test apparatus, which is under the technical cognizance of the Bureau of Ordnance. The instructions conform in all respects to the policies prescribed by the Chief of Naval Operations. The information in this publication includes a brief general description of the materials and equipment to be tested, the test apparatus to be used, and the test procedures to be followed. Instructional materials herein include specific instructions in regard to the proper operation and maintenance of the major functional assemblies and subassemblies, and detail descriptions of the same.

5,557

U. S. Naval Postgraduate School 1956 LIST OF THESES SUBMITTED BY OFFICER STUDENTS IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR DEGREES THROUGH 1956 (U. S. Naval Postgraduate School, Monterey, California) Research Paper No. 14

5,558

U. S. Naval Postgraduate School 1957 LIST OF THESES SUBMITTED BY OFFICER STUDENTS IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR DEGREES FOR 1957 (U. S. Naval Postgraduate School, Monterey, Calif.) Research Paper No. 19

5,559

U. S. Naval Postgraduate School 1958 LIST OF THESES SUBMITTED BY OFFICER STUDENTS IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR DEGREES FOR 1958. (U. S. Naval Postgraduate School, Monterey, Calif.) Research Paper No. 20

5,560

U. S. Naval Postgraduate School 1959 LIST OF THESES SUBMITTED BY OFFICER STUDENTS IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR DEGREES FOR 1959 (U. S. Naval Postgraduate School, Monterey, Calif.) Research Paper No. 21

5,561

U. S. Naval Postgraduate School 1960 LIST OF THESES SUBMITTED BY OFFICER STUDENTS IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR DEGREES FOR 1960 (U. S. Naval Postgraduate School, Monterey, Calif.) Research Paper No. 27

5,562

U. S. Naval Postgraduate School 1961 LIST OF THESES SUBMITTED BY OFFICER STUDENTS IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR DEGREES FOR 1961 (U. S. Naval Postgraduate School, Monterey, Calif.) Research Paper No. 30; ASTIA AD-270 117

5,563

U.S. Naval Research Laboratory 1961 NAVY HIGH-IMPACT SHOCK MACHINES FOR LIGHT-WEIGHT AND MEDIUMWEIGHT EQUIPMENT I. Vigness
(Shock and Vibration Branch, U.S. Naval Research Laboratory, Washington, D.C.)
NRL Report 5618 June 1, 1961 ASTIA AD 260 008

ABSTRACT: Descriptions are given of the Navy HI shock machines for lightweight and mediumweight equipment. Shock motions are given for standard loading conditions. These are illustrated by acceleration-, velocity-, and displacement-time relations. Maximum values of velocities and displacements, and of accelerations passed by various low-pass filters, are presented. Shock spectra are presented for selected conditions. Equivalent displacement- and velocity-shock, together with maximum values of acceleration, can be established for their

respective effective frequency ranges from observations of the shock spectra.

Concepts relative to the specification of shock tests are considered. These include brief considerations of analyses of shock motions, methods of specifying a shock test, and what is meant by simulation of field conditions. It is indicated that shock tests should not be specified in terms of shock motions, or spectra, unless the values specified by considered only as nominal values.

5,564

U.S. Naval School of Aviation Medicine 1955 DISORIENTATION: A CAUSE OF PILOT ERROR. (U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola Fla.) Research Proj. No. NM 001 110 100.39, 2 March 1955. ASTIA AD 66 703.

ABSTRACT: This report which is written primarily for flight surgeons summarizes and organizes a large number of studies bearing on disorientation (vertigo) in aircraft pilots. It is organized in terms of the perceptual processes which lead to proper orientation and disorientation in flight and attempts to show their relation to the pilot's task. Disorientation in flight is considered to be due to psychophysiological causes which should be regarded as the inevitable consequence of placing man in a task for which he is not fitted either by endowment or past training. An attempt is made to present explanations of pilots' experiences with disorientation in psychophysiological terms. Some suggestions are made to prevent disorientation and to deal with it when it does occur.

5,565

U. S. Naval School of Aviation Medicine 1960 BIBLIOGRAPHY: PSYCHOLOGICAL RESEARCH IN THE U. S. NAVAL SCHOOL OF AVIATION MEDICINE. (Naval School of Aviation Medicine, Pensacola, Fla.) ASTIA AD-258 939, July 1950 - June 1960

5,566

U. S. Naval School of Aviation Medicine 1961 COMPREHENSIVE BIBLIOGRAPHY OF RESEARCH REPORTS ISSUED OVER A NINETEEN-YEAR PERIOD BY THE U. S. NAVAL SCHOOL OF AVIATION MEDICINE. (Naval School of Aviation Medicine, Pensacola, Fla.) ASTIA AD-258 940, May 1, 1961

5,567

U.S. Navy Yard 1941 ACCELERATION BELT.
(RAF, Institute of Aviation Medicine, Farnborough)
FPRC 263[c), March 1941.

5,568

U.S. Navy 1943 REPORT ON CAUSATION OF BLAST INJURY.
Naval Medical Bulletin 41:363-366, Mar. 1943.

5,569

MOTION PICTURE

U.S. Navy Department 1943 G AND YOU. (Navy Department)

ABSTRACT: Presents the problem of high acceleration and its physical effects on pilots. Demonstrates the accelerometer and the centrifuge. Shows various tests performed to determine the effects of G upon pilots. Explains the basic principles of the flying suit and shows how it is fitted to the pilot.

5,570

U.S. Navy 1945 ACCELERATION: INFORMATION ON AND CENTRIFUGE INDOCTRINATION OF FLIGHT SURGEONS. (Navy Dept., Naval Air Station, San Diego, Calif.) 22 October 1945

5,571

U.S. Navy Dept. June 1946 SPECIFICATION FOR HUMAN CENTRIFUGE DEVICE 9-G-1. (Navy Dept., Office of Research & Inventions, Special Devices Division)

5,572

U.S. Navy 1947 TISSUE DEFORMATION IN AIRCRAFT CRASHES.
(Division of Aviation Medicine)
Navy Department Bumed News Letter, Aviation Supplement 9(1):
December 1947.

5,573

U.S. Navy 1949 NAVAL ORDNANCE LABORATORY DROP TESTER (40) XD-1A, DESIGN, CONSTRUCTION AND CALIBRATION OF (PROJECT NOL-26-Re2b-281-3)
(Naval Ordnance Laboratory, White Oak, Silver Spring, Maryland)
Naval Ordnance Lab. Memorandum 10292, ASTIA AD-103435, 14 June 1949

ABSTRACT: A 40 ft guided drop tester has been constructed and installed in the White Oak explosive test area, where it is designated as Building 320

The drop tester provides a facility for applying reproducible shock patterns characterized by peak accelerations up to 30,000 g and velocity changes

up to 75 feet per second. The primary application of the drop facility is for conducting safety tests on unarmed, live-loaded fuzes.

This report describes the drop tester and its operation, presents calibration data and reviews the basic design considerations. The personnel who contributed to its development are listed.

5,574

U.S. Navy 1950 BIBLIOGRAPHY OF HUMAN ENGINEERING REPORTS. (REVISED) (US Office of Naval Research, Special Devices Center, Port Washington, N.Y.) Library of Congress PB 103234

5,575

U.S. Navy 1950 A SYMPOSIUM: PSYCHOPHYSIOLOGICAL FACTORS IN SPATIAL ORIENTATION (School of Aviation Medicine, Pensacola, Fla.) 30-31 Oct. 1950. ASTIA ATI 178 831

5,576

U.S. Navy 1951 INVESTIGATION OF HUMAN TOLERANCE TO COMBINED ACCELERATIONS (U.S. Naval Air Development Center, Philadelphia, Pa.)

5,577

U.S. Navy 1954 SUMMARIES OF RESEARCH. (Naval Medical Research Institute, National Naval Medical Center, Bethesda, Maryland) 1 January - 30 June 1954, ASTIA AD-46495

ABSTRACT: These summaries cover the research reported upon during the first six months of 1954. A series of Lectures and Reviews are referred to only by title. In order to facilitate distribution, classified studies are not included.

5,578

U.S. Navy 1956 THIRD SUPERSONIC TRACK SYMPOSIUM PROGRAM, CHINA LAKE, CALIFORNIA, 24-27 SEPTEMBER 1956.

5,579

U.S. Navy 1957 EXPERIMENTAL INVESTIGATION OF THE PRESSURE DISTRIBUTION ON AXI- SYMMETRIC FLAT-FACE CONE-TYPE BODIES AT SUPERSONIC AND HYPERSONIC SPEEDS. (U.S. Naval Ordnance Lab., White Oak, Maryland) Navord Report 5659, ASTIA AD-156190, 1 October 1957

ABSTRACT: An extensive systematic experimental investigation of the pressure distribution on blunt body shapes at supersonic and hypersonic speeds is in progress. The results obtained from the initial phase of this investigation are given. The experimental wind tunnel results are for six variations on a general truncated cone-type body shape. The data cover a Mach number range from about 1.75 to 8.00 for bodies with 2-inch and 5-inch base diameters. Also included are typical schlieren and shadow photographs obtained for a number of the body shapes. In addition, shadow graphs and aerodynamic drag data were obtained for a single configuration in the Pressurized Range.

5,580

U.S. Navy Department 1960 PROGRESS REPORT ABSTRACTS (Physiology Branch, Office of Naval Research) ONR Rept. ACR-45, Jan. 1960.

ABSTRACT: This publication consists of a collection of 77 short progress reports prepared by the investigators sponsored by the physiology Branch of the Office of Naval Research. It is designed to meet a need for reciprocal exchange of conveniently summarized research data among these investigators. Subjects covered may fall under one of more of the following generalized topics.

(1) Nerve and muscle function, (2) regulatory systems and functions, (3) physical factors in biological systems, (4) aviation physiology, (5) underwater physiology, (6) physiological problems of climatic strewses, and (7) adjustments to operational hazards.

5,581

U.S. Navy 1960 DETERMINATION OF TEST INSTRUMENTATION REQUIREMENTS FOR BIOLOGICAL AIRBORNE AND ASTRONAUTICAL TESTS; REQUEST FOR (Air Crew Equipment Lab., Naval Air Material Center, Pa.) Letter Report. Project TED no. NAM AE-1403.1, Rept. no. 2137 28 March 1960. ASTIA AD 234 091

ABSTRACT: A description of electrodes suitable for obtaining ECG records when worn under protective clothing during prolonged exposures in adverse environmental conditions has been given. The manner in which these electrodes were applied to the surface of the body was also indicated. The electrodes were found to give clinically acceptable ECG recordings during tests lasting over 12 hr. During this time, subjects dressed as shown in enclosure (5) were exposed to very warm and humid environmental conditions.

After wearing these electrodes for 46 hr, a subject having fair, thin skin showed no skin changes other than a moderate reddening at the areas of contact. After removing the electrodes, these reddened areas disappeared within 6 hr. In no case, when these electrodes were used, did any of the subjects report discomfort arising from the electrodes or the lead wires. (Author)

5,582

U.S. Navy 1961 MOTION PICTURES, SCENE DESCRIPTIONS AND SAFETY PROCEDURES OF NAVY CENTRIFUGE SIMULATIONS OF THE X-15 RESEARCH AIRCRAFT. (Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.) Progress Rept. NADC-MA L6126, 26 July 1961. ASTIA AD 271 927

5,583

U.S. Office of Naval Research 1946 MONTHLY REPORT OF THE SPECIAL DEVICES CENTER DECEMBER 1946
Office of Naval Research, Special Devices Center, Port Washington, L.I., N.Y. ASTIA ATI 28590

ABSTRACT: Synthetic training devices, teaching aids, human engineering, tactical evaluators, research tools, and training methods are the fields for which special devices have been developed. In order to familiarize the operator with his duties new training techniques include assessing dry aircraft rocket and bombing runs, remote scoring target, projector smoke generator, coordination of navigation devices, and contact-flight simulator. A discussion is given of the pilot ejection seat which is necessary for escape from high-speed aircraft. New developments in sighting for aircraft and anti-aircraft gun systems are automatic sighting systems combining radar information, a gyro unit, a computer, and servos. It is suggested that television be used for mass training of personnel which is an important factor in emergencies.

5,584

US Office of Naval Research 1954 BIBLIOGRAPHY OF UNCLASSIFIED RESEARCH REPORTS (PSYCHOLOGICAL RESEARCH)
(US Office of Naval Research, Psychological Sciences Div.)
Library of Congress PB 116382

5,585

U.S. Office of Naval Research 1954 BIBLIOGRAPHY ON RESEARCH REPORTS (PSYCHOLOGICAL) JANUARY 1947 - January 1954
(US Office of Naval Research, Physiological Psychology Branch)
Library of Congress PB 116303

5,586

US Office of Naval Research 1956 BIBLIOGRAPHY OF HUMAN ENGINEERING REPORTS. (US Office of Naval Research, Special Devices Center, Port Washington, N.Y.) OTS PB 121452

5,587

U. S. Office of Naval Research 1956 BIBLIOGRAPHY ON MOTION SICKNESS. (Office of Naval Research, Physiological Psychology Branch, Psychological Sciences Division, Washington, D. C., Joint Services Committee for the Study of Motion Sickness) Rept. No. 2; ONR Rept. No. ACR-3; ASTIA AD103 549

ABSTRACT: A title bibliography containing selected references pertinent to an evaluation of the protective effects of drugs in motion sickness is presented. The references represent the literature which appeared up to and through the year 1954.

5,588

Office of Naval Research 1961 SYMPOSIUM PROCEEDINGS STRUCTURAL DYNAMICS OF HIGH SPEED FLIGHT LOS ANGELES, CALIFORNIA -APRIL 24,25, 26, 1961 (Office of Naval Research, Washington, D.C.) Rept. no. CR-62, ASTIA AD-264 140

CONTENTS: Concepts for aeroelastic system approximations; static aerodynamics for flutter analyses; flutter at high mach numbers; an indicial flutter analysis for hypersonic delta wings; a theory for aeroelastic studies of delta lifting surfaces; flutter of flat panels in a low supersonic flow; flutter of rectangular panels; model flight testing on high-speed tracks; liquid behavior in rocket propellant tanks; dynamics of LP vehicles; aero-inertial control system; dynamic loads of missile configurations; wind loads on a vertically rising vehicle; random gust and taxi response calculations for delta wing aircraft; blast-loading on airfoils; stall buffeting loads; a method for analyzing heated wings; deformational response of heated wing structures; thermal stiffness; acoustic fatigue tests for elevated temperatures structural design; structural vibration in space vehicles; structural response to noise inputs; captive missile response to random pressures; structural response to the noise input of the Saturn engines; the environmental vibration problem.

5,589

Public Health Service 1958 BIBLIOGRAPHY OF SPACE MEDICINE (Public Health Service, Washington, D.C.) Publication no. 617 (Bibliography series 21), 1958, 49 pp.

ABSTRACT: This bibliography contains references on ac eleration, deceleration, and partial and zero gravity.

5,590

U. S. Quartermaster Research & Engineering Command 1960 AIR DELIVERY ENGINEERING STUDY, M-831, AIRBORNE DITCHER. (Quartermaster Field Evaluation Agency, U. S. Army Quartermaster Research & Engineering Command, Fort Lee, Va.) Technical Rept. E-51; FEA ABN 5937; Sept. 1960

ABSTRACT: An air delivery engineering test was conducted to determine the structural adequacy of the M-831 Airborne Ditcher for air delivery. Both static and airdrop tests were made to obtain the necessary data required for evaluation. Standard air delivery equipment was used wherever possible.
The air delivery system was designed for an impact velocity of 25 feet per second and an impact deceleration not to exceed 20 g's or a damage susceptibility factor of 20.
Four instrumented static drop tests were performed at the FEA's Static Drop Facility from a height of 8 feet to determine a suitable energy dissipating unit. The results of static drop tests gave an average impact load factor of 17.9 g's.
Five airdrop tests were made on the FEA's Tracking Range from a C-130 aircraft flying at an indicated airspeed of 130 knots and an absolute altitude of 1,500 feet. The gross weight of the system, rigged for air delivery, was 20,600 pounds. A 24-foot fist ribbon cargo extraction parachute was used for extraction and 6 G-11A cargo parachutes were used for retardation. The extraction force varied between 17,000 and 19,500 pounds and the average opening force for each of the 6 G-11A cargo parachutes was 2.23 g's. The results of the airdrop tests gave the average equilibrium rate of descent, w_{eq}, as 21.7 feet per second.
It was concluded that the test item is functionally suitable for air delivery providing the test item is modified to include (1) 4 suspension points, (2) 4 load-bearing plates attached to the basic frame, and (3) installation of a permanent brace to secure the discharge conveyor assembly.
It was recommended that the M-831 Airborne Ditcher be submitted to the appropriate agencies for air delivery service test when the proposed modifications are accomplished. (Abstract Bibliography Technical Reports Published Fiscal Year 1961, Quartermaster Research & Engineering, Airborne Test Activity, Yuma Test Station, Arizona, ASTIA AD-262 197, Aug. 1961)

5,591

U. S. Quartermaster Research & Engineering Command 1961 AIR DELIVERY ENGINEERING STUDY OF TRANSPORTER, LIQUID, ROLLING WHEEL TYPE, 600-GALLON, T-4 (Quartermaster Airborne Test Activity, Quartermaster Research & Engineering Command, U. S. Army, Yuma Test Station, Arizona) Technical Rept. E-59; ATA 61014; March 1961

ABSTRACT: An air delivery engineering study was conducted to determine the structural adequacy of the Transporter, Liquid, Rolling Wheel Type, 600-Gallon, T-4, for low velocity type air delivery; to design a low velocity air delivery system for use with U. S. Air Force aircraft, utilizing standard air delivery components wherever possible; and to determine if the air delivery system is functionally suitable to submit to the appropriate agencies for service test.
A series of static drop tests were conducted to determine the structural adequacy

of the test item when dropped using standard air type equipment and paperboard honeycomb energy dissipating material. The air delivery system was designed for an impact velocity of 25 feet per second and an impact deceleration of 20 g's. A series of airdrop tests were conducted to determine the functional suitability of the air delivery system. These tests were conducted from a C-130 cargo aircraft flying at 130 knots indicated airspeed and 1500 feet absolute altitude. The gross weight of the CEP system, prepared for air delivery, was 8700 pounds. A 22-foot cargo extraction parachute was used for extraction and three G-11A cargo parachutes were used for load retardation.
It was concluded that the test item was structurally adequate for air delivery and the proposed air delivery system was functionally suitable for air delivery and recommended that the air delivery system be submitted to the appropriate agencies for service test. (Abstract Bibliography Technical Reports Published Fiscal Year 1961, Quartermaster Research & Engineering, Airborne Test Activity, Yuma Test Station, Arizona, ASTIA AD-262 197; Aug. 1961)

5,592

U. S. Quartermaster Research & Engineering Command 1961 ABSTRACT BIBLIOGRAPHY TECHNICAL REPORTS PUBLISHED FISCAL YEAR 1961 (Quartermaster Research & Engineering, Airborne Test Activity, Yuma Test Station, Arizona) ASTIA AD-262 197; Aug. 1961

5,593

U.S. Select Committee on Astronautics and Space Explorations. 1959 SPACE HANDBOOK: ASTRONAUTICS AND ITS APPLICATIONS. (85th Congress, Second session Washington, 1959)

5,594

U.S. Senate 1958 ASTRONAUTICS AND SPACE EXPLORATION
(Hearings before the House Select Committee on Astronautics and Space Exploration, 85th Congress, 2nd Session, on HR 11881, Washington: GPO)

ABSTRACT: Testimony by many of the nation's leading space scientists in April-May 1958 prior to the enactment of legislation creating NASA. Volume is a valuable source book covering such aspects of space as law, medicine, vehicles, and research, and such projects as Vanguard and the IGY.

5,595

U.S. War Dept. 1943 PHYSIOLOGICAL ASPECTS OF FLYING
TM 1-705, (Washington: U.S. Government Printing Office, 1943)

ABSTRACT: Paragraph 55. Effects of centrifugal forces: (p) loss or blackout of

vision as it occurs in making a sudden change in direction at high speed: The visual mechanism being peculiarly sensitive to lack of oxygen or blood-flow, fails to function under the above conditions, and when 6 G's are reached, a dark curtain usually flashes over the sense of vision causing the blackout, the effect being in proportion to the force and time endured. At high forces even short periods of time are sufficient to produce loss of vision.

5,596

U.S. Work Projects Administration 1941 BIBLIOGRAPHY OF AERONAUTICS, SUPPLEMENT TO PART 48- PARACHUTES: PART 49- ROCKET PROPULSION: PART 50- STRATOSPHERIC FLIGHT
(U. S. Work Projects Administration, New York, New York) Compiled from the Index of Aeronautics of the Institute of the Aeronautical Sciences. 47p., March 1941

ABSTRACT: Includes articles, books and pamphlets bringing up-to-date the original parts of the bibliography. The latter were not accessible for review.

ACCELERATION

V

5,597

Vacca, C. and L. Vacca 1960 MODIFICATIONS OF THE ELECTROCARDIOGRAM IN ALBINO RATS SUBJECTED TO TANGENTIAL (TRANSVERSE) ACCELERATIONS BEFORE AND AFTER SPLENECTOMY. I.
In Riv. Med. Aero. 23:347-367, July-Sept. 1960 (Italy)

5,598

Vacca, C., P. De Franciscis, & L. Vacca 1961 VARIAZIONI DELL'ECG IN RATTI ALBINI SPLENECTOMIZZATI A VARIA DISTANZA DI TEMPO ED IN TOPI CON AGENESIA DELLA MILZA, TRATTATI CON OMOGENATO TOTALE DI MILZA E SOTTOPOSTI AD ACCELERAZIONI TANGENZIALI (TRANSVERSALI) II. (ELECTROCARDIOGRAPHIC VARIATIONS IN ALBINO RATS SPLENECTOMIZED AT VARIOUS TIME INTERVALS AND IN MICE WITH SPLENIC AGENESIS TREATED WITH TOTAL SPLENIC HOMOGENATES AND SUBJECTED TO TANGENTIAL (TRANSVERSE) ACCELERATIONS. II. Rivista di medicina aeronautica e spaziale (Roma) 24(4):501-532, Oct.-Dec. 1961

ABSTRACT: Dramatic electrocardiographic (ECG) alterations were observed in rats newly splenectomized (from 5 and 45 days), splenectomized about one year previously, and in mice with splenic agenesis who were subjected to transverse accelerations of 3 and 6 g for 2-3 minutes, and 10 g for 2 minutes. The time required for return of ECG patterns at rest to normal after accelerations in rats splenectomized for 1 year (about 20-25 minutes) was equal to that of animals newly splenectomized. Intraperitoneal injection of bovine splenic homogenate 45 minutes before exposure to acceleration restored the normal ECG at rest in less time (10-12 minutes in newly splenectomized animals and 5-7 minutes in those splenectomized from 6 months on). Mice with splenic agenesis behaved similar to animals splenectomized from 6 months to 1 year. It is postulated that a functional relationship exists between the spleen and the heart under conditions of stress. The injection of splenic homogenate may have a remarkable effect on heart disorders produced by transverse acceleration because it reduces the time necessary to restore a normal resting ECG to half.

5,599

Vacca, C. & C. Koch 1962 INFLUENCE OF VASOSENSORY REFLEXOGENIC AREAS ON VESTIBULAR FUNCTION IN THE RABBIT SUBJECTED TO HIGH TRANSVERSE ACCELERATIONS. Riv. Med. Aero. 25:641-652, Oct.-Dec. 1962 (It)

5,600

Vacca, C., & L. Vacca 1962 EKGRAPHIC MODIFICATIONS IN ALBINO RATS DURING TANGENTIAL ACCELERATIONS BEFORE AND AFTER SPLENECTOMY (PRELIMINARY COMMUNICATION) In Barbour, A. B., & H. E. Whittingham, eds., Human Problems of Supersonic and Hypersonic Flight (New York, Oxford, London, Paris: Pergamon Press, 1962) pp. 170-185

5,601

Vaeth, J.G. 1952 ESCAPE FROM EARTH Flying 51:26-27

ABSTRACT: A scientist at the US Navy Special Devices Center, Office of Naval Research, discusses the problems involved in escaping from the earth's gravitational pull.

5,602

Valentine, G. 1956 DYNAMIC ANALYSIS-EMERGENCY ESCAPE SYSTEMS. (Stanley Aviation Corp., Denver, Colorado) Document No. 451; Contract AF 33(600)32054; ASTIA AD-115 879; 13 July 1956

ABSTRACT: This report presents an appraisal of twelve configurations of emergency escape devices. They are: (1) Upward seat, forward facing; (2) Upward seat, forward facing with added mass; (3) Downward seat, forward facing; (4) Downward seat, forward facing with added mass; (5) Seat-capsule, forward facing; (6) Seat-capsule, forward facing with added mass; (7) Upward seat aft facing, (8) Upward seat aft facing with added mass; (9) Downward seat aft facing; (10) Downward seat aft facing with added mass; (11) Seat capsule, aft facing; and (12) Seat capsule, aft facing with added mass. The following characteristics of the more promising of these configurations were determined for ejection at 650 knots EAS at sea level and 44000 feet altitude: (1) Trajectory to tail. (2) Spinal and cross-body accelerations vs. time. (3) Pitching acceleration, velocity and altitude vs. time. Also determined were thruster requirements for upward ejection at maximum q and minimum airspeed and low altitude escape limitations for critical configurations.

5,603

Valentine, G. A. 1958 Proposal - ENCAPSULATED SEAT (Stanley Aviation Corporation, Denver, Colo.) Document No. 645.

ABSTRACT: Presented herein is the Stanley Aviation design proposal for an emergency escape system capable of functioning successfully at speed and altitude regimes compatible with the Convair-Fort Worth B-58 airplane.

5,604

Valentine, G.A. 1960 HUMAN FACTOR CONSIDERATIONS IN THE DESIGN OF THE B-58 ESCAPE CAPSULE. (Paper, 31st Annual Meeting of the Aerospace Medical Assoc., Americana Hotel, Bal Harbour, Miami Beach, Fla., May 19-11, 1960)

ABSTRACT: The Convair B-58 will be equipped with an escape capsule in each cockpit. The escape capsule is designed to provide protection in case of cockpit decompression at altitude, permit emergency egress throughout the speed and altitude range of the B-58, and serve as an aid to survival on either water or land under any climatic condition. In the event that cockpit pressurization is lost, the B-58 pilot and crew members can actuate handles which initiate the following series of actions: torso and leg positioning, capsule door closure, and capsule pressurization. The pilot's capsule permits the pilot to fly the aircraft being encapsulated. Thus, the aircraft can be flown to an altitude where pressurization is not required. Capsule ejection is initiated by the aircraft crew using either or both of the two ejection triggers. The capsule doors provide protection against windblast as the capsule enters the airstream. Careful rocket catapult design and good stability, provided by a stabilization parachute, hold accelerations within human tolerance limits. The stabilization equipment is jettisoned as the recovery parachute is deployed. Landing accelerations are minimized through the use of an impact attenuating air bag. Automatically inflated flotation cells on outriggers are used to provide buoyancy and stability when the capsule lands on water. Critical survival equipment is accessible to the capsule occupant with the doors closed. A complete set of Strategic Air Command survival equipment is provided in each capsule and is readily accessible with the capsule doors opened.

5,605

Valentine, G. A. 1962 HUMAN FACTORS CONSIDERATIONS IN THE DESIGN OF THE B-58 ESCAPE CAPSULE. In Barbour, A. B., & H. E. Whittingham, eds., Human Problems of Supersonic and Hypersonic Flight (New York, Oxford, London, Paris: Pergamon Press, 1962) pp. 286-294

5,606

van Allen, J. A. 1952 THE ANGULAR MOTION OF HIGH-ALTITUDE ROCKETS In White, C. S., & O. O. Benson,Jr., eds., Physics and Medicine of the Upper Atmosphere, A Study of the Aeropause (Albuquerque, N. Mex.: Univ. of New Mexico Press, 1952) pp. 412-431.

5,607

van Allen, J. A. 1952 METHODS AND VEHICLES FOR RESEARCH IN THE HIGH ATMOSPHERE. In White, C. S., & O. O. Benson, Jr., eds., Physics and Medicine of the Upper Atmosphere, A Study of the Aeropause pp. 394

5,608

van de Water, M. 1942-43. PULLING OUT OF FAST DIVES Chem. Leaflet 16:1135-1138.

ABSTRACT: The fastest power dive does not hurt the pilot; the trouble comes when he has to pull out of it quickly. A sudden stop, abrupt change in speed, or a rapid alteration of direction, especially in loops, if a curve is made at too great a speed or in too sharp a turn, have a pronounced ill effect on the pilot.

A normal aviator can stand 4.5 to 5.5 G's for 3 to 4 seconds without ill effects. A radius of 1,500 feet is required, to keep the acceleration below 5 G's.

The eyes are particularly affected by failure of circulation in the head. First they seem covered by a gray haze. If the high strain is maintained, abruptly everything goes black. Experienced fliers get used to blacking out. "Negative gravities" of from seat-to-head forces cause a "redding out". Low negative G's minus 3 or 4 may produce very serious conditions.

5,609

van der Wal, F. L. and W. D. Young 1958 A PRELIMINARY EXPERIMENT WITH RECOVERABLE BIOLOGICAL PAYLOADS IN BALLISTIC ROCKETS. PROJECT MIA (Space Technology Laboratories, Inc., Redondo Beach, Calif.) GM-TR-0165-00498, STL reprint no. 298, Sept. 1958

ABSTRACT: Mice carried in the nose cone of long-range ballistic missiles have successfully survived re-entry into the atmosphere. In most aspects, the environmental conditions experienced by these subjects exceeded in severity those which will be imposed on satellite passengers. Although no new technique were used, this program represents a significant step forward from the early pioneering flights of mice and monkeys in relatively low-performance sounding rockets. The relative success of these experiments permits a considerable degree of confidence in the ultimate successful recovery of biological payloads from future satellite vehicles.

The project, known as Project MIA (Mouse-In-Able), was planned as a noninterference experiment in conjunction with the Project Able re-entry test program. In each of the three Able flights, one mouse was carried in the nose cone. Although none of the nose cones was recovered, telemetered physiological records were obtained on the second and third Able flights.
Preparation for the flights included planning of the program, designing and fabricating of the MIA package, developing of instrumentation (including the technique of sensor implantation in the animal and signal amplification), testing of the assemble unit (including the mouse) for duration and ability to withstand environmental conditions anticipated in the flight profile, and providing equipment and instruction to personnel aboard the recovery ships to assure obtaining maximum experimental data. Thsi prepatory work was accomplished and the first flight occurred within one month after official authorization.

This report includes a detailed description of the physical system, and the preliminary tests and flight preparations, the instrumentation used in flight, and the resulting signal pattern. The special problems associated with the use of living payloads in space-flight vehicles are also discussed.

5,610

van der Wal, F. L., & W. D. Young 1959 PROJECT MIA (MOUSE-IN-ABLE), EXPERIMENTS ON PHYSIOLOGICAL RESPONSE TO SPACEFLIGHT. J. American Rocket Society 29:716-720, Oct. 1959.

ABSTRACT: This project was planned as a noninterference experiment in conjunction with the Project Able reentry test program employing as the launching vehicle a 2-stage missile consisting of the Douglas Thor IREM and The Aerojet 1040 liquid propellant rocket. Three Able vehicles were flown: 4/23,7/9, and 7/23/58. Each carried a mouse. Although none of the nose cones was recovered, telemetered physiological records (heart rate) were obtained on the second (for mouse Laska) and third (for mouse Benji) flights. The amount and nature of the data available were extremely limited, and therefore no generalized conclusions regarding the behavior of space mice could be drawn. Among the observations were the following: (1) Take-off conditions were not severe enough to produce any evidence of violent or continuing response from the mice. (2) The acceleration loads during burning were essentially paralleled by Laska's heart rate, though this characteristic was not displayed by Benji under similar load conditions. (3) The observed decrease in Laska's heart rate at first-stage burnout was gradual; at second-stage burnout it was sharp. This is in opposition to the heart-rate behavior reported for Laika, the Russian satellite dog. No trend was detected in Benji's heart rate at first-stage burnout, but a distinct increase to slightly above his preflight reading was apparent at the beginning of weightlessness. (4) Since both mice flew to a maximum altitude of 1400 statute miles (as compared with Laika's apogee of 1050 miles), they returned to earth from a higher altitude than that reached by any other living organism. (5) Laska, and probably Benji, returned to sea level alive after experiencing reentry conditions approaching those associated with satellite reentry. (6) No evidence of distress due to weightlessness was noted in either flight. The mice were weightless for longer periods than any animal other than Laika. (7) There is every reason to believe that both Laska and Benji would have been recovered alive after their flights if the nose cones had been retrieved. The report includes a description of the physical system, the preliminary tests, development of the instrumentation used in flight, and the resulting signal pattern. The special problems associated with the use of living payloads in space-flight vehicles are discussed.

5,611

van Egmond, A. A. J., J. J. Groen, & L. B. W. Jongkees 1949 THE MECHANICS OF THE SEMICIRCULAR CANAL. J. Physiol. 110:1-17.

5,612

van Egmond, A. A. K., J. J. Groen, and L. B. W. Jongkees 1952 THE FUNCTION OF THE VESTIBULAR ORGAN (S. Karger, Basel, Switzerland)

5,613

van Liere, E.J. 1957 SPACE MEDICINE
West Virginia Med. J. 53(8): 297-301 Aug. 1957

ABSTRACT: An outline is made of some of the physiologic problems encountered in space flight, including those arising from accelerations, weightlessness, rapid decompression, and hypoxia. As a result of such flights physicians will have to treat such things as radiation sickness, ultraviolet and thermal burns, cosmic ray damage, sterility, accidents due to meteors, and fractures sustained by assuming incorrect position when acceleration begins. Mention is made of the emotional strain and physical and mental fatigue which are conduc[illegible] to bringing about neuroses in spacemen.

5,614

Van Middlesworth, L., and S.W. Britton 1946 PROTECTION AGAINST ACCELERATORY FORCES BY CO_2 INHALATION Federation Proceedings 5:107

ABSTRACT: Increased tolerance to positive acceleratory forces has been demon[illegible]ated with monkeys, cats, and dogs which inhaled CO_2/O_2 mixtures before and during acceleration. Brachial arterial pressure, EKG, and EEG were continuously rec[illegible]d in more than 200 exposures of 30 animals. 13-20% CO_2 in O_2 administered (at [illegible] level) to monkeys for 18-180 seconds, or to dogs 50-180 seconds, prevented ab[illegible] 40% of the blood pressure changes ordinarily observed at 4 "g" per 10-second exposure. When this mixture was inhaled for more than 300-400 seconds the be[illegible]ficial effect was lost.

5,615

van Middlesworth, L., & R. F. Kline 1948 PROTECTION AGAINST ACCELERATORY FORCES BY CARBON DIOXIDE INHALATION. Am. J. Physiol., 152:22-6.

5,616

van Rossum, J. W. M. 1962 BIBLIOGRAPHY ON BLAST, SHOCK WAVES AND ALLIED TOPICS, FEATURING NUCLEAR EXPLOSIONS (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht (Netherlands).

ABSTRACT: Entries include references to reports pertaining to characteristics of nuclear explosions - air burst, ground burst and underwater burst - together with the response of structures to blast loading. Attention is paid to measurements, experimental techniques and testing equipment. Many of the references in this report bear only a marginal relationship with the subject mentioned, but their findings are of interest as adding to the over-all picture. This bibliography is divided in main headings each with several subheadings. The use of some topics as subdivisions of other topics has been indicated by cross references. References have been arranged chronologically with the latest references placed first. An author index is provided. (Author)

5,617

van Woerden, J. 1959 LITERATUUROVERZICHT (OVER RUIMTEVAARTGENEESKUNKE) (SPACE MEDICINE BIBLIOGRAPHY) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Report No. TDCK-16903; ASTIA AD-227 817; Feb. 1959

ABSTRACT: This bibliography contains summaries of reports and articles on space medicine, compiled from the abstract - cards indexes of the Netherlands Armed Services Technical Documentation and Information Center.

SECOND ABSTRACT: This bibliography contains one hundred eight abstracts on space medicine compiled from reports and articles at the Netherlands Armed Service Technical Documentation and Information Centre. Most of the abstracts are in English, but some are in German or Dutch. The bibliography covers the field of space medicine from biological and physiological problems to psychological variables.

5,618

van Woerden, J. 1959 UNITERMS: SPACE FLIGHT MEDICINE (Netherlands Armed Services Technical Documentation and Information Centre, Den Haag, The Netherlands) UDC: 613.693:629.19, TDCK 16903, Feb. 1959.

ABSTRACT: This bibliography on space medicine contains summaries of reports and articles compiled from the abstract card indices of the Netherlands Armed Services Technical Documentation and Information Centre. Some of the reports are available on loan from the Centre. The index indicates wide coverage of factors related to space travel from biological and physiological to psychological variables; design of vehicles and suits, radiological problems of space flight, etc. One hundred eight abstracts are included. A majority are in English, but some are in German or Dutch.

5,619

Van Wulfften-Palthe, P. M. 1922 FUNCTION OF THE DEEPER SENSIBILITY AND OF THE VESTIBULAR ORGANS IN FLYING. Acta oto-laryng 4:415.

5,620

Varene, P. & C. Jacquemin 1961 DOES AN OBSTRUCTIVE RESPIRATORY SYNDROME DURING TRANSVERSE ACCELERATION EXIST?
Rev. Med. Aero (Paris) 2:51-54, Dec. 1961 (Fr)

5,621

Varene, P. and C. Jaczuemin 1961 BRONCHIAL RESISTANCE DURING TRANSVERSE ACCELERATIONS
In C. R. Acad. Sci. (Paris) 252:3652-3654, June 5, 1961 (France)

5,622

Vary, V. V. Oct. 1958 UNITED STATES AIR FORCE DEVELOPMENT OF AIRCRAFT ARRESTING GEAR. ASTIA AD 227 468. (Presented at the Thirteenth Meeting of the Flight Test Panel, held from 21st to 25th Oct, 1958, in Copenhagen, Denmark)

SUMMARY: For many years Navy airplanes have required arresting gear and catapults for carrier operation. This has meant a considerable weight penalty to the airplane structure, which has had to be designed to withstand horizontal arresting accelerations up to 6 g and also large vertical accelerations due to the relatively high vertical speed of contact with the deck. A relatively low stalling speed--to keep within required launching and arresting energies--has been another penalty. Land based Air Force airplanes have, until recently, gone in for longer runways and,consequently, can operate at greater loads and speeds. This makes the design of arresting gear for Air Force Airplanes much more difficult than for the short-stroke, high-g Navy airplane. This report describes the United States Air Force Arresting Gear Program and discusses various devices by which engagement can be effected and the airplane successfully arrested. At the present time, emergency arrestment only is the USAF goal, but the future for normal routine operational arrestment is also discussed.

5,623

Vasilevskii, V. & Yu. Fedotov 1963 MEDICINE AND THE COSMOS
(Joint Publications Research Service, Washington, D.C.)
Trans. of Molodoi Kommunist (USSR) 20(12):45-50, 1962.
3 April 1963. ASTIA AD 408 243

5,624

Vasil'yev, G. 1959 KABINA KOSMICHESKEY RAKETY (Cabin of a Space Rocket)
Sovet. Aviat. (USSR) p. 4, 12 Sept. 1959.
(Air Technical Intelligence Ctr., Wright-Patterson AFB, Ohio)
Rept. No. ATIC-1256225, 22 Oct. 1959.

ABSTRACT: The use of Tsiolkevskii's chamber, filled with water, in place of the usual cabin by pilots of fighter planes and by astronauts is suggested by the author as a means for counteracting the effects of great g-force exerted on the human body during certain maneuvers.

5,625

Vaughan, V.L., Jr. 1959 WATER-LANDING IMPACT ACCELERATIONS FOR THREE MODELS OF REENTRY CAPSULES. (Langley Research Center, Langley Field, Va.) NASA TN D-145, ASTIA AD 227296

ABSTRACT: Three conical models were tested to determine the rigid-body impact accelerations for nominal flightpaths angles of 90° and 65°, a range of contact attitudes of -30° to 30°, and a range of full-scale vertical contact velocity from 10 to 45 feet per second. Accelerations of the models at impact were measured along the X (roll) and Z (Yaw) axes.

5,626

Vaughan, Victor L., Jr. 1961 LANDING CHARACTERISTICS AND FLOTATION PROPERTIES OF A REENTRY CAPSULE. NASA TN D-653 ASTIA AD 251 188

ABSTRACT: An investigation has been conducted to determine the rigid-body impact accelerations of a reentry capsule during simulated parachute-supported landings on sand and on water. Tests were also made to determine the flotation properties of the capsule. Two 1/6-scale dynamically similar models, one a landing impact model and one a flotation model, were used in the investigation. Tests were made at a variety of flight paths to simulate the effect of surface winds that might act on the capsule during parachute letdown. A range of contact attitudes was investigated to simulate the attitude the capsule might have upon contact as a result of the capsule swinging under the parachute. Landing impact accelerations were measured along the X-axis (roll) and Z-axis (yaw) by accelerometers located at the center of gravity of the models. The maximum accelerations along the X-axis measured at the center of gravity were about 74g for sand landings and about 33g for water landings. The maximum onset rates of acceleration, also along the X-axis, were about 25,000g per second for sand landings and about 12,800g per second for water landings. Accelerations 2.05 feet in front and in back of the center of gravity for water landings varied as much as ±65 percent from those Z-axis were about 25g for sand landings and about 9g for water landings. The capsule with a dry interior was stable with center-of-gravity locations at 1.21 feet and 1.08 feet measured above the maximum diameter of the capsule. The capsule was unstable with a center-of-gravity location at 1.33 feet and would turn over on its side. The weight of a man and his survival equipment in the canister caused the capsule to turn over on its side for all center-of-gravity conditions tested.

5,627

Velasco do Pando, M. 1959 ARTIFICIAL SATELLITES AND INTERPLANETARY TRAVEL: PHYSIOLOGICAL EFFECTS OF CHANGE IN GRAVITY. A.M.A. Proceedings, April 1959.

ABSTRACT: This is the corrected and extended version of part of an analytical study (Sec. 13) on the launching of space rockets, which was published

in a previous issue of the same journal (52(1):11-61, 1958. An attempt is made of correlating mathematically basic physiological and physical parameters If j represents the effects of gravity experienced by a space traveler within the space vehicle ("sensible gravity"), the following formula applies:

$$j = \frac{d^2y}{dt^2} + \frac{ga^2}{(a+y)^2}$$

in which y is the altitude, t the time, g the gravitational acceleration on the surface of the earth, and a the terrestrial radius. In this formula the expression $\frac{d^2y}{dt^2}$ represents the effective vertical acceleration and $\frac{ga^2}{a+y}$ the effects of terrestrial acceleration at the altitude y. The validity of the formula is tested for the following conditions: (1) the vehicle rests on the terrestrial surface; (2) the vehicle travels unaccelerated at a given altitude (this being the case when the upward acceleration equals the weight of the vehicle) ; (3) the vehicle travels at a given altitude and at a given acceleration and (4) the vehicle travels through outer space with the rocket motor shut off (the occupants are in a state of weightlessness). In conclusion, the author derives optimal values for escape velocity and trajectory of the hypothetical space ship.

5,628

Venson, V.G., E.L. Beckman, K.R. Coburn & R.M. Chambers 1961 EFFECTS OF WEIGHTLESSNESS AS SIMULATED BY TOTAL BODY IMMERSION UPON HUMAN RESPONSE TO POSITIVE ACCELERATION. (Naval Air Development Center, Aviation Medical Acceleration Lab., Johnsville, Pa.) Rept. No. NADC-MA-6132, June 26, 1961, ASTIA AD 212 329. See Also Aerospace Med., 33(2):198-203, Feb. 1962.

ABSTRACT: Using underwater breathing equipment, twelve members of the Underwater Demolition Team No. 21 were completely immersed in water for eighteen hours. The subjects had no ill effects as a result of the immersion. Following immersion, their responses to positive acceleration were determined by observing the G level at which the limitation of ocular motility under acceleration (LOMA) occurred. This G level is approximately the same as when greyout occurs when subjects are exposed to positive acceleration. A small but significant decrease in the G level at which LOMA occurred was found following the period of immersion

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Verliac, F.A. 1940 CONNAISSANCES ACTUELLES SUR L'INFLUENCE DES ACCELERATIONS EN AVION SUR L'ORGANISME (Actual Understanding on the Influence of Aircraft Acceleration on the Body)
(These de Paris: Le Francois 1940 52 p.)

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Vigness, I. 1961 NAVY HIGH-IMPACT SHOCK MACHINES FOR LIGHTWEIGHT AND MEDIUMWEIGHT EQUIPMENT (Naval Research Laboratory) Report. 5618. June 1, 1961.

Descriptions are given of the Navy HI shock machines for lightweight and mediumweight equipment. Shock motions are given for standard loading conditions. These are illustrated by acceleration-, velocity, and displacement-time relations. Maximum values of velocities and displacements, and of accelerations passed by various low-mass filters, are presented. Shock spectra are presented for selected conditions. Equivalent displacement- and velocity-shock, together with maximum values of acceleration, can be established for their respective effective frequency ranges from observations of the shock spectra.

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Villela, A.A., W. Lins, Jr. & A. Lobao 1950 ACCELERATION AND VENOUS SYSTEM: NEW OCCUPATIONAL DISEASE
Arquivos Brasileiros de Cardiologia (Sao Paulo) 3: 295-312.

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Villetorte, P. 1961 SUMMARY OF DISCUSSION; IN THE CHAIR: MR. P. VILLETORTE
International Road Safety and Traffic Review 9:50

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Vinacke, W. E. 1946 THE CONCEPT OF AVIATOR'S "VERTIGO". (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-6001.1. 7., 8 May 1946

ABSTRACT: Research in an effort to clarify the kinds of disorientation characteristic of flying under various conditions, and to elucidate the effects of disorientation upon the pilot, and to clarify a term employed by pilots to describe these reactions.

5,634

Vinacke, W. E. 1946 "VERTIGO" AS EXPERIENCED BY NAVAL AVIATORS. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-6001. 1.12., 3 July 1946

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Vinacke, W.E. 1946 TYPES OF ILLUSIONS EXPERIENCED BY AIRCRAFT PILOTS Amer. Psychologist 1:282

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Vinacke, W. E. 1946 PREDICTING THE SUSCEPTIBILITY OF AVIATORS TO "VERTIGO". (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-6001. 1.10., 21 June 1946

5,637

Vinacke, W. E. 1947 ILLUSIONS EXPERIENCED BY AIRCRAFT PILOTS WHILE FLYING. J. Aviat. Med. 18(4):308-325.

SUMMARY & CONCLUSIONS: From case material on sixty-seven pilots, interviewed on the subject of "vertigo", seventy-seven instances of sensory illusions were selected by the author. An attempt was made to include all the different illusory phenomena reported by the pilots, where illusion is defined as a "mistaken perception." Five psychologists were asked to classify the seventy-seven items into meaningful categories. Agreement among the five classifiers was ascertained and names assigned to the general types of illusions represented by the items. Each of these is discussed in terms of the probable etiology involved and the effect of the illusion on the behavior of the pilot. The illusions reported in the study are of five general types which, in practice, are not always separable; namely, visual, non-visual, conflicting sensory cues, dissociational or recognitional, and emotional. Visual illusions include confusion of lights, splitting of lights (diplopia), autokinesis, depth perception, relative motion, and perspective illusions. There is also evidence that visual hallucinations occasionally occur. Non-visual illusions include failure to perceive rotation itself, or the after-effects of rotation, or both, false sensations, after-effects of rotation, and correct perception with wrong reference point. There may also occasionally be non-visual hallucinations. Illusions resulting from conflicting sensory cues may occur in the visual field, in the non-visual field, or in combinations of the two. Dissociational or recognitional illusions include phenomena of jamais vu, déjà vu, loss of sense of direction, and loss of the sense of time. General emotional disturbance is non-specific and results in generalized disorientation, including perceptual, rather than in specific illusions occurring in flight affords insight into the environment of the aviator, and the adjustment of the aviator to that environment. Adjustment to the flight environment has two aspects, erroneous response to environmental cues (such as illusions), and the psychological, or emotional and cognitive state of the aviator.

5,638

Violette, F., R. Sencla . & A. Loubiere 1959 EFFECTS OF WEAK AND PROLONGED ACCELE TIONS ON DOG KIDNEYS (EFFETS DES ACCÉLÉRATIONS DE FAIBLE VALEUR ET DUREE PROLONGEE SUR LE REIN DU CHIEN) J. Physiol. (Paris) 51(3):575-576, May-June 1959.

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Violette, Francois 1961 CENTRIFUGES IN FRANCE: PAST AND PRESENT RESULTS. ACCELERATION RESEARCH PROGRAM IN FRANCE. (Paper, Panel on Acceleration Stress of the Armed Forces-NRC Committee on Bio-Astronautics, 6-11 March 1961, NASA Ames Research Ctr., Moffett Field, Calif.)

5,640

Violette, F. 1961 FRENCH OBSERVATIONS AND RESEARCHES CONCERNING IMPACT OF CRASHES. (Presented at Impact Acceleration Symposium, Brooks AFB, 27-30, 1961)

ABSTRACT: Observations and research results of the French Air Force Medical Corps on impact and crash include the following: (1) For wounded patients that are carried with feet forward on longitudinally set stretchers, two straps are sufficient -- one on the base of the thorax, the other on the middle of the thighs. These straps, usually moderately tightened, must be sufficiently tightened in case of crash to prevent any slipping of the wounded on the stretcher. The restraint may be comfortized: (a) with stoppers placed on the arms of the stretchers, and (b) by broadening the straps (three inches or 7.5 cm). A release-pin system is recommended for quick strap release. (2) The telescopic ejection seat is superior to the ejection seats with solid axis guns. Also, the breaking-joint of the spine was about the seventh thoracic vertebra. In addition, a helmet chinstrap in high-speed ejection is both useless and dangerous. (3) In the emergency ditching of a helicopter, the impact shock on the cabin floor was not felt by the standing crew members; nevertheless, the pilot and copilot both received spinal fractures although well strapped. In such accidents the impact deceleration may be transmitted without softening from the floor to the seat and to the strapped subject.

5,641

Violette, F. 1962 FRENCH OBSERVATIONS AND RESEARCHES CONCERNING IMPACT AND CRASH
(In: Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, pp. 35-38)

ABSTRACT: Few researches have been accomplished in France concerning crash and impact problems because of the lack of finances to purchase the needed equipment. Private societies manufacturing cars and planes have also been kept back because of the prices of the devices, and until now just followed the progress of the researches completed in other countries, mostly in the United States.

French current medical literature concerning impact consists of general reviews and does not bring forth any new facts.

Problems concerning crash and impact have therefore been raised at the French air Medical Corps which tried to give them a solution. (1) The problem of contention of transported wounded personnel in the crash. (2) The problem of choice between ejection seat with full gun and with telescopic gun. (3) Casualties of the flying Personnel occurred during emergency crash or ditching of helicopter and contributed in putting forth a particular traumatology.

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Viteles, M. S., & O. Backstrom, Jr. 1943 AN ANALYSIS OF GRAPHIC RECORDS OF PILOT PERFORMANCE OBTAINED BY MEANS OF THE R-S RIDE RECORDER. (CAA Division of Research, Washington, D. C.) Rept. No. 23; Nov. 1943

ABSTRACT: R-S ride recorder records movement of aircraft in 3 dimensions. Useful for mapping "g" patterns of aerial maneuvers.

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Vladimirov, C. E. N. S. Sedina et. al. 1959 RESEARCH ON NEUROPHYSIOLOGY AT THE MILITARY MEDICAL ACADEMY IMENI S. M. KIROV
(Trans. of Tezisy Dokladov Nauchnoy Sesii, Voycnno-Meditsinskaya Ordena Lenina Akademiya imeni S. M. Kirova (These of Reports of the Scientific Session of the Miltary-Medical Order of Lenin Academu, imeni S. M. Kirov) Leningrad, P. 6-8, 31-32, 35-37, 46-48, and 54-55, Oct. 29-Nov. 2, 1956.
(Library of Congress, Washington, D.C.) 59-13369

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Vloynkin, Yu. M., V.I. Yazdovskiy et al. 1962 THE FIRST MANNED SPACE FLIGHTS (Pervyye Kosmicheskiye Polety Cheloveka)
Foreign Tech. Div., Air Force Systems Command, Wright-Patterscn AFB, Ohio
Trans. No. FTD-TT-62-1619 Dec. 7, 1962 ASTIA AD 294 537
Original Source: Mediko-Biologicheskiye Issledovaniya (Moskva)

ABSTRACT: Contents include material on the following subjects:
Training cosmonauts in controlling the ship
Life Support in space flight
Microclimatic conditions in a spaceship cabin
Food and water supply
Life support and recovery systems
Radiation protection
The biological effect of cosmic radiation in spaceships
Measures providing radiation safety on the flights of Gagarin and Titov
The protective properties of space suits
Emergency supply pack of the cosmonaut
Systems for landing the cosmonaut
Familiarization-training flights on aircraft under weightlessness conditions
Psychological investigations
Organization and method of carrying out physical training exercises
Results of the medical examination of the astronauts
Methods of physiological investigations and medical monitoring during spaceflight
The physiological reactions of the astronauts in flight

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Voas, R.B. 1961 PROJECT MERCURY ASTRONAUT TRAINING PROGRAM
In: The Training of Astronauts (National Academy of Sciences, National Research Council) Publication No. 873, Pp. 22-40

ABSTRACT: A general over-all outline of the training program is given. A brief discussion is presented of the astronaut selection program and basic considerations for the training program. Training in vehicle operation includes lectures, field trips, and study programs of the various capsule systems. Simulators for training in attitude control during orbit and retrofire, navigation, control of tumbling, environmental control of the cabin, and management of procedures are discussed. Training in various scientific disciplines is described along with the various lecture courses that each astronaut takes. Space flight conditions such as disorientation, weightlessness, reduced pressure, etc., are described and simulated for the astronauts. A physical fitness program for the trainees is discussed pertaining to weight control, breathing control, and general physical conditioning. Countdown procedures and ground communications are recovery-survival methods are part of ground activity training. Maintenance of flight skills as a method to maintain vigilant decision making is accomplished by regular flights in high-performance jet aircraft. The significance of this program on future space flight is discussed. (J. Aerospace Med. 33(11): 1403, Nov. 1962)

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Voas, R. B. 1961 PROJECT MERCURY: ASTRONAUT TRAINING PROGRAM. PHYSCOPHYSIOLOGICAL (Sic) ASPECTS OF SPACE FLIGHT. (Columbia Univ. Press) Pp. 96-116. Jan. 1961.

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Voas, R.B. 1963 TRAINING MAN FOR SPACE
Paper: Lectures in Aerospace Medicine, School of Aviation Medicine, Brooks AFB, Texas, 4-8 February 1963

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Vogel, P. 1931 ÜBER DIE BEDINGUNGEN DES OPTOKINETISCHEN SCHWINDELS (Concerning the Condition of the Optical Illusion)
Pflüg. Arch. ges. Physiol. (Berlin) 228: 510

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Vokhmyanin, P. 1936 RESULTS OF MEDICAL OBSERVATION OF A GROUP OF HIGH SPEED FLYERS
Voenno-sanitarnoe delo (Moscow) 11: 19-22

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Vollmecke, A. R. 1961 PROPOSAL FOR STUDY OF A DYNAMIC TESTING DEVICE FOR AIRCRAFT AND COMPONENTS (General Dynamics Corp., Convair Division, San Diego, Calif.) Rept. No. ZS-308; ASTIA AD-259 117; 20 June 1961

ABSTRACT: General Dynamics/Convair has, in the development of commercial aircraft, been actively engaged in a program of delethalization of cabins and seats under simulated crash conditions. Experience includes design and use of such energy devices as HYGE, rocket sleds, pendulum swings, electro-hydraulic and electropneumatic servo systems. Data systems associated with these test programs have also been designed, manufactured, installed and serviced by General Dynamics/Convair personnel. The proposal presented in this report defines system concepts based upon actual test experience. Emphasis is placed upon reliability and repeatability of testing to known input values of acceleration or deceleration. Practical engineering principles of size limitations, initial system cost, cost per test 'shot', time between consecutive 'shots", and ease of test parameter change are the basis for system concept choices.
A preliminary study by General Dynamics/Convair indicates that inherent advantages exist within two different and separate test concepts. The first is that of programming the specimen acceleration from rest-to-velocity; the second is to decelerate the moving specimen from velocity-to-rest. The g-forces that occur through either acceleration or deceleration are identical, so far as the specimen or its mere image is concerned. Any damage that takes place is the result of g-forces. If the forces are applied in a particular pattern, reach a particular magnitude, and extend through a particular time duration, it makes no difference whether they are created by an acceleration or a deceleration of the object under test, as long as the object is oriented correctly on the test machine. The test facility, therefore, in both cases would consist of an accelerator, a track-guided test vehicle (with a specimen receiver capable of acceleration in three coordinate directions), a decelerator and a data acquisition station.
General Dynamics/Convair proposes that the two test concepts as defined within this report be given consideration with choice of final system to be based upon thorough engineering evaluation.
(AUTHOR)

5,651

Volynkin, Yu. M., V.I. Yazdovskiy et al 1962 THE FIRST MANNED SPACE FLIGHTS (Translation Services Branch, Foreign Technology Division, Wright-Patterson AFB, Ohio) FTD-TT-62-1619/1+2 7 Dec. 1962 ASTIA AD 294 537

ABSTRACT: The radiation situation during Yu. A. Gagarin's and G.S. Titov's flights was favorable. The biotelemetric equipment installed on the space ships, operated reliably and secured registration of all physiological indices specified by the program. The increase in frequency of the pulse in the pre-launching period and in a portion of entry, connected with the inevitable emotional strain and acceleration and deceleration forces, was not accompanied by changes in the electrocardiogram and kinetocardiogram, going out the frame of the sinus tachycardia. The astronauts did not experience difficulties in eating and drinking. It was established that under conditions of weightlessness, the usual daily rhythm of sleep and wakefulness is not disturbed. Urination under conditions of weightlessness was done without difficulty. Dizziness, perspiration during weightlessness, were provoked by sharp movements of the head and observations of the moving surface of the earth in the illuminator.

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Volynkin, Yu. M. et al 1962 THE FIRST MANNED SPACE FLIGHTS
Trans. of mono. Pervye Kosmicheskie Polety Cheloveka, Moscow, 1962.
(Office of Technical Services, Washington, D.C.)
Dec. 7, 1972 63-15572

CONTENTS:
General problems of flight
The space ship "Vostok" as an object of control
Teaching (and training) cosmonauts in controlling the

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von Beckh, H.J.A. 1955 VELOCIDAD, ACCERACION, GRAVITACION.
Riv. nac. aeronaut. Sept. 1955.

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von Beckh, H. J. 1958 PHYSIOLOGY OF LAUNCHING AND RE-ENTRY STRESS IN RODENTS.
(Air Force Missile Development Center, Holloman AFB, N. Mex.) AFMDC TN 58-11
ASTIA AD 154 105, Aug. 1958.

Summary: Centrifuge runs with rodents, by several investigators are reviewed. It is concluded that accelerative forces per se would not endanger these animals in bio-satellite experiments. However, environmental stresses and the absence of gravity could lower their resistance, and therefore, a reliable G-protection for the animal is proposed. (Author)

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von Beckh, H.J. 1958 FLIGHT EXPERIMENTS ABOUT HUMAN REACTIONS TO ACCELERATIONS WHICH ARE FOLLOWED OR PRECEDED BY THE WEIGHTLESS STATE.
(Air Force Missile Development Center, Holloman AFB, New Mexico)
Report No. TN 58-15, Dec. 1958. ASTIA AD 154 108.

ABSTRACT: Flight experiments which simulated Pre-weightlessness and Post-weightlessness acceleration were conducted in jet aircraft. It was shown that alternations of acceleration and the weightless state decrease the acceleration tolerance of the subject and the efficiency of the physiological recovery mechanisms. The implications for planning of manned space flight are: (1) thrust values and re-entry profiles must take the lower acceleration -tolerance into consideration; and (2) adequate G- protection must be designed for the pilot, to prevent dangerous effects of unavoidable high accelerations. (Author)

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von Beckh, H.J. 1958 FLIGHT EXPERIMENTS ABOUT HUMAN REACTIONS TO ACCELERATIONS WHICH ARE FOLLOWED OR PRECEDED BY WEIGHTLESSNESS. (Ninth International Astronautical Congress, Amsterdam, 25-30 Aug. 1958)

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von Beckh, H.J. 1958 MULTI-DIRECTIONAL G-PROTECTION IN SPACE FLIGHT AND ESC Paper, Second Europena Congress of Aviation Medicine, Stockholm, September, 16-19, 1957
See also: J. Aviat. Med. 29(5): 335-341, 1958

ABSTRACT: It is known that maximum human tolerance to G-loads is obtained if the accelerations are acting at right angles to the long axis of the body. This report describes a device, termed the "anti-G capsule", which is pivoted about the lateral axis of the craft and automatically assumes a position, suc that the resultant of all acting accelerations is perpendicular to the heart-head line of the subject. The ejection and stabilization mechanism of this capsule would also afford an analogous G protection during and after escape from a disabled aircraft or space vehicle within the lower layers of the atmosphere.

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von Beckh, H. J. 1958 MULTI-DIRECTIONAL G PROTECTION IN SPACE FLIGHT AND DURING ESCAPE. A THEORETICAL APPROACH.
J. of Aviation Medicine 29(5):335-342, May 1958

ABSTRACT: It is known that maximum human tolerance to G-loads is obtained if the accelerations are acting at right angles to the long axis of the body. This report describes a device, termed the "anti-G capsule," which is pivoted about the lateral axis of the craft and automatically assumes a position, such that the resultant of all acting accelerations, is perpendicular to the heart-head line of the subject. The ejection and stabilization mechanism of this capsule would also afford an analogous G protection during and after escape from a disabled aircraft or space vehicle within the lower layers of the atmosphere.

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von Beckh, H. J. 1958 MULTIDIRECTIONAL G-PROTECTION IN SPACE VEHICLES. In Hecht, F., ed., VIIIth International Congress, Barcelona, 1957 (Vienna: Springer, 1958) pp. 37-46

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von Beckh, H.J. 1958 MULTI-DIRECTIONAL G-PROTECTION IN SPACE VEHICLES
J. Brit. Interplan. Soc. 16(9): 525-533, Sept./Oct. 1958

ABSTRACT: In this paper there is described a device which could grant this multidirectional g-protection by automatic positioning. The resultant of all acting accelerations would be presented at right angles to the head-heart line of the operator. This device, termed the "Anti-G Capsule," would at the same time afford an analogous g-protection during and after escape from a disabled space vehicle within the lower layers of the atmosphere. An anti-g capsule for providing multidirectional protection for pilots of space vehicles during periods of acceleration, by automatic positioning, is described and the relevant literature is reviewed. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space Medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Drijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903; Feb. 1959; ASTIA AD 227 817)

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von Beckh, H.J. & G.J.D. Schock 1958 CENTRIFUGE EXPERIMENTS ON HIGH-G LOADS IN MICE AND THEIR POSSIBLE ALLEVIATION BY MULTIDIRECTIONAL ANTI-G DEVICES
Air Force Missile Development Ctr., Holloman AFB, N. Mex. AFMDC TN 58-10 Aug. 1958 ASTIA AD 154 104

ABSTRACT: Using the centrifuge, time-tolerance limits on transversely positioned mice were studied and the results compared with longitudinal G-tolerance values reported by other authors. The possibilities of a multidirectional G-protection during escape trajectories and the re-entry phase are discussed. (Author)

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von Beckh, H. J. 1958 HUMAN REACTIONS DURING FLIGHT TO ACCELERATION PRECEDED BY OR FOLLOWED BY WEIGHTLESSNESS.
Air Force Missile Development Center, Holloman AFB, New Mexico
AFMDC TN-58-12 ASTIA AD 154 108.

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von Beckh, H.J. 1959 HUMAN REACTIONS DURING FLIGHT TO ACCELERATION PRECEDED BY OR FOLLOWED BY WEIGHTLESSNESS
Aerospace Medicine 30(6): 391-409
See also: AFMDC TN 58-15 ASTIA AD 154 108

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von Beckh, J.H. 1959 FLIGHT EXPERIMENTS ABOUT HUMAN REACTIONS TO ACCELERATIONS WHICH ARE FOLLOWED OR PRECEDED BY THE WEIGHTLESS STATE
Aerospace Medicine 30(6): 391-409, June 1959

ABSTRACT: Alternation of weightlessness and acceleration results in a decrease of acceleration tolerance and of the efficiency of physiologic recovery mechanisms. This indicates that acceleration thresholds of reversible and irreversible injury will be lower in space flight conditions than in the one G field of man's earthly environment. Defects of circulation, muscular effectiveness, vision, and of conscious judgment will occur at lower acceleration values and will probably continue for longer times than they do under present normal flight conditions. In an astronautical venture depending upon the skill of a human pilot, a blackout, lapse of judgment or even the slightest reduction in efficiency at a crucial time, could undoubtedly cause the failure of the mission.

The implications for planning of manned space flight are, first, that thrust values and reentry profiles must take the lower acceleration tolerance into consideration and second, that adequate G protection must be designed for the pilot to prevent dangerous effects of high acceleration.

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von Beckh, H.J. 1959 WEIGHTLESSNESS AND SPACE FLIGHT
Astronautics 4(2):26-27, 84-86, Feb. 1959.

ABSTRACT: Deterioration of neuromuscular coordination and disorientation are considered to be originated by the weightless state per se. However, more complex problems arise during extended space flights, as well as during alternate acceleration and weightlessness, such as occurs during the ascent and re-entry of space vehicles. Results of experiments in jet aircraft are cited to show that the weightless state aggravates other physiological conditions, which, in combination, pose serious problems to man in space flight. Subjects reported experiences of increased susceptibility to or severity of acceleration effects when they entered positive G states immediately after experiencing weightlessness. Subjects who normally blacked out at 5 G could tolerate only 3.5 to 4 G in the experiments. In the opposite case, when acceleration preceded weightlessness, physiological recovery mechanisms seemed disturbed. Blackout lasted longer, and more severe discomfort and chest pains were reported. Cinematographic observations, registrations of heart rate, electrocardiograms, and galvanic skin responses corroborated the subjective reports. It is suggested that extended weightlessness may lead to lessened muscle tone and strength, as well as to inconveniences to the cardiovascular system. The heart, having transported the blood without the force of gravity during the weightless state, would need a certain time for adaptation after re-entry into the gravity field of the earth or of another planet.
(Aerospace Medicine 30(6):456, July 1959)

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von Beckh, H.J. 1959 FLIGHT EXPERIMENTS ABOUT HUMAN REACTIONS TO ACCELERATIONS WHICH ARE FOLLOWED OR PRECEDED BY WEIGHTLESSNESS. In: International Astronautical Congress, Proceedings of the IXth, 1958 (Wien : Springer - Verlag, 1958, pp. 507-525)

ABSTRACT: Alteration of weightlessness and accelerations results in a decrease of acceleration tolerance and of the efficiency of physiologic recovery mechanism. The implications for planning manned space flight are, first, that thrust values and re-entry profiles must take the lower acceleration tolerance into consideration, and second, that adequate G protection must be designed for the pilot, to prevent dangerous effects of unavoidable high accelerations.

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von Beckh, H.J. 1960 A SUMMARY OF MOTION SICKNESS EXPERIENCES IN WEIGHTLESS FLIGHTS CONDUCTED BY THE AEROMEDICAL FIELD LABORATORY
(Paper, Symposium on Motion Sickness in Weightlessness Research, March 1960, Wright-Patterson AFB, Ohio)

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von Bekesy, G. 1939 UBER DIE VIBRATIONSEMPFINDUNG (Concerning the Vibration Experiance)
Akustische Zeitschrift 4: 316-334

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von Bekesy, G. 1940 UBER DIE STÄRKE DER VIBRATIONSEMPFINDUNG UND IHRE OBJEKTIVE MESSUNG (Concerning the Strength of the Vibration Experience and Its Objective Measurements)
Akustische Zeitschrift 5: 113-124

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von Bekesy, G. 1959 NEURAL FUNNELING ALONG THE SKIN AND BETWEEN THE INNER AND OUTER HAIR CELLS OF THE COCHLEA. Reprint Journal of the Acoustical Society of America 31:1236-1249, Sept. 1959; ASTIA AD-229 246
See also (Psycho-Acoustic Lab., Harvard Univ., Cambridge, Mass.) Contract No. 186615; ASTIA AD-229 246; 1 June 1959.

ABSTRACT: An attempt has been made to show that (1) the rotating tones in hearing, (2) the rotating vibrations on the skin, (3) the difference limen for the smallest perceptible distance on the skin, and (4) Mach's law of contrast are all

consequence of the same funneling action of the nervous system. In many situations the role of the funneling action can be better understood if a neural funneling unit is proposed, taking into account that a local stimulus produces both an area of activity and, around it, an area of decreased sensitivity. Since the inner and outer hair cells in the cochlea show a difference in sensitivity, the funneling action between these areas of different sensitivity has been investigated. It has been found that, between such areas, the locus of the sensation is continuously displaced as the intensity of the stimulus is increased. This suggests that along the organ of Corti there is a longitudinal displacement produced by variations in frequency, and a radial displacement between the outer and inner hair cells produced by variations in sound pressure. Thus there seems to be a pitch-loudness coordinate system in the ear. The cochlear model (J. Acoust. Soc. Am. 27:830-841, 1955) with nerve supply was therefore further developed into a cochlear model with more and less sensitive nerve supplies, in order to represent the outer and inner hair cells in the organ of Corti. (AUTHOR)

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von Braun, W. 1951 MULTI-STAGE ROCKETS AND ARTIFICIAL SATELLITES. In Marbarger, J. P., ed., Space Medicine; The Human Factor in Flights Beyond the Earth (Urbana, Ill.: University of Illinois Press, 1951) pp. 14-30

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von Braun, W. 1952 THE RETURN OF A WINGED ROCKET VEHICLE FROM A SATELLITE ORBIT TO THE EARTH In White, C. S., & O. O. Benson, Jr., eds., Physics and Medicine of the Upper Atmosphere, A Study of the Aeropause (Albuquerque, N. Mex.: Univ. of New Mexico Press, 1952) pp. 432-440

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Von Braun, Wernher,(ed. John P. Marbarger) 1956 MULTI-STAGE ROCKETS AND ARTIFICIAL SATELLITES SPACE MEDICINE (Illinois: University of Illinois Press, 1956)

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See also reprint Newsletter

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Zeitschrift für Flugtechnik und Motorluftschiffahrt (Munich; Berlin) 23: 164-165

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Zeitschrift für Biologie (Munich) 93: 79-92.

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von Diringshofen, H. 1933 ÜBER DIE WIRKUNG VON BESCHLEUNIGUNGEN IM FLUGE AUF DES MENSCHEN (The Effects of Accelerations During Flight Upon Man)
Zeitschrift für Flugtechnik und Motorluftschiffahrt (Munich; Berlin) 24: 589-592

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von Diringshofen, H. 1933 BLUTDRUCK UND HOMOSTATIK DES KREISLAUFES BEI BESCHLUNIGUNG (Effect of Acceleration on Blood Pressure and Hemostatics)
Verh. dtsch. Ges. Kreislaufforsch (Dresden) 6: 146-153.

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von Diringshofen, H. 1934 DIE WIRKUNG VON GRADLINIGEN BESCHLEUNIGUNG UND VON ZENTRIFUGALKRAFTEN AUF DER MENSCHEN. EXPERIMENTELLE UNTERSUCHUNGEN ÜBER DEN EINFLUSS HOHER BESCHLEUNIGUNGEN AUF BLUT-DRUCK, HERZSCHLAG, UND ATMUNG DES MENSCHEN IN MOTORFLUG. (INFLUENCE OF GREAT ACCELERATION OF SPEED ON BLOOD PRESSURE, HEART RATE AND RESPIRATION DURING FLYING.) Zeitschrift fur Biologie (munchen) 95:551-566
See also abstract: J. Avia. Med. 7:50-51, 1936.

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von Diringshofen, H. 1934 EFFECT OF SPEED AND CENTRIFUGAL AT FORCE ON HUMAN BEINGS. II. Experimental studies on the effect of high speed on the blood pressure, pulse and respiration of aviators. Zeitschr. f. Biol., 95:551-566, 1934.

ABSTRACT: Physiologic test flights as well as observations of hemostatic and hemodynamic conditions have demonstrated that a further investigation of the effect of speed upon the circulation will require continuous blood pressure determination during flight with simultaneous registration of pulse and respiratory frequency as well as type of respiration, recorded synchronously with the speed and altitude levels, at a centrifugal force corresponding to 4 times the gravity or 4 g. The portable electrocardiograph of the Siemens Reiniger firm was used. This instrument permits of a continuous five minute registration. An electric stop clock device was added to indicate 10 second intervals. (Lobner, Berlin.) It served for synchronization of the various records (electrocardiogram, blood pressure, pneumatotachogram, and the speed-ometer). The electrocardiogram was hung in the back seat of the plane in such a manner as to be within reach of the pilot. The electro-cardiographic recording mechanism was changed in reaction to speed. To ascertain the pulse frequency it was necessary to make recalculations if the speed varied within the ten second intervals. The plate elec-trodes of the electrocardiogram were arranged to the right shoulder, left hip. Even during spins fairly reliable electrocardiograms can be taken. Blood pressure readings were taken with the autotonograph but being very sensitive to changes in speed and to concussion it had to be reconstructed for the present purpose. Hochrein's pneumotachograph was used for ascertaining the respiratory rate. Curves, diagrams and plates illustrat-ing the apparatus are included. The results confirm the marked increase in blood pressure in response to acceleration and show that the degree of rise in blood pressure, increase in pulse frequency and respiratory frequency depend both on the duration as well as the degree of acceleration. (J. Avia. Med. 7(1):50-51).

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von Diringshofen, H. 1934 DIE WIRKUNG VON GRADLINIGEN BESCHLEUNIGUNGEN UND VON ZENTRIFUGALKRAFTEN AUF DEN MENSCHEN. (Effects of linear acceleration and centrifugal forces on man) Zeitschrift fur Biologie, 95:1-26.

ABSTRACT: von Diringshofen showed that hemostatic forces cause visual disturbances in pilots during quick turns (centrifugal forces). A disturbance of circulation in the brain and retina due to hydrostatic blood pressure and a lowering of pressure in the brain arteries as compared to the pressure in the heart region is the basis for this reaction. He has devised a method of computing the hydrostatic changes in blood pressure in each bodily region as dependent on the acceleration acting on the body. Thus the acceleration at which each individual will have disturbances of vision or of consciousness can be plotted. Acceleration effects on the circulatory system were studied by the author theoretically and experimentally by performing curves and steep spirals in flight. In this first communication he presented the hemostatics of the circulation of the blood under the influence of acceleration, placing special emphasis upon the importance of hemostatic consideration as a basis for the investigation of hemodynamics of the circulation under the influence of accelerations. Visual disturbances, observed by the flier as a result of centrifugal forces at the time of rapid changes in flight direction, may be explained solely on the basis of hemostatic considerations. According to the author these visual disturbances are due to a circulatory disturbance (hyphemia) in the brain or in the retina of the eye as a result of hydrostatic reduction in blood presure in the cerebral arteries as compared with the blood pressure at the level of the heart. By means of a schematic arrangement the hydrostatically changed pressure for the blood vessels of every part of the body, as dependent upon the degree of acceleration, may be read or computed. The hemostatically induced changes in blood pressure in the veins and arteries are explained as to their practical effects in normal flying and upside down flying. In the next communication (II) the author will give the results of simultaneous investigation of blood pressure, frequency of heart beat, and respiration under the influence of high accelerations in curve and steep spiral flights. He will explain his method of electrocardiography, in man during motor flight. In these investigations the "individual basic curves" of blood changes at heart level, dependent upon the degree of acceleration, were obtained for various periods of acceleration. These curves represent a certain "norm" and may give information concerning the ability of the individual to hear high accelerations, by way of showing at what degree of acceleration disturbance of vision and consciousness may be expected. (J. Aviation Med. 5:123-124 (1934).

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von Diringshofen, H. 1934 UBER DIE WIRKUNG DES CORIOLISBESCHLEUNIGUNGEN AUF DAS LABYRINTH BEIM TRUDELN EINES MOTORFLUGZEUGES (The Effect of Complimentary (Coriolis) Accelerations on the Labyrinth During Spinning of an Airplane)
Luftfahrtforschung (Munich) 11: 150-151; 22 June 1934

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von Diringshofen, H. 1935 LOS MAS IMPORTANTES PROBLEMS DE LA MEDICINA AERONAUTICA (The Most Important Problems of Aviation Medicine) Revista médica germano-ibero-americana (Leipzig) 8: 418-438

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von Diringshofen, H. 1935 DIE WICHTIGSTEN AUFGABEN DES FLIEGERARZTES UND DER LUFTFAHRTMEDIZIN (The Most Important Tasks of the Flight Surgeon and Aviation Medicine). Deutsche Medizinische Wochenschrift (Stuttgart) 61:461-464 & 545-547.

ABSTRACT: Much German research deals with the problems of oxygen deficiencies. Effect of speed on the heart is studied. Even at 5 g. the normal blood pressure is not able to pump the blood from the heart to the brain. However, blood pressure rises in compensatory effort. This compensatory rise in blood pressure required from 10 to 20 minutes to develop and can be aided voluntarily by the pilot by tensing his limbs and abdominal muscles. Much greater speed can be tolerated in a lying position.

Brief accelerations to 8 g. may be tolerated without ill effect, whereas acceleration above 5 g. lasting several seconds may cause visual disturbance. Very brief accelerations to 10.5 g. may cause cerebral concussions Systematic studies are needed to determine the limits of tolerance of the normal person. Small pilots are preferable to tall pilots because there is less distance for the heart to pump the blood to the brain. Studies during flight are indispensable and a technic for the objective study of these conditions during flight is necessary. Sudden traction on the pericardium has been known to cause cardiac arrest. Simultaneous records of the pulse, blood pressure, and respiration during flight should be made. ABSTRACT: (Limited) Journal of Aviation Medicine, 6(4):160-161.

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von Diringshofen, H. 1935 LUFTFAHRTMEDIZINISCHE FRAGEN UND AUFGABEN UNTE BESONDERER BERUCKSICHTIGUNG DER BESCHLEUNIGUNGSWIRKUNGEN (Aeromedica Questions and Tasks with Special Regard to Acceleration Effects) Verh. dtsch. Ges. inn. Med. (Munich) 47: 27-39

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von Diringshofen, H. 1936 UBER DIE WIRKUNG HOHER BESCHLEUNIGUNGEN UND FLIEHKRAFTE AUF DEN MENSCHEN (Effect of Great Accelerations of Spee and Centrifugal Force on Man) Luftfahrtmedizinische Abhandlungen (Leipzig) 1: 72-85

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von Diringshofen, H. 1959 SENSORY-PHYSIOLOGICAL OBSERVATIONS DURING THE TRANSITION FROM ACCELERATION TO WEIGHTLESSNESS
Raketentechnik und Raumfahrtforschung (Stuttgart) 3(2): 33-35 (In German)
Translated in: U.S. Joint Publications Research Service, Feltman Research and Engineering Labs., Picatinny Arsenal, Dover, N.J., Picatinny Arsenal Translation No. 61, Pp. 1-8, Nov. 1959 ASTIA AD 228 967
See also: J. Aerospace Medicine 30(8): 621-622

ABSTRACT: A review of three experiments is presented concerning the immediate physiologic and psychologic effects of short exposures to subgravity. (1) About 20 years ago, the author induced weightlessness by vertical dives in a Ju-87 aircraft for durations of 7-8 seconds (radial acceleration 8 G). The psychologic reaction was a pleasant one, and the sensation of "slumping", which usually introduces widhgtlessness episodes, was not perceived. (2) In 1954, while in Argentine, the author achieved weightlessness in parabolic flight for durations of 12-14 seconds, preceded by an acceleration of 5 G lasting 5 seconds. Transitional accelerations of 2 G preceding weightlessness lasted 2 seconds. Disagreeable sensations of "slumping" and of falling through empty space were distinctly perceived for about 5 seconds after the onset of weightlessness, leading over eventually to a sensation of floating in space. (3) In a "subgravity tower" designed by Dr. T. Lomonaco at the Aeromedical Research Institute in Rome, weightlessness was produced in a seat suspended from and catapulted upward by rubber straps fastened to the top of a 15-m.-high tower. Initial acceleration was 3 G and lasted .5 second. Three launchings were carried out consecutively, inducing weightlessness for 2, 1.3, and .8 seconds, respectively. At the point of transition from acceleration to weightlessness a very disagreeable sensation of falling was perceived. The findings of these three experiments, in conjunction with results of more extensive experiments carried out in the United States by Gerathewohl and others, can only be considered preliminary to weightlessness conditions in space travel. There is evidence to the effect that acclimatization takes place when weightlessness extends over longer periods. It appears that nausea and other disagreeable sensations are experienced less frequently by individuals actively engaged in navigation or in other mind-absorbing tasks than by "passive" riders. In conclusion, the author speculates on the possibility that changes in G force during the various accelerative launching stages may be particularly inducive to "space sickness".

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von Diringshofen, H. 1961 CONSIDERATIONS FOR SPECIAL INSTRUMENT FLIGHT TRAINING TO MINIMIZE SPACIAL DISORIENTATION
Aerospace Medicine 32(5):442-443, May 1961.

ABSTRACT: The problem of the unlimited control of the high speed aircraft during instrument flight is discussed. The present practice of a combination of visual and instrument combat flying is said to be one of the main causes of spatial disorientation and vertigo. As speeds increase the danger also increases. Thus, the need for increased instrument training in blind flight is stressed in order to minimize spatial disorientation. The artificial horizon indicator and warning signals to avoid dangerous flight situations are discussed as important unsolved display problems. (Tufts)

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von Diringshofen, H. 1944 BLOOD CIRCULATION IN CHANGING FIELD OF GRAVITY Deutsche Medizinische Wochenschrift (Stuttgart) 70: 150; 17 March 1944.

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von Diringshofen, H. (reference to) 1945 "MEDICAL INTELLIGENCE" The Air Surgeon's Bulletin. 2(11):410

ABSTRACT: "Some interesting gossip about Heinz von Diringshofen,.....is related by an intelligence report from Headquarters of the IX Service Command. He was given his own research laboratory at the University of Frankfort after having differences with Strughold, the top man in German Air Force aeromedical research. This laboratory was almost completely destroyed by bombings only 2 months after work had been started, but inspection of a wrecked centrifuge found there and various reports written by von Diringshofen lead to the belief that the centrifuge probably had been used for experimental studies on the labyrinth. He also had been working on the problem of resusitation with a rather complicated tilt table.....". (CARI)

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von Diringshofen, H. 1950 BESCHLEUNIGUNGSWIRKUNGEN IM RONTGENBILD (Acceleration Effects in the X-ray Pictures)
Weltraumfahrt 1: 135-137

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von Diringshofen, H., & H. J. A. von Beckh 1952 ASPECTOS MEDICOS DE LA ASTRONAUTICA (MEDICAL ASPECTS OF SPACE FLIGHT) Rev. nac. aeronaut., Buenos Aires 12(128):18-22, Nov. 1952

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(In: Raumfahrtforshung, Ed. by H. Gartmann, Munich, Oldenburg Press, 1952)

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von Diringshofen, H. 1942 DIE WIRKUNG VON [illegible] AUF DEN BLUTKREISLAUF DES IM FLUGZEUG SITZENDEN MENSCHEN ([illegible]fugal Acceleration in Flight on Circulation of Man in Si[illegible]tion)
Luftfahrtmedizin 6: 152-165, 1942

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von Diringshofen, H. 1942 INCREASED DANGER OF CIRCULATORY COLLAPSE DUE TO SIMULTANEOUS ACTION OF ALTITUDE AND ACCELERATION IN AIRPLANES. War Med., 2:373.

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von Diringshofen, H. 1943 THE JU-89 EQUIPPED FOR MEDICAL FLIGHT RESEARCH
J. Royal Aeronautical Soc. 47:416-417, 1943
See also Flugsport 35:108-111, 1943

ABSTRACT: Acceleration tolerance was determined in a JU-89 on 22 subjects in 200 plane runs, the highest acceleration used being 8.5 "g" for 3 seconds.

% Subjects	Grayout	Blackout	Collapse
80	5 "g"	5.5 "g"	6 "g"
50	6 "g"	6.8 "g"	7.5 "g"
20	6.5 "g"	7.5 "g"	8.0 "g"

When subjects became anoxic, collapse occurred in 2 to 3 seconds at 3 "g".

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von Diringshofen, H. 1943 AENDERUNG DER LAGE DES MENSCHEN IM SCHWEREFELD DER ERDE (Change of the Human Position in the Field of Gravity of the Earth)
Deutsche Medizinische Wochenschrift (Stuttgart) 69: 498.

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von Diringshofen, H. 1943 DER MENSCH IM VERÄNDERTEN SCHWEREFELD (Man in the Changed Field of Gravity)
Klinische Wochenschrift (Berlin) 22: 450

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von Diringshofen, H. 1943 MAN IN CHANGING FIELD OF GRAVITY: EFFECTS OF CHANGES IN POSTURE WHILE FLYING. Muenchen Med. Wschr. 90:279, April 1943.

von Diringshofen, H. 1940 UNTERSUCHUNGEN IM FLUGZEUG UBER DIE ERHOHTE KOLLAPSGEFAHR DURCH GLEICHZEITIGE EINWIRKUNG VON HOHE UND BESCHLEUNIGUNG (Increased Danger of Circulatory Collapse Due to Simultaneous Action of Altitude and Acceleration in Airplanes)
Verh. dtsch. Ges. Kreislaufforsch. (Dresden) 13: 92-97

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von Diringshofen, H. 1941 THE EFFECT OF THE CENTRIFUGAL FORCES ON THE BLOOD CIRCULATION OF THE AIRCRAFT PILOT.
Luftfahrtmedizin 6:152-165. R.T.P. Translation No. 1680 May 1941.

ABSTRACT: Reactions to "g" may be divided into 3 categories depending on cardiovascular tone of pilot.

a. In those with high blood pressure and normal or increased minute volume of heart, blackout threshold is high and recovery very rapid.
b. In those with normal or low blood pressure and adequate circulation, visual difficulties occur at moderately low values of "g" accompanied by insufficient filling of the right auricle. The left ventricle is definitely flattened.
c. In those with weak cardiovascular systems, the whole circulation fails under "g". Muscle tone is lost and the heart beats empty. A long period of recovery is necessary. This is very dangerous.

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von Diringshofen, H. 1941 DIE WIRKUNG VON FLIEHKRAFTEN AUF DEN BLATKREISLAUF DES IM FLUGZEUG SITZENDEN MENSCHEN (The Effect of the Centrifugal Forces on the Blood Circulation of the Aircraft Pilot)
Luftfahrtmedizin 6: 152-165
(R.T.P. Translation No. 1680 issued by the Ministry of Aircraft Production)

ABSTRACT: Reactions to "g" may be divided into 3 categories depending on cardiovascular tone of pilot. In those with high blood pressure and normal or increased minute voluem of heart, blackout threshold is high and recovery very rapid. In those with normal or low blood pressure and adequate circulation, visual difficulties occur at moderately low values of "g" accompanied by insufficient filling of the right auricle. The left ventricle is definitely flattened. In those with weak cardiovascular systems, the whole circulation fails under "g". Muscle tone is lost and the heart beats empty. A long period of recovery is necessary. This is very dangerous.

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von Diringshofen, H. 1938 UNTERSUCHUNGEN IM MOTORFLUGZEUG ZUR BESTIMMUNG DER ERTRAGLICHKEITSGRENZEN GEGENÜBER FLIEHKRAFTEN (Determination of Limits of Endurance of Acceleration During Flight)
Luftfahrtmedizin 2: 321-332

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von Diringshofen, H. 1939 MEDICAL GUIDE FOR FLYING PERSONNEL (Toronto: Univ. of Toronto Press)

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von Diringshofen, H. MEDICAL GUIDE FOR FLYING PERSONNEL.
Translation; V.E. Henderson, University of Toronto Press, 1940

ABSTRACT: This monograph considers high flights, the effect of acceleration and of centrifugal force, the importance of the sense organs for the flier, sensory illusions in blind flying, the effects of noise and vibration and the cause of air sickness, sport for flying personnel, hygiene, the important points in the medical examination of flying personnel, and the flier and his medical officer.

Persons sitting in an airplane may suffer the following disturbances:
(1) Those occurring during the normal increase in centrifugal force which is of short duration.
(a) The visual distrubances which occur in one or two seconds after the force is applied and quickly disappear as the centrifugal forces diminishes. These are the well known "gray veil" or "mist before the eyes" which, if the force is greater, becomes the "blackout" the total loss of vision with consciousness retained.
(b) The same disturbance together with temporary loss of consciousness.
(2) The deep, long-lasting loss of consciousness due to the centrifugal forces overstraining the circulation and leading to a circulatory collapse (collapse due to excessive strain)
(3) A very transitory distrubance of vision with a slight clouding of consciousness after a short zoom upward.

The distrubance of vision and consciousness most frequently observed occur only one and one-half to two seconds after the beginning of the centrifugal force and end almost with its cessation. Dependent on the magnitude of the force the distrubances are more or less marked.

A very slight disturbance consists in a "gray veil." The outlines of the objects under observation, instruments, etc., are no longer sharp. They appear as though they were seen through a mist, which becomes thicker as the force increases and thins as it decreases. With increasing centrifugal force the mistiness passes into blindness, which is described as the eyes becoming black or "blacking out." Consciousness is quite clear and thinking undisturbed.

There is no longer any doubt that disturbances of blood flow in the retina of the eye and in the brain are the cause of the distrubances.

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von Diringshofen, H. 1937 TOLERABLE CENTRIFUGAL FORCES AND EFFECT OF POSTURE. (Biz Zu welcher Staerke kann der Mensch im Flugzeug Zentrifugalkraefte vertragen.....Koerperhaltung) ASTIA ATI-60740, March 1937.

ABSTRACT: Maximum tolerable centrifugal forces which the human can withstand without ill effects and their effects of posture were investigated. A series of tests with individuals in an erect or slightly stooped sitting position showed that the maximum endurance to centrifugal force of three seconds duration is 4 to 8 g. In a crouched posture this figure may be increased to 8 to 10 g. This is approximately twice the figure which has been cited and accepted in technical circles. Of the individuals tested, 50% withstood 8.5 times the force of gravity for three seconds without visual disturbance and without loss of consciousness.

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von Diringshofen, H. 1937 KORPERLICHE BEANSPRUCHUNG DER BESATZUNG IN HOCHWERTIGEN FLUGZEUGEN (Bodily Requirement of the Crew in High Value Aircraft)
Luftwehr. (Berlin) 4: 359-366

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von Diringshofen, H. 1938 BESCHLEUNIGUNGSFRAGEN AUS DER PRAXIS (Acceleration Questions Out of the Practice)
Luftfahrtmedizinische Abhandlungen (Leipzig) 2: 103-115

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von Diringshofen, H. 1938 VORLAUFIGE MITTEILUNG UBER RONTGENAUFNAHMEN UND DURCHLEUCHTUNGEN DES HERZENS BEI FLIEHKRAFTEINWIRKUNGEN IM FLUGZEUG (Roentgenography and Roentgenoscopy of Heart During Acceleration: Preliminary Report)
Luftfahrtmedizin 2: 281-286

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von Diringshofen, H. 1938 FÜR DEN TRUPPENARZT PRAKTISCH WICHTIG FRAGEN DER LUFTFAHRTMEDIZIN (Practical, Important Questions of Aeromedicine for the Company Doctor)
Luftfahrtmedizinische Abhandlungen (Leipzig) 2: 252-253

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von Diringshofen, H. 1936 INFLUENCE OF GREAT ACCELERATION OF SPEED ON BLOOD PRESSURE, HEART RATE AND RESPIRATION DURING FLYING. (DIE WIRKUNG VON GRADLINIGEN BESCHLEUNIGUNG UND VON ZENTRIFUGALKRAFTEN AUF DER MENSCHEN. EXPERIMENTELLE UNTERSUCHUNGEN UBER DEN EINFLUSS HOHER BESCHLEUNIGUNGEN AUF BLUTDRUCK, HERZSCHLAG, UND ATMUNG DES MENSCHEN IN MOTORFLUG).
Abstract: J. Avia. Med. 7:50-51
See also Ztschr. f. Biol. 95:551-566, 1934.

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von Diringshofen, H. 1936 UBER DEN EINFLUSS DER KORPERHALTUNG FUR DAS ERTRAGEN HOHER BESCHLEUNIGUNGEN (Influence of Body Posture on Ability to Endure Greatly Accelerated Speed and Evaluation)
Verh. dtsch. Ges. inn. Med. (Munich) 48: 283-287.

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von Diringshofen, H. 1936 UNTERSUCHUNGEN IM FLUGZEUG UBER SEH-UND BEWUSSTSEINNSSTÖRUNGEN DURCH ZENTRIFUGALBESCHLEUNIGUNGEN (Research in the Aircraft Concerning Sight and Consciousness Disturbances Through Centrifugal Accelerations)
Klinische Wochenschrift (Berlin) 15: 877

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von Diringshofen, H. 1936 UNTERSUCHUNGEN DER ERTRAGLICHKEITSGRENZEN FUR ZENTRIFUGALKRAFT IM MOTORFLUG (Extent to Which Centrifugal Forces May Be Withstood in Airplanes)
Verh. dtsch. Ges. Kreislaufforsch (Dresden) 9: 288-290

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von Diringshofen, H. 1937 MAXIMUM TOLERABLE CENTRIFUGAL FORCES AND EFFECT OF POSTURE (PART 3 OF 10 PARTS) (BIZ ZU WELCHER STAERKE KANN DER MENSCH IM FLUGZEUG ZENTRIFUGALKRAEFTE VERTRAGEN... KOERPERHALTUNG) ASTIA ATI 60740.

ABSTRACT: Maximum tolerable centrifugal forces which the human can withstand without ill effects and their effects of posture were investigated. A series of tests with individuals in an erect or slightly stooped sitting position showed that the maximum endurance to centrifugal force of three seconds duration is 4 to 8 g. In a crouched posture this figure may be increased to 8 to 10 g. This is approximately twice the figure which has been cited and accepted in technical circles. Of the individuals tested, 50% withstood 8.5 times the firce of gravity for three seconds without visual disturbance and without loss of consciousness.

von Diringshofen, H. 1961 INTERNATIONALES SYMPOSIUM UBER LUFT- UND RAUMMEDIZIN (International Symposium on Aerospace Medicine) (Weltraumfahrt (Frankfurt), 12(1): 11-12, Feb. 1961, in German)

[illegible] was sponsored by the Aviation Medicine Institute of [illegible] Air Force and was held October 6-13, 1960, at the School of [illegible], University of Buenos Aires. The outlook of the United States on the relative importance of psychological tests in the evaluation of space flight candidates was compared to the outlook of Europe on the same subject. However, most discussion centered around the psychological aspects of space flight and acceleration forces and tolerances. Films were shown of rocket-sled and weightlessness tests.

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von Diringshofen, H. 1962 BEITRAGE UND ANREGUNGEN DER RAUMFAHRTMEDIZIN FUR ANDERE GEBEITE DER MEDIZIN (The Contributions and Stimulations of Space Medicine to Other Fields of Medicine)
In Antonio Ambrosini, Ed. RENDICONTI DEL CONGRESSO INTERNAZIONALE--L'UOMO E LA TECNICA NELL'ERA NUCLEARE E SPAZIALE, 18-21 APRILE 1962, (Proceedings of the International Congress--Man and Technology in the Nuclear and Space Age, 40th Trade Fair, Milan, April, 18-21, 1962)
Rome, Italy: Associazione Internazionale Uomo nello Spazio)
Pp. 505-511 N63-18941

ABSTRACT: The value of investigations into space medical problems and the results of research in several medical areas are reviewed to determine the practical value of stimulating interest in space medicine among all medical sciences. Results indicate that the scientific value of such a widespread medical interest would be in excess of the psychological and physiological requirements of manned spaceflight. (N63-18941)

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Von Doenhoff, A. E. and G. W. Jones, Jr. 1953 AN ANALYSIS OF THE POWER-OFF LANDING MANEUVER IN TERMS OF THE CAPABILITIES OF THE PILOT AND THE AERODYNAMIC CHARACTERISTICS OF THE AIRPLANE. NACA TN 2967, Aug. 1953.

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von Gierke, Henning E., & Eugene Steinmetz MOTION DEVICES FOR LINEAR AND ANGULAR OSCILLATION AND FOR ABRUPT ACCELERATION STUDIES ON HUMAN SUBJECTS. NRC. No. 903.

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von Gierke, H. E., & E. Steinmetz 1961 MOTION DEVICES FOR LINEAR AND ANGULAR OSCILLATION AND FOR ABRUPT ACCELERATION STUDIES ON HUMAN SUBJECTS (IMPACT). A DESCRIPTION OF FACILITIES IN USE AND PROPOSED. (U. S. Armed Forces--National Research Council, Committee on Bio-Astronautics, Washington, D. C.) Publication No. 903; ASTIA AD-266 078.

ABSTRACT: This report briefly describes the purposes, design principles, motion capabilities, and control and safety features of some forty facilities designed to study the effects of linear and angular oscillations and of abrupt acceleration on human safety and performance. Some facilities presently under study but not yet built are also included. Photographs or schematic drawings of the design are presented for those devices for which they are available. The report includes the geographical locations of the facilities and the contact point for obtaining further information on each. (Authors)

5,725

von Gierke, H.E. 1961 BIOMECHANICS OF IMPACT INJURY. (Aerospace Medical Lab., Wright-Patterson AFB, Ohio)

ABSTRACT: A review of the biomechanics of impact injury indicates that (1) Steady-state vibration studies are very helpful for interpreting impact tolerance data. The mechanical models for the human body derived from such studies are useful as a basis for theoretical analysis and prediction of impact response. (2) Theoretical analysis of the response of the complex human system to impact loads shows clearly that a complete description of the force-time function of the impact load is necessary to define response or tolerance uniquely. Only in very limited impact-duration ranges can a single parameter such as peak acceleration, impulse, or rate-of-onset be considered primary to the response.

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von Gierke, H.E. & R.R. Coermann 1961 THE BIODYNAMICS OF HUMAN RESPONSE TO VIBRATION AND IMPACT
In: Proceedings of the International Congress of Aviation and Cosmonautical Medicine, Paris, September, 1961
See also: Revue de Medicine Aeronautique, Vol. 2, 1962.
See also: Industrial Medicine and Surgery 32: 30-32, 1963.

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Von Gierke, Henning 1961 IMPACT ANALYSIS: INSTRUMENTATION PROBLEMS (Paper, Symposium On Impact Acceleration Stress, Brooks Air Force Base, San Antonio, Texas, November 27-29, 1961)

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Von Gierke, H.E. 1961 THE RELATION BETWEEN STEADY STATE RESPONSE AND IMPACT RESPONSE OF THE HUMAN BODY. (Paper, Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Materiel Ctr., Philadelphia, Pa., 14-15 June 1961)

ABSTRACT: The physical properties of human body tissue and the behavior of the body as a passive mechanical system are reviewed. The physiological and pathological effects limiting human tolerance to vibration and impact loads and their connections with the body's physical responses are discussed. For excitation with steady state vibration and abrupt acceleration patterns containing frequencies below approximately 50 cps, the body's response can be described by analyzing the body as a lumped parameter system. Recent studies contributed to a further refinement of such a mechanical model and to a quantitative determination of its parameters. This model is useful in studying the dynamics of the body exposed to the various steady state and transient force patterns of interest in aerospace operations but has also broader physiological applications. Mechanical impedance measurements on anthropomorphic dummies are compared with measurements on live subjects. The limitations in using dummies instead of human subjects are discussed and suggestions are made to improve present-day dummies and to evaluate quantitatively their dynamic properties. The theoretical and analysis presented helps in interpreting biological effects, in guiding future experimentation, and in developing and understanding protective measures. Gaps in our present knowledge and parameters to be investigated to make existing data more adequate to arrive at definitive vibration and impact exposure criteria are discussed.

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von Gierke, Henning E. 1962 BIOMECHANICS OF IMPACT INJURY
In: Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, pp. 121-122

ABSTRACT: A review of the biomechanics of impact injury indicates that: (1) Steady-state vibration studies are very helpful for interpreting impact tolerance data. The mechanical models for the human body derived from such studies are useful as a basis for theoretical analysis and prediction of impact response. (2) Theoretical analysis of the response of the complex human system to impact loads shows clearly that a complete description of the force-time function of the impact load is necessary to define response or tolerance uniquely. Only in very limited impact-duration ranges can a single parameter such as peak acceleration, impulse, or rate-of-onset be considered primary to the response.

5,730

von Gierke, H.E. & E.P. Hiatt 1962 BIODYNAMICS OF SPACE FLIGHT
In: Singer, S.F., ed., Progress in the Astronautical Sciences, 1: 343-401
See also: WADD-Q-1

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von Greim, R. 1931 KUNSTFLUG (Skill Flight)
Flugsport (Frankfurt a.m.) 23: 104-116

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von Hermann, F. 1952 PRONE FLYING
Sailplane and Glider, London, 20:5-7, June 1952.

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von Hoerner, Sebastian 1962 THE GENERAL LIMITS OF SPACE TRAVEL
Science 137(3523):18-23

Summary: This article summarizes the basic facts concerning the possibility of interstellar travel, ignoring technical difficulties. Only such fundamental properties as time, acceleration, power, mass, and energy are considered.

The discussion touches on fuel energy content and exhaust velocity requirements, distances (of the order of 18.6-820 light-years), speeds (approaching the velocity of light), energy content of nuclear fuels utilizing annihilation, fusion, and fission (tabulated), human tolerance to long-term acceleration (=1g), relativistic time-dilatation (tabulated), time requirements (at 98% velocity of light, 14 years to travel 18.6 light-years; 300 years to travel 820 light-years).

Author's personal conclusion: "Space travel, even in the most distant future, will be confined completely to our own planetary system, and a similar conclusion will hold for any other civilization, no matter how advanced it may be." (CARI)

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Von Tavell, F. May 1947 IMPORTANCE OF TIME FACTOR FOR DISTURBANCES DUE TO ACCELERATION DURING MILITARY FLIGHT.
Schweiz. med. Wchnschr. 77:611-614. 31 May 1947

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von Wenusch, F.R. 1898 DIE WIRKUNG DER CENTRIFUGALKRAFT AUF DIE BLUTCIRCULATION (The Effect of Centrifugal Force Upon the Blood Circulation)
Wiener klinische Wochenschrift (Vienna) 11: 361-365.

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von Wittern, W.W. 1952 FORCE BALLISTOCARDIOGRAPHY
(Wright Air Development Center, Wright-Patterson AFB, Ohio)
WADC Tech. Report 52-340 Nov. 1952.

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von Wittern, W.W. 1953 BALLISTOCARDIOGRAPHY WITH ELIMINATION OF THE INFLUENCE OF THE VIBRATION PROPERTIES OF THE BODY. American Heart Journal, 46(5):705-714, Nov. 1953.

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Voyachek, [illegible] & J. Steinman 1943 FUNDAMENTALS OF AVIATION MEDICINE (Assoc. Comm. on Av. Med. Res. of the Natl. Res. Council, Canada) The Univ. of Toronto Press

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Vykukal, H.C., G.W. Stinnett & R.P. Gallant 1961 PERFORMANCE OF AN INTERCHANGEABLE, MOBILE-PILOT RESTRAINT-SYSTEM DESIGNED FOR USE IN A MODERATELY HIGH ACCELERATION FIELD. (Paper, Aerospace Medical Assoc., Chicago, Ill., 24-27 April 1961)

5,740

Vykukal, H.C., G.W. Stinnett & R.P. Gallant 1961 PERFORMANCE OF AN INTERCHANGEABLE, MOBILE-PILOT-RESTRAINT-SYSTEM DESIGNED FOR USE IN A MODERATELY HIGH ACCELERATION FIELD
Aerospace Medicine 32(3): [illegible]

ABSTRACT: A continuing program has been underway at the NASA Ames Research Center to provide a pilot-restraint system suitable for use in research programs designed to investigate the ability of pilots to perform meaningful control tasks while being subjected to [illegible] be encountered in re-entry vehicles returning from orbital [illegible] Previous investigations have used the NASA contour couch which is unwieldly to handle and is not interchangeable between pilots. At present, two modified separate pilot restraint systems have been built and tested at the University of Southern California centrifuge, up to [illegible] 8 g eyeballs in, eyeballs out, and eyeballs down. Modifications to the support concepts as a result of this testing were made, and this new support system was used in a recent program conducted at the AMAL-NAMC Johnsville centrifuge. These systems, in part, are mobile, feature quick ingress and exit, a novel pneumatic bladder back support automatically adjusting to the pilot's contour, and are considered by the user pilots to be equal or superior to previous systems experienced. This paper will describe the various support systems and outline the pilot's acceptance of these systems noting those areas requiring improvement. Consideration will be given to the adaptability of the present approach to vibration and impact stresses.

5,741

Vykukal, H.C., R.P. Gallant, & G.W. Stinnett 1961 AN INTERCHANGEABLE, MOBILE PILOT-RESTRAINT SYSTEM, DESIGNED FOR USE IN A MODERATELY HIGH ACCELERATION FIELD. J. Aerospace Med. 33(3):279-285, March 1962.

ABSTRACT: A pilots' mobile restraint suit, developed at the Ames Research Center of the National Aeronautics and Space Administration is described. The primary purpose of this restraint and support system was to permit simulator studies of flight vehicle control under varying conditions of acceleration stress. Although not tested under impact accelerations or lateral transverse forces, it is believed that the basic concept would be useful for an orbital or space vehicle. A list of 8 restraint suit requirements is given with pictures and a detailed description. (CARI)

ACCELERATION

W

5,742

Wacholder, B.V. and E. Fayer April 1960 CRITICAL ENVIRONMENTS ENCOUNTERED BY HIGH-ALTITUDE VEHICLES.
(1960 Proceedings of the Institute of Environmental Sciences, 19-35)

ABSTRACT: Four typical vehicles were tracked from the launching pad and orbit through to re-entry into the Earth's atmosphere. It is our belief that only through such a study can we obtain the necessary insight into the problems of the environment throughout the vehicle's flight path. This study leads to the conclusion that the critical environments are vacuum, radiation, and temperature. In addition micrometeorites have to be considered as a possible hazard to vehicle's flight path. This study leads to the conclusion that the critical environments are vacuum, radiation, and temperature. In addition micrometeorites have to be considered as a possible hazard to vehicles designed to stay in orbit for an extended period of time. The effect of the unique space environment of radiation and vacuum on the more susceptible materials and components such as plastics and semiconductors was also outlined.

It is planned to continue the study to determine instrumentation requirements to monitor the deleterious space environments.

5,743

Wacholder, B.V, & E. Fayer 1960 STUDY OF INSTRUMENTATION AND TECHNIQUES FOR MONITORING VEHICLE AND EQUIPMENT ENVIRONMENTS AT HIGH ALTITUDE INSTRUMENTATION AND MONITORING TECHNIQUES
Wright Air Development Division, Air Research and Development Command, Wright-Patterson AFB, Ohio WADC TN-59-307, Vol. III June 1960
ASTIA AD 268 090

ABSTRACT: Instrumentation techniques are presented which are available within the state-of-the-art; an instrumentation system is proposed for the monitoring of high-altitude environments encountered by typical vehicles. The high altitude environmental effects on typical vehicles and equipment is summarized. The present airborne-instrumentation state-of-the-art is presented for measuring temperature, pressure, strain, vibration, acceleration, radiation, meteorite detection, and acoustic noise. A feasible instrumentation system is discussed for monitoring these deleterious environments. In addition, recommendations are made for an extension of this study to cover environments created by nuclear and other advanced propulsion systems. Another recommendation is the continuation of the instrumentation study to effect a complete design specification for an environmental monitoring system for a particular vehicle.

5,744

Wacholder, B.V. and E.Fayer 1961 STUDY OF INSTRUMENTATION AND TECHNIQUES FOR MONITORING VEHICLE AND EQUIPMENT ENVIRONMENTS AT HIGH ALTITUDE. VOLUME I. VEHICLES AND ENVIRONMENTS. WADC TN 59 307, ASTIA AD 266288

ABSTRACT: Typical aerospace vehicles and their trajectories are described. The operating environments of these vehicles, in the region of space between the earth and the moon, are discussed. Those vehicles studied include the boost-glide vehicle, nearearth orbiting vehicles, extreme elliptical orbiting vehicles traversing the Van Allen radiation belts, transfer vehicles, and lunar vehicles. Each vehicle studied typifies some environmental problem, such as re-entry conditions or radiation effects. (Author)

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Waggoner, J. N. et al 1960 PRESENT ACTIVITIES IN THE LIFE SCIENCES. 1960 Report by the Life Sciences Committee, Aerospace Medical Association, Washington, D. C.

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Wagner, E. 1886 FORTGESETZTE UNTERSUCHUNGEN ÜBER DEN EINFLUSS DER SCHWERE AUF DEN KREISLAUF (Continued Research Concerning the Influence of Gravity Upon the Circulation)
Pflüg. Arch. ges. Physiol. (Berlin) 39: 371-386.

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Wahl, N. E. &. A. A. Whiting 1948 HEAD IMPACT INVESTIGATION. FINAL REPORT. (Cornell Aeronautical Laboratory, Inc., Buffalo, N. Y.) Contract No. N6ori-119, Rept. No. OG-537-D-9, Jan. 1, 1948. ASTIA ATI 201 360.

ABSTRACT: The objectives of this project were the collection of data on accelerations, impact blows, and the determination of protective characteristics of panels and structural configurations.

A plastic head form filled with a gelatimous material was developed to have strength characteristics similar to those of a human head. This 9-1/2 pound head form was designed to fracture when dropped five feet onto a flat, rigid surface.

A shock cord actuated catapult apparatus was developed to project the head forms into test panels and other structural configurations. This device produced a range of impact velocities of the head form from 15 to 140 feet per second. The head form was cradled on a catapult car which was mounted on two horizontal rails. The shock cords accelerated the head form over a distance of 6 feet, at which point the shock cords arrested the catapult car and the head form continued to travel in free flight approximately 8 feet to the test panel.

5,748

Waitt, G. E. n.d. INVESTIGATION INTO THE EFFECT OF ALTITUDE AND ANOXIA ON "BLACKING-OUT" THRESHOLD. (Great Britain, Flying Personnel Research Committee) Rept. No. FPRC 213

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Wahl, N.E., Whiting, A.A. 1948 HEAD IMPACT INVESTIGATION -PROGRESS REPORT FOR AUGUST (Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.) Report No. OG-537-D-7, NR-172-384, Contract No. N5ori-119, Task Order 8, 1 Jan. 1948. TIP U1912

ABSTRACT: This program is divided into two phases; one, the development of plastic head forms and two, the evaluation and crash testing of these forms.

During the past month, fifteen head forms were fabricated for test purposes and material for additional head forms has been prepared.

Difficulties were experienced in the instrumentation set-up which required some changes before actual testing could be started.

Several successful test runs were made against 1/8" 24ST aluminum alloy flat panels.

With impact velocities of approximately 30 feet per second, the head form was decelerated at approximately 195 G's with no damage to the head form at the point of impact. There was however, a failure of the head form in contre-coup with a shattering fracture at the rear of the head form.

5,750

Wahl, N.E., A.A. Whiting 1948 HEAD IMPACT INVESTIGATION - PROGRESS REPORT FOR SEPTEMBER (Cornell Aeronautical Laboratory, Inc. Buffalo 21, N.Y.) Rept. No. OG-537-D-8; NR-172-384; Contract No. N6ori-119, Task Order VIII, 1 Jan. 1948 TIP U2186

ABSTRACT: During the past month, additional tests have been run against 1/8" 24ST aluminum alloy flat panels, aluminum alloy curved panels, and sandwich con-

struction panels using balsa wood and Styrofoam. An additional series of tests have been run using several tubes of different materials.

Tests conducted at impact velocities up to 60 ft. per second indicate that the sandwich construction panel offers excellent protection for the head form. 24ST aluminum alloy tubes with low diameter: thickness ratio severely damaged the head form on impact. By increasing the diameter: thickness ratio, the tubeswere less destructive to the head form on impact.

The test work on various panels is nearing completion and the next report published will be the final report summarizing all work covered under this contract.

5,751

Wahl, N.E. & A.A. Whiting 1948 HEAD IMPACT INVESTIGATION (Cornell Aeronautical Lab., Inc., Buffalo, N.Y.) Report No OG-537-D-9 NR 172-384, 22 Dec. 1948. ASTIA AD 201360.

ABSTRACT: The objectives of this project were the collection of data on accelerations impact blows, and the determination of protective characteristics of panels and structural configurations.

A plastic head form filled with a gelatinous material was developed to have strength characteristics similar to those of a human head. This 9-1/2 pound head form was designed to fracture when dropped five feet onto a flat, rigid surface.

A shock cord actuated catapult apparatus was developed to project the head forms into test panels and other structural configurations.

It was found that with proper considerations for the design of impact structures it is entirely possible to absorb impact energies of 400-800 in. lbs. without fracture of the skull. Prevention of skull fractures by proper energy absorption devices will greatly reduce the number of fatal injuries received in airplane crashes. However, fracture of the skull is only one indication of a lethal blow and many deaths have been recorded where the brain has been injured as a result of a head blow without skull fractures.

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Wakeley, C.P.G. 1943 BLAST INJURIES (DR. JOHN BURNS LECTURE) Glasgow Med. J. 139:91-102

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Wald, H., M. Guernsey, & F. H. Scott 1937 SOME EFFECTS OF ALTERATION OF POSTURE ON ARTERIAL BLOOD PRESSURE. Amer. Heart J. 14:319-330

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Walchner, O. & F.M Sawyer 1958 PARACHUTIST SPIN PROBLEM. (USAF, Wright-Patterson AFB, Ohio) WADC TN-58-261. Sept. 1958.

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Walchner, O. & F.M. Sawyer 1960 PARACHUTIST'S SPIN PROBLEM (Aeronautical Research Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio) Proj. No. 1366, Rept. No. ARL TN 60-150, Sept. 1958. ASTIA AD 250 438

ABSTRACT: Research was undertaken to furnish the Aerospace Medical Laboratory an estimate of the spinrates possible when a man falls free from high altitudes in a supine position. The spinning moments acting on a small model in a uniform airflow were determined for some configurations which were slightly unsymmetrical with respect to the spinaxis. The spinrates were then calculated assuming that the body does not pitch and roll during the fall. For a vertical fall from an altitude of 83,000 ft, spinrates were determined which far exceed the value which may be fatal to man. (Author)

5,756

Walchner, O. 1961 PARACHUTIST'S SPIN PROBLEM. In Bergeret, P., ed., Escape and Survival: Clinical and Biological Problems in Aero Space Medicine. (Advisory Group for Aeronautical Research and Development, Paris) AGARDograph No. 52. pp. 10-17 ASTIA Doc. No. AD 261 881.

ABSTRACT: The Aeronautical Research Laboratory of the Air Force Research Division was recently informed of the hazardous flat spin conditions that a parachutist is likely to encounter during a free fall from high altitude. The problem was approached through a study of the autorotation characteristics inherent in different configurations, including man. The tests described here indicated that the spin could be controlled, for instance, by proper oreintation and attitudes of the feet or other limbs. However, controlling a flat spin in this

way certainly would require extensive training and would suppose that the man is not in state of shock and has not lost consciousness. Also, the pressure suit worn at high altitudes probably will not allow sufficient freedom to steer the body with the limbs. The fall must be spin proof until a safe altitude is reached at which the parachute can be opened. It was shown that small asymmetries in the configuration may lead to autorotation. The configuration and the flexibility of limbs of man offer very many possibilities for such undesirable asymmetries. The idea of eliminating these asymmetries in shape by placing the man in a capsule is not encouraging after the flat spinning cylinder has been observed in a vertical air flow. Maybe the only efficient approach to a solution to the parachutist's spin problem will be to develop means of preventing a man from assuming a flat position during the fall.

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Waldman, A. N. 1961 PIEZORESISTIVE ACCELEROMETERS
In 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D. C. (Mt. Prospect, Ill.: Institute of Environmental Sciences, P. O. Box 191) pp. 627-633

5,758

Walhout, G.J. , D.J. Schneider & L.E. Spencer 1961 INVESTIGATION, U.S. ARMY H-21C VERTOL SHAWNEE HELICOPTER
Aviation Crash Injury Research, Phoenix, Arizona Contract DA-44-177-TC-707
TREC Technical Report 61-134 USATRECOM Task 9R95-20-001-01

ABSTRACT: Report is made of crash injury investigation involving a U.S. Army H-21C helicopter to determine the extent of injuries to occupants and aircraft damage. Wreckage was examined at the crash site, photographs obtained, and reconstruction of the approximate kinematics of the crash sequence made. It was found that crew seat attachments failed and injury-producing hazards were present in the aircraft which was extensively damaged. As a result of the findings, it is recommended, in part, that crew and passenger seat belt-shoulder harness tiedown be secured to the basic structure of the aircraft and that the use of cast aluminum for seat anchorages be discontinued.

5,759

Walhout, G. J. and H. W. Schweer Feb. 1962 AIRCRAFT ACCIDENT, HOLLOMAN AIR FORCE BASE, NEW MEXICO (Aviation Crash Injury Research, Phoenix, Ariz.) Rept.no. AvCIR 61-19; Contract DA 44-177-tc-802, TREC TR 62-9, Feb. 1962, ASTIA AD-275 183L

ABSTRACT: On October 26, 1961, a U.S. Army L-19, Serial No. 50-1654, of the Army Aviation Branch at Holloman Air Force Base, New Mexico, crashed while performing simulated bombing attacks on an Army bivouac. The crash site was approximately 3-½ miles west of the departure end of runway 25 at Holloman AFB, New Mexico.

A crash injury investigation of the accident was conducted on October 28-30, 1961 by Aviation Crash Injury Research (AvCIR) under the provisions of U.S. Army Transportation Research Command Contract No. DA 44-177-TC-802.

The investigation revealed that the pilot was seriously injured during impact and was then severely burned by the fire which developed at the end of the crash sequence. The observer, in the rear seat, was also injured when he released his lap belt and was ejected from the aircraft during the crash sequence. As a result of this investigation, it is recommended that: (1) The latching mechanism of the pilot's seat be improved. (2) Consideration be given to the development of crash-fire inerting systems for Army aircraft. Further efforts be devoted to the improvement of the APH-5 retention system. (4) Radio components underneath the rear seat be relocated or padded with energy absorbing material.

5,760

Walker, A. E., J. J. Kollross, and T. J. Case 1944 THE PHYSIOLOGICAL BASES OF CONCUSSION. J. Neurosurg. 1-103.

5,761

Walker, S M. 1955 ACCELERATION OF THF HEART BY KCl, INTRAPERITONEALLY INJECTED, IN THE DOG.
(Univ. of Louisville School Of Medicine, Louisville, Ky.)

ABSTRACT: Male mongrel dogs were anesthetized with 275 mg/kg of sodium barbital and prepared for recording the respiration, blood pressure, and ECG. A single dose (usually 600 mg/kg) of 2% KCl solution was injected intraperitoneally in 7 animals The average survival time after KCl injection was 2 hr. and 25 min. The sinus rate was accelerated in 4 out of 7 experiments. Ectopic beats occurred in 5 cases. In all cases A-V block was followed by alternate slow and rapid ventricular beats. The rapid ventricular rate exceeded tne initial sinus rate. For the 7 experiments the average sinus rate before KCl injection was 159/min. For the 7 experiments the average of the rapid ventricular rate after KCl injection was 197/

min. Although marked ventricular slowing occurred toward the end of each experiment, only 2 experiments terminated in cardiac arrest. The other 5 terminated in ventricular fibrillation. Previous reports in the literature have shown that intravenous injection of KCl usually produces slowing of the sinus pacemaker and of the ventricular rate. The present report shows that intraperitoneal injection of KCl usually produces acceleration of the sinus pacemaker and of the ventricular rate. (Federation Proceedings 14:486, Mar. 1955)

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Walker, P. B. 1961 THE VICTOR ACCIDENT INVESTIGATION 1959-61. (Royal Aircraft Establishment, Great Britain) Report No. Structures 266. ASTIA Doc. No. AD-324 763. (Secret Report)

5,763

Walhout, G. J., D. J. Schneider & L. E. Spencer 1961 CRASH INJURY INVESTIGATION: U. S. ARMY H-21C VERTOL SHAWNEE HELICOPTER, TOBYHANNA, PENNSYLVANIA, 23 AUGUST 1961. (Aviation Crash Injury Research, Phoenix, Arizona) AvCIR 61-11, TREC Tech. Rept. 61-134, September 1961.

ABSTRACT: Report is made of crash injury investigation involving a U.S. Army H-21C helicopter to determine the extent of injuries to occupants and aircraft damage. Wreckage was examined at the crash site, photographs obtained, and reconstruction of the approximate kinematics of the crash sequence made. It was found that crew seat attachments failed and injury-producing hazards were present in the aircraft which was extensively damaged. As a result of the findings, it is recommended, in part, that crew and passenger seat belt shoulder harness tiedown be secured to the basic structure of the aircraft and that the use of cast aluminum for seat anchorages be discontinued. (AUTHOR)

5,764

Walhout, G. J. & H. W. Schweer 1962 CRASH INJURY INVESTIGATION: U. S. ARMY L-19A AIRCRAFT ACCIDENT, HOLLOMAN AIR FORCE BASE, NEW MEXICO, 26 October 1961. (Aviation Crash Injury Research, Phoenix, Arizona) AvCIR 61-19, TREC Tech. Rept. 62-9, February 1962.

ABSTRACT: Report is made of crash injury investigation involving a U.S. Army L-19A aircraft to determine cause of injuries and extent of aircraft damage. Wreckage was examined at the crash site, photographs obtained, and reconstruction of the approximate kinematics of the crash sequence made.

The investigation revealed that the pilot was seriously injured during impact and was then severely burned by the fire which developed at the end of the crash sequence. The observer, in the rear seat, was also injured when he released his lap belt and was ejected from the aircraft during the crash sequence. As a result of this investigation, it is recommended that:

1. The latching mechanism of the pilot's seat be improved
2. Consideration be given to the development of crash-fire inerting systems for Army aircraft.
3. Further efforts be devoted to the improvement of the APH-5 retention system.
4. Radio components underneath the rear seat be relocated or padded with energy absorbing material.(AUTHOR)

5,765

Walker, A. Earl, Jerry J. Kollros, & Theodore J. Case 1944 THE PHYSIOLOGICAL BASIS OF CONCUSSION
(J. of Neurosurg 1(2):103-116 March 1944)

ABSTRACT: Analysis of the clinical manifestations of concussion in the cat, dog and monkey show that they are the result of intense excitation of the central nervous system at the moment of the blow to the head.

At the moment of concussion a marked electrical discharge occurs within the central nervous system. In the vinethene-novocaine anesthetized animal the cortical activity is increased in frequency following the initial discharge (afterdischarge) for 10 to 20 seconds, then decreases until there is little spontaneous activity (extinction). Within several minutes the electroencephalogram becomes practically normal again.

At the moment of a blow on the skull a sudden increase in pressure at the site of impact occurs with pressure waves being transmitted throughout the intracranial cavity.

It is concluded that these mechanical forces produce a breakdown of the polarized cell membranes of many neurones in the central nervous system, thus discharging their axones. This intense traumatic excitation is followed by the same electroencephalographic, chemical and clinical phenomena which characterize intense stimulation of the nervous system by electrical, chemical or other agents.(AUTHOR)

5,766

Walker, Robert Y. 1962 WHAT CAN MAN CONTRIBUTE TO OPERATIONS IN SPACE
In: (School of Aerospace Medicine) Lectures in Aerospace Medicine, 1962 pp. 173-190

ABSTRACT: Man has some real capabilities to contribute to space flights that cannot be duplicated by mechines. Man has the specific advantages of being

able to economically, simply, and without fixed pre-programming sense, synthesize, judge, and act as an intelligent subsystem responding to events in the performance of the vehicle and the mission to gain the greatest returns. Fro these reasons, it is imperatuve that man be included at an early stage in space vehicles to speed up the development and application of such vehicles. This will insure and expedite the growth of such systems to their ultimate operational value for man's use.

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Walsh, E.G. 1957 PHYSIOLOGY OF THE NERVOUS SYSTEM (London, England, Longmans, Green, and Co., 1957)

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Walters, G. R., C. C. Wunder, and Lincoln Smith March 1960 MULTIFIELD CENTRIFUGE FOR LIFE-LONG EXPOSURE OF SMALL MAMMALS . Reprinted from Journal of Applied Physiology 15(2):307-308.

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Walton, L. 1953 TYPICAL IMPACTS OF JET AIRCRAFT LAND CRASHES J. Aviation Med. 24:474-482

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Wang, Kenneth, & Lu Ting 1960 ANALYTIC SOLUTIONS OF PLANAR REENTRY TRAJECTORIES WITH LIFT AND DRAG. (Polytechnic Institute of Brooklyn, New York) PIBAL Rept. No. 601; Contract AF 49(638)445; AFOSR TN 60-508; ASTIA AD-237 370; Apr. 1960

ABSTRACT: An approximate analytic solution was obtained for the shallow re-entry trajectory with aerodynamic forces. The limitation on the entry velocity was removed by retaining the gravitation and the centrifugal terms in the equations

of motion. The solution is applicable to trajectories with entry velocity differing much from the circular orbit velocity. For constant lift and drag coefficients the solutions are expressed as 2 algebraic relations. The first one relates the angle of inclination to the atmospheric density or altitude. The second one relates the velocity to the density. For lift and drag coefficients varying as a function of altitude, the solutions may be modified accordingly. For a given entry condition and vehicle area/wt ratio, the first relation is independent of the drag coefficient. Thus it can be tabulated for various lift coefficients only. The second relation gives the velocity at any point of the trajectory for a given drag coefficient. The acceleration experienced by the pilot, and the total acceleration at any point of the trajectory, can be calculated once the velocity and the density are known. It is found that the maximum acceleration can be approximated by the acceleration at $\gamma=0$, where γ is the angle of inclination. For trajectories consisting of multiple entries and exits the exit velocity and exit angle can be computed by a simple iteration. (AUTHOR)

5,771

Wang, K. and L. Ting. 1961 APPROXIMATE SOLUTIONS FOR REENTRY TRAJECTORIES WITH AERODYNAMIC FORCES. (Brooklyn, Polytechnic Inst.) Contr. AF-49(638)445, Rept. no. 647, AFOSR-684, May 1961

ABSTRACT: Approximate analytic solutions for planar trajectories with constant lift and drag coefficients are obtained by improving and extending the analytic solution of Allen and Eggers, and that of Lees, Hartwig, and Cohen. The solutions are derived in a closed form of simple functions expressing the relations between the velocity, the angle of inclination, and the density, or elevation. Using these relations, the acceleration experienced by the pilot and the peak value can be calculated. Before reaching the peak acceleration and the trajectory of constant lift and drag coefficients can be changed to a trajectory with constant designed acceleration by lift and drag modulation.

5.772

Wang, S. C., & H. I. Chinn 1952 EMETIC TRIGGER ZONE AND MOTION SICKNESS IN DOGS. (College of Physicians & Surgeons, Columbia Univ., New York, and School of Aviation Medicine, Randolph Field, Texas)

ABSTRACT: Wang and Borison (1950) have localized a chemoreceptive trigger zone for emesis in the caudal portion of the medulla. Ablation of this zone protects dogs from vomiting to apomorphine and other centrally acting emetics. The vomiting center remains intact in these animals, because they vomit to threshold doses of orally administered copper sulphate. Twelve dogs which have been consistently sensitive to swinging motion on 4 successive weekly trials are selected for the operations: The results shown in the labyrinthectomized and cerebellar animals are in conformity with those reported by Sjoberg (1931) and by Tyler and Bard (1949), respectively. The findings on trigger zone ablated dogs (see table) indicate that the chemoreceptive zone is in the direct pathway concerned with the vestibular reflex in producing motion sickness. The mechanism involved in the mediation of impulses to this zone is now under study.

5,773

Wang, S. C., & H. 1. Chinn 1956 EXPERIMENTAL MOTION SICKNESS IN DOGS: IMPORTANCE OF LABYRINTH AND VESTIBULAR CEREBELLUM. Amer. J. Physiol. 185(3):617-623, June 1956

ABSTRACT: Bilateral labyrinthectomy or ablation of the nodulus and uvula of the cerebellum was observed to eliminate vomiting responses to prolonged swinging motion in dogs selected for their normal susceptibility to motion sickness. Incomplete extirpation of these structures produced partial or total resistance to motion sickness. The animals operated upon exhibited generally normal responses to intravenously administered apomorphine or to orally administered copper sulfate. The results indicate that the vestibular impulses produced by motion traverse the nodulus and uvula of the cerebellum and the chemoceptive emetic trigger zone before reaching the medullary vomiting center.

5,774

Wang, S. C., H. I. Chinn, & A. A. Renze 1957 EXPERIMENTAL MOTION SICKNESS IN DOGS: ROLE OF ABDOMINAL VISCERAL AFFERENTS. (School of Aviation Medicine, Brooks AFB, Texas) Rept. No. 57-112, June 1957

5,775

Ward, A. A., Jr. 1960 EXPERIMENTAL CONCUSSION. FINAL REPORT. (University of Washington School of Medicine, Seattle, Wash.) Contract NONR 942(00), Proj. NR 101 127, c. 1960

ABSTRACT: A brief summary was given of research directed at physiological mechanisms responsible for the coma that follows acceleration--acceleration concussion. The technique used was that of monitoring alterations in neural activity after a blow to the head in cats and monkeys. Neurophysiological studies following acceleration concussion were made. A study of drugs for clinical treatment of this condition was also conducted. (Tufts)

5,776

Ward, A. A., Jr. 1961 EXPERIMENTAL CONCUSSION. (School of Medicine, Washington University, Seattle) (Contract Nonr-94200, Proj. NR 101 127) ASTIA Doc. No. 264 899.

5,777

Ward, Arthur A., Jr. June 1961 PHYSIOLOGICAL BASIS FOR CONCUSSION. (Paper, Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Material Center, Philadelphia, Penn. June 14-15, 1961)

ABSTRACT: Within the brain, a complex biological communication device containing 10 billion elements, there are circuits within the central core which appear to play an indispensable role in the maintenance of consciousness. The function of this reticular activating system, which projects diffusely to many parts of the brain, is dependent upon a continuous input of sensory signals. If this sensory driving is blocked in any fashion, activity in these critical circuits then "runs down" and consciousness is lost. Direct damage to these circuits in the upper brain stem and central thalamus thus produces coma; while blocking transmission of sensory input upon which its activity depends by means of various drugs is the basis for the loss of consciousness during anesthesia. It appears that, following acceleration concussion, changes in those circuits responsible for the sensory driving of the reticular system are also produced so that transmission is blocked and loss of consciousness occurs.

There is evidence to suggest that the human nervous syster handles many items of information simultaneously whereas modern computers tend to do one thing at a time. This use of parallel paths with multilevel referencing coupled with systems of second and third order feedback circuits provides a high redundancy figure for the brain with equivalent functional reliability. Were it not for this property, unattainable demands of reliability would be placed upon individual switching elements of the brain. These factors may play a role in the ability of the brain to withstand relatively high forces before concussion occurs.

5,778

Ward, B., E. Schumacher and F. Bloetscher 1960 A SPACE FLIGHT ESCAPE SYSTEM. In 1960 Proceedings of the Institute of Environmental Sciences, Pp. 298-300.

ABSTRACT: The severity of the external environment that occurs during ballistic re-entry depends upon configuration, ballistic coefficient; surface emissivity, the initial conditions of altitude, velocity and flight path angle; and the method of control for the escape capsule of a manned re-entry vehicle. A jettisonable crew escape capsule is presented for a glide re-entry type of space vehicle which provides an escape capability utilizing drag-stabilized ballistic re-entry. Escape trajectories within specific flight corridor limits are given, and the sequential environmental parameters of temperature, acceleration and atmosphere are analyzed in their relation to vehicle design and human requirements. The capsule internal environment is also discussed and a design solution for its control is presented.

5,779

Ward, J.W. and S.L. Clark 1945 INJURY TO PARANASAL SINUSES BY SIMULATED BLAST IMPACTS. Report # 70 (abstracted), Comm. Neurosurgery, 12 March 1945

5,780

Wardill, T. E. M. 1948 PHYSIOLOGIC EFFECTS OF FLYING
Caribbean M. J. 10:49-57 (nos. 1-2)

5,781

Ware, Ray. W. 1962 BIO-INSTRUMENTATION FOR SPACE FLIGHT
In: (School of Aerospace Medicine) Lectures in Aerospace Medicine, 1962 pp. 159-172

ABSTRACT: This paper is on the topic of biomedical monitoring with emphasis on the practical and theoretical aspects of biomedical instrumentation. It contains a detailed discussion of the techniques used to obtain the measurements of physiological variables in flight. The physiological parameters discussed are the following: EKG (heart rate); respiratory rate and depth (pulmonary ventilation); blood pressure (systolic and diastolic); body temperature, including both the average of several skin temperature loci and "core" temperature; EEG, GSR: psychomotor performance and; eye movements.

5,782

Warren, J.K. 1962 ASTRONAUTICA E MEDICINA (Astronautics and Medicine) Rassenga medica e culturale (Milano) 39(9): 15-18, 51. Sept. 1962.

ABSTRACT: Results of recent American and Russian research projects and space missions are reviewed concerned with man in space as affected by magnetic fields, solar radiations, gravitational forces, weightlessness, accelerations, decelerations, and psychological factors. Pictures of a space environment simulator and gondola to study disorientation and the effects of accelerative forces are included. (Aerospace Medicine 34(3): 271. March 1963)

5,783

Warren, N.D. 1950 AN INVESTIGATION OF CERTAIN AFTEREFFECTS OF INTERMITTENT RADIAL ACCELERATION. (The Psychological Laboratory, The University of Southern California) Psychological Research on the Human Centrifuge, Report No. 8. Oct. 1950.

ABSTRACT: Healthy young male students were employed as subjects in an attempt to determine the aftereffects of prolonged exposure to moderate g intensities.

The subjects were divided into experimental and control groups. A battery of six tests was administered to each group before rotation on the human centrifuge and again at the conclusion of the rotation.

The experimental group was subjected to 3 G's for one minute every eight minutes for a total of 7 minutes. The same exposure schedule was employed for the control group except that the g intensity was 1 1/2 instead of 3 g. (Note: a body at rest on the surface of the earth is being accelerated toward its center with a force of one gravity.)

An analysis of the results was made. T-ratios of the mean differences were computed in order to evaluate the within group differences, and t-ratios based on the mean gains were computed for the between group differences.

5,784

Warren, N.D. 1950 PSYCHOLOGICAL RESEARCH ON THE UNIVERSITY OF SOUTHERN CALIFORNIA HUMAN CENTRIFUGE. (Abstract) Amer Psychol., 5(9):465, September 1950

5,785

Warren, B. H., J. A. Roman and A. Graybiel 1963 EXCLUSION OF ANGULAR ACCELERATIONS AS THE PRINCIPAL CAUSE OF VISUAL ILLUSIONS DURING PARABOLIC FLIGHT MANEUVERS.
(U.S.A.F. School of Aerospace Medicine, Brooks AFB, Texas) SAM-TDR-63-78.

ABSTRACT: The angular accelerations produced in the pitch axis during parabolic flights in the F-100F jet aircraft were reversed 180^{o} with reference to the experimental subject. This was accomplished by flying the aircraft upside down during most of the subgravity period. During such reversal of angular accelerations, no difference was noted in the observed apparent displacements of a visual real target and afterimage from those observed when the aircraft was flown right side up.

The conclusion is drawn that the angular accelerations resulting in the above maneuvers are not a significant factor in producing visual illusions previously observed and described during the subgravity phase.

5,786

Warren, J.K. 1962 ASTRONAUTICA E MEDICINA (ASTRONAUTICS AND MEDICINE) Rassenga medica e culturale (Milano) 39(9): 15-18, 51. Sept. 1962.

ABSTRACT: Results of recent American and Russian research projects and space missions are reviewed concerned with man in space as affected by magnetic fields, solar radiations, gravitational forces, weightlessness, accelerations, decelerations, and psychological factors. Pictures of a space environment simulator and gondola to study disorientation and the effects of accelerative forces are included. (Aerospace Medicine 34(3): 271, March 1963)

5,787

Warren, N. D., W. S. Zimmerman, A. A. Canfield, & R. C. Wilson 1948 THE INFLUENCE OF GRIP UPON ABILITY TO ESTIMATE ACCURATELY THE PULLING FORCE APPLIED TO AN AIRCRAFT STICK. (Dept. of Psychol., Univ. of Southern Calif.) Contract No. N6 ori 77, Task Order 3, Jan. 1948

5,788

Warren, N.D., R.C. Wilson, G.A. Green, G.L.Bryan, N.E. Willmorth 1950. AN INVESTIGATION OF CERTAIN AFTEREFFECTS OF INTERMITTENT RADIAL ACCELERATION. (Reports from the Psychological Lab., Univ. of Southern Calif.) (Psychological Research on the Human Centrifuge, Rept. no. 8, under contract no. N6ori 77, Task Order 3, Office of Naval Research)

5,789

Warren, N.D. 1950 PSYCHOLOGICAL EFFECTS OF INCREASED POSITIVE RADIAL ACCELERATION. In U.S. Office of Naval Research, A symposium: Psychophysiological factors in spatial orientation. Washington, D.C. Pp. 52-54 ONR Proj. Nr. 143-098. Contract N6ori77, Task III, Pensacola, Florida.

ABSTRACT: In the program of psychological research on the human centrifuge at the University of Southern California, two kinds of problems have been studied: (a) the effects upon certain primary abilities, such as spatial orientation, perceptual speed, etc., and (b) changes is some more complex functions whose applications to design and to personnel questions are more direct. In the latter group are studies of reaching speed and accuracy, and if maximum force which can be applied to airplane controls. Continuing studies in the field indicate that the type of movement required of the subject has a relationship to the speed and accuracy of the movement which may suggest the most advantageous location, not only of emergency control, but of particular kinds of knobs and switches.

5,790

Warren, N. D. 1950 PSYCHOLOGICAL RESEARCH ON THE UNIVERSITY OF SOUTHERN CALIFORNIA HUMAN CENTRIFUGE. (Paper, 30th Annual Meeting of the Western Psychological Assoc., 27-29 April 1950, Santa Barbara, Calif.)

ABSTRACT: Research under Office of Naval Research Contract N6ori77, Task Order 3, is concerned with both theoretical and practical aspects of the effects of positive radial acceleration (g) on human subjects. The centrifuge permits application of controlled amounts of g to (and beyond) the limits of human tolerance. These forces simulate those experienced by flyers during certain maneuvers of the airplane. Results have applicability to problems of aircraft design and to psychophysiological theory. (Amer. Psychologist 5(9):465, Sept. 1950)

5,791

Warren, N. D. 1951 THE EFFECTS OF INCREASED POSITIVE RADIAL ACCELERATION ON REACHING AND MANIPULATING TOGGLE SWITCHES. (University of Southern Calif.) June 1951

5,792

Warren, N.D., C.L. Bryan, R.C. Wilson, N.E. Willmorth, & D.W. Svenson. 1951 PSYCHOLOGICAL RESEARCH ON THE HUMAN CENTRIFUGE. ASTIA AD 159 432;

5,793

Warrick, M. J., & D. W. Lund 1946 EFFECT OF MODERATE POSITIVE ACCELERATION (G) ON ABILITY TO READ AIRCRAFT-TYPE INSTRUMENT DIALS. (Air Material Command, Wright Field, Dayton, Ohio) Rept. No. TSEAA-694-10; ASTIA ATI-110 567; 15 Nov. 1946

ABSTRACT: This study was conducted to determine whether or not a pilot's ability to read aircraft instrument dials is impaired by a positive G force less than that required to produce blackout.
Nine common aircraft instrument dials were reproduced in a printed dial reading test of the true-false type. Thirty-four rated military pilots were given this test on the human centrifuge under conditions of 1½ and of 3 G.
It was found that the pilots attempted to read as many dials under conditions of 3 G as they did under conditions of 1½ G. However, under conditions of 3 G, 24% of their readings were erroneous as compared with 18% under conditions of 1½ G. This increase of errors is statistically significant at the 1 percent level of confidence.

5,794

Warrick, M. J., R. E. Nelson, & D. W. Lund 1947 EFFECT OF INCREASED POSITIVE ACCELERATION (G) ON ABILITY TO READ AIRCRAFT INSTRUMENT DIALS. In P. M. Fitts, ed., Psychological Research on Equipment Design (Air Materiel Command Wright-Patterson AFB, Ohio) Rept. No. 19, ATI-125 983, pp. 257-264

SUMMARY AND CONCLUSIONS: 1) The purpose of this study was to determine whether the ability to read aircraft instrument dials is impaired under conditions of moderately low G. Thirty-four rated military pilots were required to read printed simulated instrument dials under conditions of 1½ and 3 G as produced by the human centrifuge. It was found that the subjects made significantly more errors under conditions of 3 G than they did under conditions of 1½ G. 2) Since the ability to read simulated aircraft dials accurately was decreased under conditions of 3 G as compared to conditions of 1½ G, it is concluded that moderate G impairs the ability to read aircraft instruments. (AUTHOR)

5,795

Waterfield, R. L. 1931 THE EFFECT OF POSTURE ON THE VOLUME OF THE LEG. J. Physiol. 72:121-131

5,796

Waterfield, R. L. 1931 THE EFFECTS OF POSTURE ON THE CIRCULATING BLOOD VOLUME. J. Physiol. 72:110-120

5,797

Waters, J. W. 1954 DITCHING. Flying Safety, 10 (4): 6-9.

ABSTRACT: This is an article dealing with ditching under night and instrument conditions.

5,798

Waters, J. W. 1955 DITCHING. Flying Safety (April 1955): 6-9.

ABSTRACT: This article describes procedures for forced landings upon water, at night, and flying by instruments. First of all it is necessary to establish the circumstances

of the sea and wind, in order to choose the proper landing direction. If the pilot is unable to obtain this information himself, he may obtain it from the flight traffic directions of the "Rescue Coordination Center". It is better, however, that the flyer make his own observations by use of flares. The article then describes the landing procedure with the use of two flares M45 by 600,000/CP, which each burn three minutes. A follow-up article will describe the method to be used when an accompanying aircraft is present.

5,799

Waters, M.H.L. & A.C. Browning 1961 THE USE OF PARACHUTES AT HIGH SPEED AND HIGH ALTITUDE (Royal Aircraft Establishment, Gt. Britain) Technical note No. Mech. Eng. 340, August 1961. ASTIA AD 267 692

ABSTRACT: Parachutes are considered generally as inflatable drag devices, and their use in rocket recovery is studied. The speeds concerned are supersonic and the altitudes range to 300,000 ft., which is the effective limit of the earth's atmosphere. Most of the note discusses the higher altitude region (1000,000 to 3000,000 ft.) where forced inflation is necessary, and aerodynamic heating is important. On the basis of vertical re-entry trajectories, broad design limits for drag devices are suggested, and weight estimates made. Satellite recovery is not treated, but the techniques needed there are common to rocket recovery. Parachute systems are practical for recovering rocket parts, and experiments needed to develop such systems are outlined. (Author)

5,800

Watson, J. F., N. S. Cherniack, F. W. Zechman 1960 RESPIRATORY MECHANICS DURING FORWARD ACCELERATION. (Wright Air Development Division) WADD TR 60-594, ASTIA AD 252 621, Sept. 1960
See also abstract: Fed. Proc. 19:375
See also J. Clin. Invest. 39(11):1737-1743, Nov. 1960

Summary (a): Static relaxation pressure volume curves of the thorax and lung were obtained on 4 trained subjects while in the supine position on the human centrifuge at 1, 2, 3, and 4 g. As acceleration increased, the intrapulmonic pressure increased for a constant volume shifting the pressure volume curve downward and to the right. Compliance of the thorax and lung decreases from 1 to 4 g as the result of the fall in pulmonary mid-position. Inspiration during 4 g acceleration, regardless of the end expiratory position was always active. Elastic work of breathing approximately doubles from 1 to 4 g while nonelastic work does not change.

Absolute lung volumes during acceleration decrease proportionately [sic] with the exception of residual volume which did not change. Since these changes are similar to those described during negative pressure breathing, positive pressure breathing is suggested as a means by which respiration during forward acceleration may be improved and toleration increased. (AUTHOR)

5,801

Watson, J. F., N. S. Cherniack, & F. W. Zechman 1960 RESPIRATORY MECHANICS DURING FORWARD ACCELERATION. J. Clin. Invest. 39(11):1737-1743, Nov. 1960
See also Fed. Proc. 19:375
See also (Wright Air Development Div., Wright-Patterson AFB, Ohio) WADD TR 60-594; ASTIA AD-252 621; Sept. 1960, (F)

SUMMARY (a): Static relaxation pressure volume curves of the thorax and lung were obtained on 4 trained subjects while in the supine position on the human centrifuge at 1, 2, 3, and 4 g. As acceleration increased, the intrapulmonic pressure increased for a constant volume shifting the pressure volume curve downward and to the right. Compliance of the thorax and lung decreases from 1 to 4 g as the result of the fall in pulmonary mid-position. Inspiration during 4 g acceleration, regardless of the end expiratory position was always active. Elastic work of breathing approximately doubles from 1 to 4 g while nonelastic work does not change. Absolute lung volumes during acceleration decrease proportionately (sic) with the exception of residual volume which did not change. Since these changes are similar to those described during negative pressure breathing, positive pressure breathing is suggested as a means by which respiration during forward acceleration may be improved and tolerance increased. (AUTHOR)

5,802

Watson, J. F., N. S. Cherniack, F. W. Zechman 1960 RESPIRATORY MECHANICS DURING FORWARD ACCELERATION. Fed. Proc. 19:375
See also (Wright Air Development Division) WADD TR 60-594; ASTIA AD 252 621 Sept. 1960. (F)
See also J. Clin. Invest. 39(11):1737-1743, Nov. 1960

Summary (a): Static relaxation pressure volume curves of the thorax and lung were obtained on 4 trained subjects while in the supine position on the human centrifuge at 1, 2, 3, and 4 g. As acceleration increased, the intrapulmonic pressure increased for a constant volume shifting the pressure volume curve downward and to the right. Compliance of the thorax and lung decreases from 1 to 4 g as the result of the fall in pulmonary mid-position. Inspiration during 4 g acceleration, regardless of the end expiratory position was always active. Elastic work of breathing approximately doubles from 1 to 4 g while nonelastic work does not change. Absolute lung volumes during acceleration decrease proportionately sic with the exception of residual volume which did not change. Since these changes are similar to those described during negative pressure breathing, positive pressure breathing is suggested as a means by which respiration during forward acceleration may be improved and toleration increased. (AUTHOR)

5,803

Watson, John F. & Rita M. Rapp 1961 EFFECT OF FORWARD ACCELERATION ON RENAL HEMODYANMICS, ELECTROLYTE EXCRETION, AND WATER CLEARANCE (Aeronautical Systems Division, Aerospace Medical Laboratory, Wright-Patterson Air Force Base, Ohio) ASD TR 61-375 Project 7222; Task 71746 ASTIA AD 267340, Aug. 1961.

ABSTRACT: The effect of forward acceleration on renal hemodynamics, electrolyte excretion, and water clearance has been studied in six normal human subjects. Forward acceleration produced a slight increase in glomerular filtration rate and effective renal plasma flow during and after the stress. Following centrifugation there was a 20- to 35-minute lag before the appearance of an increase in urine volume and free water clearance. These changes in water excretion were transient, not accompanied by a natriuresis nor associated with changes in serum osmolality. Physiologic responses to forward acceleration and negative pressure breathing were compared. We concluded that forward acceleration, like negative pressure breathing, induces an increase in intrathoracic blood volume which inhibits the release of anti-diuretic hormone via a non-osmotic, volume sensitive receptor mechanism located within the intrathoracic vascular space. (author)

5,804

Watson, J. F. & N. S. Cherniack 1961 EFFECT OF POSITIVE PRESSURE BREATHING ON THE RESPIRATORY MECHANICS AND TOLERANCE TO FORWARD ACCELERATION (USAF Biomedical Lab., Wright-Patterson AFB, Ohio) Proj. 7222, Task 71746, ASD TR 61 398, Aug. 1961

ABSTRACT: The hypothesis that positive pressure breathing may reverse the abnormalities of respiratory mechanics produced by forward acceleration and thereby increase tolerance limits was studied experimentally. Vital capacity, inspiratory reserve, tidal air, and expiratory reserve were measured in four Ss at 4, 6, and 8 g with and without positive pressure; 100 percent oxygen was used in both cases. Time tolerances and vital capacity with and without pressure breathing were determined in nine Ss at ten g; each S rode until he felt he could no longer withstand further acceleration. Changes in lung volumes and time tolerances due to positive pressure breathing were analyzed. (Tufts)

5,805

Watson, J. F. & N. S. Cherniack 1961 EFFECTS OF POSITIVE PRESSURE BREATHING ON THE RESPIRATORY MECHANICS AND TOLERANCE TO FORWARD ACCELERATION. Rept. for 1 Mar - 18 May 59 on Biophysics of Flight. (Aerospace Medical Lab., Aeronautical Systems Div., Wright-Patterson AFB, Ohio) ASD TR 61-398, August 1961. ASTIA Doc. No. AD-268 565.

ABSTRACT: The main factors limiting tolerance to forward acceleration are dyspnea, chest pain, and difficulty in inspiring. Previous studies of the mechanics of respiration during forward acceleration revealed the follow-

ing: (1) lung volumes decreased proportionately with the exception of residual volume; (2) resting midpulmonary position decreased; (3) intrapulmonic pressure increased for a constant volume; (4) static and dynamic pulmonary compliance decreased; (5) elastic work of breathing increased due to the work necessary to overcome the additional resistance resulting from acceleration. The effects of positive pressure breathing on lung volumes and time tolerance to forward acceleration of 12 trained subjects were studies. Positive pressure breathing significantly increased lung volumes, particularly the expiratory reserve volume. This increase in lung volumes was associated with a 67 percent mean increase in time tolerance. Positive pressure breathing is therefore both a practical and physiologically sound countermeasure by which tolerance to forward acceleration can be improved and human safety during prolonged exposures increased. (Author)

See Also J. Clin. Invest. (In press, 1960)

5,806

Watson, J. F. & Rita M. Rapp 1961 EFFECT OF FORWARD ACCELERATION ON RENAL HEMODYNAMICS, ELECTROLYTE EXCRETION, AND WATER CLEARANCE. (USAF Biomedical Lab., Wright-Patterson AFB, Ohio) Proj. 7222, Task 71746, ASD TR 61 375, Aug. 1961

ABSTRACT: The effect of forward acceleration on renal hemodynamics, electrolyte excretion, and water clearance was studied in six normal human Ss. Physiologic responses to forward acceleration and negative pressure breathing were compared. (Tufts)

5,807

Watson, J. F., & N. S. Cherniack 1962 THE EFFECT OF POSITIVE PRESSURE BREATHING ON THE RESPIRATORY MECHANICS AND TOLERANCE TO FORWARD ACCELERATION. In Barbour, A. B., & H. E. Whittingham, eds., Human Problems of Supersonic and Hypersonic Flight (New York, Oxford, London, Paris: Pergamon Press, 1962) pp. 313-324
NOTE: Reel 11, Flash 5

5,808

Watson, J. F., & R. M. Rapp 1962 EFFECT OF FORWARD ACCELERATION ON RENAL FUNCTION. J. Applied Physiol. 17(3):413-416, May 1962

ABSTRACT: The effect of forward acceleration on renal hemodynamics, electrolyte excretion, and water clearance was studied in six normal human subjects. Forward acceleration produced a slight increase in glomerular filtration rate and effective renal plasma flow during and after stress. After centrifugation there was a 20-35 minute lag before the appearance of an increase in urine volume and free water clearance. These changes in water excretion were transient and were not accompanied by a natriuresis nor associated with changes in serum osmolality. Physiologic responses to forward acceleration and negative pressure breathing were compared. It is suggested that forward acceleration, like negative pressure breathing, may induce an increase in intrathoracic blood volume which inhibits the release of antidiuretic hormone via a nonosmotic volume-sensitive receptor mechanism located within the intrathoracic vascular space. (AUTHOR)

5,809

Watson, J.T. 1961 GRAVITATIONAL CONTROL RESEARCH
(Report, Faculty of the Graduate School of Southern Methodist University as Partial Fulfillment of the Requirements for the Degree of Master of Science in Electrical Engineering) Feb. 1961. ASTIA AD 253 588.

ABSTRACT: Success in attaining control over gravitation seems unquestionably tied to a better understanding of gravitation. At the present time, most of the work being done towards gaining gravitational control is centered around the quest for better knowledge concerning the nature of gravitation. This report will be concerned with some of the more applicable theories and research. The information will be discussed in four sections: Introduction, Characteristics of Gravitation, Theories of Gravitation, and Current Research Effort. Some of the material will, of necessity, fall into more than one category.

5,810

Watson, William L. 1961 THE VALSALVA MANEUVER: ITS RELATIONSHIP TO CHRONIC RECURRENT AEROTITIS MEDIA
(School of Aerospace Medicine, USAF Aerospace Medical Center (ATC), Brooks Air Force Base, Texas) Review 5-61 ASTIA AD 264464

ABSTRACT: Aerotitis media is an acute or chronic traumatic inflammation of the middle ear and is caused by inadequate ventilation of the middle ear during ascent or descent in flight. One generally accepted way of equalizing the pressure is by performing the Valsalva maneuver.

The studies for this report have adopted a new approach to the problem of testing pilots by using the Valsalva maneuver. The rationale for this study is based on the assumption that flight personnel who have accrued many hours of flying time have not suffered chronic recurrent attacks of aerotitis media, since otherwise they would have been removed from flying status. This is a report on the procedures, results, review of subject records, and Air Force implications of the studies.

5,811

Watson- Jones, R. 1941 FRACTURES OF THE SPINE SUSTAINED BY RAF PILOTS AND THE RELATIONSHIP OF THESE INJURIES TO THE SUTTON HARNESS, PARACHUTE HARNESS AND OTHER EQUIPMENT. (Flying Personnel Research Committee, Canada) FPRC Report No. 274, April 1941

5,812

Watson-Jones, R. 1943 FRACTURES AND JOINT INJURIES. 2nd Ed. Edinburgh: Livingston, 1943.

5,813

Watt, G.E. 1940 CENTRIFUGAL ACCELERATION IN AIRCRAFT AS IT AFFECTS THE FIGHTER PILOT. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 136(b), May 1940.

5,814

Watt, G. E. 1940 INVESTIGATION INTO THE EFFECT OF ALTITUDE AND ANOXIA ON "BLACKING-OUT" THRESHOLD. (Royal Air Force, Farnborough) FPRC 213. ASTIA ATI 206 402.

ABSTRACT: Plane tests were made at 10,000 and 15,500 feet with and without oxygen. Failure to use oxygen at 10,000 feet lowers "g" tolerance by 0.5 "g". This was confirmed at 15,500 feet, where complete blackout occurred at 5.9 "g" as opposed to 6.9 "g" at 10,000 feet using oxygen. Tolerance was constant from 20,000 to 32,000 feet when using oxygen.

5,815

Watts, D. T., E. S. Mendelson, H. N. Hunter, A. T. Kornfield, & J. R. Poppen TOLERANCES TO VERTICAL ACCELERATION REQUIRED FOR SEAT EJECTION. (Naval Air Experimental Station, Philadelphia, Pa.) J. of Aviation Med. 18:88, 1947.

5,816

Watts, D.T., E.S. Mendelson, & A.T. Kornfield 1946 PILOT'S ESCAPE FROM HIGH PERFORMANCE AIRCRAFT MECHANISM FOR DEVELOPMENT AND TEST OF (Aero Medical Equipment Laboratory, Naval Air Experimental Station, Naval Air Material Center, Philadelphia) Report No. 1 TED No. NAM 256005, 20 Jan. 1947. ASTIA ATI 206 052

ABSTRACT: Tests were conducted in the field of ejection for the following purposes: (a) To investigate the operation of personnel ejection catapults for use in escape from aircraft. (B) To evaluate the safety and comfort of such existing devices, viz. the Martin-Baker (MBA) multiple charge, slowly accelerating practical factors affecting human comfort and safety during upward ejection in a conventional aircraft seat with standard harness and cushions. (d) To estimate the upper limits of acceleration from seat to head that may be tolerated for seat ejection. (e) To obtain physiological information for the improvement or development of ejection seats. A complete description of the tests and results is given in this publication.

5,817

Watts, D.T., E.S. Mendelson, & A.T. Kornfield 1947 HUMAN TOLERANCE TO ACCELERATIONS APPLIED FROM SEAT TO HEAD DURING EJECTION SEAT TESTS; PILOT'S ESCAPE FROM HIGH PERFORMANCE AIRCRAFT MECHANISM FOR -DEVELOPMENT AND TEST OF (Aero Medical Equipment Lab., Naval Air Experimental Station, Naval Air Material Ctr., Pa.) Project TED No. NAM 256005, Rept. No. 1, Jan. 1947. ASTIA ATI 206052

CONCLUSIONS: Average subjects have repeatedly ridden on the MBA 40", 52" and 60" catapults and have attained average velocities of 55.4, 63.4, and 60.4 ft/sec respectively. Average maximum "G" recorded on the catapult seat

and the hip, shoulder and head of subjects have been 17.4, 19.9, 18.5 and 17.0 "G" respectively. These accelerations have not resulted in significantly undesirable reactions and it is believed average aviation personnel could tolerate such accelerations with no injury.

The T-2 catapult with a much faster initial rate of acceleration produces unbalanced oscillations in the seat-cushion-subject mass system. This results in excessive accelerations recorded on the subject and man's limitation is approached while obtaining a maximum ejection velocity of 40 to 47.5 ft/sec No conclusions can be made as to the absolute optimum rate of seat acceleration for personnel ejection catapults. However, from the practical standpoint these experiments have shown that seat acceleration rates up to 100 "G" per second have not produced significant internal oscillations in the seat-cushion-subject mass with resultant excessive accelerations on the subject. Acceleration rates of 100 to 200 "g" per second begin to elicit excessive accelerations on the subject and rates of 200 to 700 "G" per second lead to such highly excessive acceleration on the subject that the performance of any catapult with a given stroke is definitely limited. This phenomenon might be controlled to some extent by the use of highly damped cushions, but the more logical point of control is in the catapult imparting the accelerations and it is believed that the present seat parachute and cushion is a highly satisfactory cushioning system for ejection seats.

As shown under the condition of these experiments average men can safely tolerate the acceleration required to obtain adequate velocity for seat ejection. It is expected that other problems associated with seat ejection from aircraft can be solved. This is borne out by the live ejection of Lt. A.J. Furtek on 30 Oct. 1946. at an IAS of 250 mph. (Author)

5,818

Watts, D. T., E. S. Mendelson, & H. N. Hunter 1947 EVALUATION OF FACE CURTAIN AND ARM REST FOR USE ON EJECTION SEATS. (Naval Air Experimental Station, Philadelphia, Pa.) TED No. NAM 256005, Rept. No. 4, March 1947

ABSTRACT: Experiments were conducted comparing arm rests and a face curtain for use on ejection seats. The curtain is pulled from above the head to the level of the sternum. This fires the catapult, restrains the head and partially supports the weight of the hands, arms and shoulders during the following acceleration. The curtain satisfactorily restrained the head and shoulders at accelerations from 17 to 21 G. With arm rests undesirable flexion of the body occurred at 10 to 12 G. Subjective reactions using the curtain were much less severe at the higher accelerations than they were at the lower values using the arms rests. It is concluded that the curtain is absolutely essential and is more protective than arm rests for use on ejection seats at accelerations up to 21 G.

5,819

Watts, D.T., E.S. Mendelson, H.N. Hunter, A.T. Kornfield & J.R. Poppen 1947
TOLERANCE TO VERTICAL ACCELERATION REQUIRED FOR SEAT EJECTION
The Journal of Aviation Medicine 18 (6): 554-564 December 1947

ABSTRACT: The problem of bailing out of military aircraft and the desirability of the ejection seat as a means of escape are discussed. A 105-foot test rig and experimental procedures are described. Results are given of sixty ejection seat experiments in which volunteer subjects were exposed to maximum acceleration in the range of approximately 18 to 21 g. It is concluded that, under the conditions of the experiments, average men can tolerate this acceleration, which is adequate to eject aviators from aircraft. Careful recordings of catapult pressure and resultant accelerations were essential for the control and analysis of the forces to which personnel were exposed. Satisfactory instrumentation for this purpose has been assembled and its use described. The dynamic response of the seat-cushion-subject mass to the suddenly applied ejection force is analyzed and discussed. This analysis has led to the improvement of existing catapults and the development of new and superior ejection devices.

5,820

Watts, D.T., E.S. Mendelson and A.T. Kornfield 1947 PRELIMINARY TESTS OF SUDDEN UPWARD ACCELERATION ON SITTING MEN. Am. J. M. Sc., 213:754

5,821

Weaver, J. A., & R. F. Gray 1962 THE PERCEPTION OF OCULOGRAVIC ILLUSIONS BY INVERTED SUBJECTS. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA 6207; ASTIA AD-282 544; 6 July 1962

ABSTRACT: Four inverted subjects were exposed to varying centrifugal accelerations on a human centrifuge. They noted that as the centrifugal acceleration varied, there was an accompanying variation of the visual vertical (oculogravic illusion). As indicated by the oculogravic illusion, inverted and upright subjects are approximately equally sensitive to centrifugal acceleration. It was found that the otolith organs are about as sensitive to lateral centrifugal acceleration of inverted subjects as they are to lateral centrifugal acceleration of erect subjects. (AUTHOR)

5,822

Weaver, J., M. Rubinstein, C.C. Clark, & R.F. Gray 1962 ENCAPSULATION OF HUMANS IN RIGID POLYURETHANE FOAM FOR USE AS A RESTRAINT SYSTEM IN HIGH ACCELERATION ENVIRONMENT. (Naval Air Development Center, Johnsville, Pa.) Report No. NADC-MA 6147, May 31, 1962.

ABSTRACT: Molded seats and couches have the advantages of distributing accelerative loads developed by the user's body across the maximum possible area. This report discusses experiments with complete encapsulation of humans in rigid casts of polyurethane foam for periods of more than two hours. The procedures discussed were judged by a subject to give better support in an acceleration environment than other forms of human restraint tested at the Aviation Medical Acceleration Laboratory, U.S. Naval Air Development Center, Johnsville, Pa. Considerable progress in solving the problems associated with casting humans in this material was made during these experiments. It was found possible to form a complete rigid cast around a human in five minutes and possible to remove this cast in less than three minutes. Subjects have stayed encapsulated in foam casts for periods of up to 30 minutes without special provisions for cooling. Vestilatable garments permit persons to stay encapsulated in the foam for periods of at least two hours. The immobilization leads muscle and joint pain which increases with time and sets limits on tolerance to being submerged in this type of rigid cast. (Author)

5,823

Webb Associates 1962 FORCE FIELDS
In: NASA Life Sciences Data Book (National Aeronautics and Space Administration, Washington, D.C.) Contract NASr-89. June 1962

ABSTRACT: This handbook provides 28 pages of charts and summaries from the various force fields. Areas covered include: acceleration (experience, impact, transverse G limits, acceleration terminology, variations in G tolerance, G vector and consciousness, direction of force, maximum tolerable acceleration profiles, G protection by water immersion); tolerance to tumbling; deceleration (abrupt transverse, positive and negative G decelerations, tolerance to vertical impact, human impact sensitivity, impact tolerance); G fields in rotating space vehicles; vibration, (response, tolerances, physiological effects, psychophysical factors, performance functions, transmission, oxygen consumption, respiratory ventilation, and tracking performance); resonance of the abdominal wall; oscillations; high dynamic pressures; and blast injury.

5,824

Webb, L.S. 1954 NAVAL ORDNANCE LABORATORY MEMORANDA, NAVORDS, AND REPORTS PUBLISHED BY THE AEROBALLISTIC RESEARCH DEPARTMENT OCTOBER 1945- DECEMBER 1953 (Naval Ordnance Lab., White Oak, Md.) 12 March 1954; Aeroballistic research rept. no. 222; NAVORD rept. no. 3660; ASTIA AD-134 631

5,825

Webb, M.G. 1957 PILOT'S ABILITY TO ACTUATE COCKPIT CONTROLS UNDER G CONDITIONS U.S. Naval Air Development Center, Johnsville, Pa. NADC-MA-LR20 March 29, 1957

ABSTRACT: An F4D ejection seat with face curtain was mounted in the gondola of the AMAL centrifuge, facing outward and the face curtain was connected to the control circuit of the centrifuge in such a way that pulling the face curtain stopped the centrifuge. One series of five runs was conducted with a build-up to peak G on each run of 12.5 seconds, at which time a signal was given and the subject activated the curtain handle. Maximum G on the first run was 2.5 G, and increments of 0.5 were used on subsequent runs until the fifth run, at which time the subject failed to reach the face curtain at 4.5 G. This failure at 4.5 G was attributed to a deficiency of the present safety harness system, leading to the possible conclusion that the presently-used safety harness system, when used in conjunction with the face curtain ejection seat firing mechanism, may prove to be outmoded.

5,826

Webb, M. G. 1958 SOME EFFECTS OF ACCELERATION ON HUMAN SUBJECTS. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5812; ASTIA AD-209 082; 30 Sept. 1958 See also J. Avia. Med. 29(12):879-884

ABSTRACT: The most important physical effects of acceleration on human subjects as observed at the Aviation Medical Acceleration Laboratory are presented in this report. Damage to the peripheral superficial veins can be prevented with adequate counterpressure with elastic bandages. By carefully choosing and monitoring subjects it should be possible to prevent cardiac emergencies. Observations suggest that aviators who experience unconsciousness in flight due to acceleration should not land immediat /, but should stay aloft for some time if fuel aboard will permit it. A definite study should be done to determine this. Serious damage to the labyrinth may be prevented by early recognition of danger signs. Further studies will undoubtedly reveal the best orientation of the human body in a G field to prevent chest pain. The intestinal bleeding and chest pain which occur in vibration studies indicate the need for extensive animal research in this relatively untouched area of investigation. (AUTHOR)

5,827

Webb, M. G. 1958 SOME EFFECTS OF ACCELERATION ON HUMAN SUBJECTS J. Avia. Med. 29(12):879-884 See also (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5812; ASTIA AD-209 082; 30 Sept. 1958

ABSTRACT: The most important physical effects of acceleration on human subjects as observed at the Aviation Medical Acceleration Laboratory are presented in this

report. Damage to the peripheral superficial veins can be prevented with adequate counterpressure with elastic bandages. By carefully choosing and monitoring subjects it should be possible to prevent cardiac emergencies. Observations suggest that aviators who experience unconsciousness in flight due to acceleration should not land immediately, but should stay aloft for some time if fuel aboard will permit it. A definitive study should be done to determine this. Serious damage to the labyrinth may be prevented by early recognition of danger signs. Further studies will undoubtedly reveal the best orientation of the human body in a G field to prevent chest pain. The intestinal bleeding and chest pain which occur in vibration studies indicate the need for extensive animal research in this relatively untouched area of investigation. (AUTHOR)

5,828

Webb, M.G. & R.F. Gray 1958 HUMAN TOLERANCE TO HIGH ACCELERATION STRES
U.S. Naval Air Development Center, Johnsville, Pa. NADC-MA-LR52 May 2, 1958

ABSTRACT: Three human subjects, submerged in water to eye level while in a sitting position in a tank, were exposed to positive G levels up to 16 G on the 50-foot centrifuge at AMAL. The acceleration followed a sinusoidal pattern as a function of time, increasing in amount for 12.5 seconds. The subjects held their breath during the runs which were carried out using the tank used by Code, Wood, and Baldes in 1942 at the Mayo Clinic. At that time they used submersion to the level of the third rib and obtained about 1.7 G protection. The present study sought to increase G tolerance by using water pressure to compress the air in the chest. It was expected that the air pressure in the chest would exert counter pressure against the hydrostatic pressures within the circulatory system of the chest and thus reduce expansion of the circulatory system during periods of increased acceleration. Peripheral light loss was used as the endpoint. Exposures of subjects to acceleration began at a level of 1.5 G and increased by 0.5 G units. The maximum acceleration to which subject MGW was exposed was 10.0 G, subject HE, 10.5 G, and subject FG, 16.0 G. For subject FG, whose normal G tolerance unprotected was 3.25 G, this amounted to an increase in G tolerance of 12.75 G, a record for positive acceleration in this degree at this time.

5,829

Webb, M.G., & R.F. Gray 1958 PRELIMINARY STUDY OF G TOLERANCE OF A SUBJECT IN THE G CAPSULE, PRONE POSITION. (Naval Air Development Ctr., Johnsville, Pa.) Letter Rept. IED ADC AE-1411, Serial 0568, 8 July 1958.

5,830

Webb, M. G., & R. F. Gray 1959 PROTECTION AGAINST ACCELERATION BY WATER IMMERSION. (Paper, American Rocket Society Semi-annual Meeting, 8-11 June 1959, San Diego, Calif.) American Rocket Society Paper 805-59, June 1959

5,831

Webb, M. G., & R. F. Gray 1960 A NEW METHOD OF PROTECTION AGAINST THE EFFECTS OF ACCELERATION ON THE CARDIOVASCULAR SYSTEM. Amer. J. Cardiol. 6(6):1070-1077, Dec. 1960

ABSTRACT: A closed water-immersion system for the protection of the cardiovascular system of human centrifuge subjects against the effects of acceleration is described. One subject was exposed to accelerations as high as 31 g. The first subject had frontal sinus hemorrhage at 28 g, possibly due to high respiratory system pressure used to protect the chest but which was later found to be unnecessary. The second subject stopped at 26 g due to anxiety. The third subject successfully sustained a 31 g exposure for 5 seconds without injury. The only clearcut evidence of cardiovascular system dysfunction was frontal sinus hemorrhage. An additional advantage of the system was found to be that movement of the extremities during high accelerations was not hindered. (AUTHORS)

5,832

Webb, M. G. 1961 END POINTS FOR ACCELERATION TOLERANCES ON THE CENTRIFUGE. In Bergeret, P., ed., Bio-Assay Techniques for Human Centrifuges and Physiological Effects of Acceleration. (London, New York, Paris: Pergamon Press, 1961) AGARDograph 48. Pp. 59-64.

ABSTRACT: The intent of this paper is to indicate that the ultimate goal for those working in the field of acceleration is to be able to test on the centrifuge the ability of man to perform his total task in the total environment. Not until this happens will centrifuge personnel be able to perform their dual function of providing accurate, adequate data for the engineers who will design future vehicles, while simultaneously working to increase man's tolerance to acceleration.

5,833

Webb, P. 1959 HUMAN TOLERANCE AND PROTECTIVE CLOTHING Annals New York Acad. Sc., 82 (3): 714-723 7 Oct 1959

5,834

Webber, D. A. 1956 ACCELERATION MEASUREMENTS DURING DROP TESTS. (Royal Air Establishment, Great Britian, Farnborough) TN STRUC. 198, July 1956

ABSTRACT: Test results of an extensive drop-testing program on a complete aircraft into which four types of accelerometers were fitted. The obtained acceleration readings and the relative merits of the four instruments designed for this special purpose are compared.

5,835

Webster, A.P. n.d. ACCELERATION in Human Engineering Bulletin 55-5 H (Flight Safety Foundation, New York, California)

ABSTRACT: The Human Engineering Bulletin is prepared to assist designers and engineers to incorporate physiological and psychological data in aircraft design as a means of advancing aviation safety.

5,836

Webster, A.P. 1947 FREE-FALLS AND PARACHUTE DESCENTS IN THE STANDARD ATMOSPHERE. (National Advisory Committee for Aeronautics, Wash., D.C.) NACA TN 1315, June 1947.

ABSTRACT: With the advent of high-altitude flying, hazards not previously encountered in the event of bail-out became of extreme importance. Without oxygen, consciousness is lost very quickly. The extreme cold necessitates the wearing of heavy flying suits which not only encumber the jumper but increase his weight. The duration of the descent subjects the jumper to anoxia and cold.

In order to have a background for answering some of the arising questions on free-falls, information was obtained on altitude, velocity and time relationships for free-falls and open parachute descent. Values were tabulated for the situation in which the weight of the jumper equals the drag in the standard atmosphere.

5,837

Webster, A.P. & H.A. Smedal 1949 SUGGESTED ALTITUDE VS. VELOCITY TOLERANCES FOR PARACHUTE OPENING SHOCK. U.S. Navy Medical News Letter, 10:1-6. March - April 1949.

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Webster, A.P. and D.E. Reynolds 1950 TIME OF CONSCIOUSNESS DURING EXPOSURE TO VARIOUS PRESSURE ALTITUDES. J. Aviat. Med., 21:237

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Webster, A. P. 1950 HIGH ALTITUDE-HIGH VELOCITY FLYING WITH SPECIAL REFERENCE TO THE HUMAN FACTORS. I. OUTLINE OF HUMAN PROBLEMS. J. Aviation Med. 21(2):82-84, 89.

5,840

Webster, A. P. & O. E. Reynolds 1950 HIGH ALTITUDE, HIGH VELOCITY FLYING WITH SPECIAL REFERENCE TO THE HUMAN FACTORS. II. TIME OF CONSCIOUSNESS DURING EXPOSURE TO VARIOUS PRESSURE ALTITUDES. J. Aviation Med. 21(3):237-245.

5,841

Webster, A.P., 1953 HIGH ALTITUDE-HIGH VELOCITY FLYING WITH REFERENCE TO THE HUMAN FACTORS. IV. OPENING SHOCK OF PARACHUTE DESCENTS. J. Aviation Med. 24(2):189-199

SUMMARY: The opening shock of standard American parachutes is shown to increase directly with the fourth power of the velocity (true air speed) of the jumper when the parachute opens; to increase directly with the weight of the jumper; and to increase directly with the mass density of the air, i.e., decrease with increase in altitude. The equation for the opening shock is of the form $P = AW\rho V_o^4$ where P is the opening shock in pounds; W is the weight of the jumper in pounds; ρ is the mass density of the air in slugs per cubic foot; is the opening velocity in feet per second; G is the opening shock in multiples of g, the acceleration due to gravity; and A is a constant depending on the type of parachute. This constant has been estimated to be 3.964 x 10 , 3.441 x 10 , and 5.386 x 10 for 24-foot nylon, 28-foot nylon and 28-foot silk parachutes, respectively. If the jumper is falling at equilibrium free-fall velocity when the parachute opens, the opening shock may be obtained from the equation $P = BWV_\rho^2$ or $G = BV_f^2$ where V_f is the free-fall equilibrium velocity, and B is a constant depending on the type of parachute. This constant has been estimated to be 0.0488, 0.0575, and 0.0785 for 24-foot nylon, 28-foot nylon, and 28-foot silk parachutes, respectively. For a constant G-tolerance criterion, the relation between the velocity and mass density of the air (altitude) is of the form

$$V_o = \left(\frac{C}{\rho}\right)^{\frac{1}{4}}$$

where C is a constant depending on the type of parachute and the value of G selected.

For a 200-pound jumper with a 20 G criterion and a 28-foot nylon parachute, the constant C is estimated to be 5.812×10^6; and for a 30G criterion, 8.718×10^6. Using this latter equation and constants a velocity-altitude tolerance table and chart were prepared showing a SAFE REGION production of 20 G or less, a DANGEROUS REGION PRODUCING 30 G or more, and BORDERLINE REGION producing between 20 and 30G

5,842

Webster, A. P., & H. N. Hunter 1954 ACCELERATION
J. Avia. Med. 25(4):378-379, Aug. 1954
See also (Naval Air Development Ctr., Johnsville, Pa.) NADC TR- ;
March 1954

ABSTRACT: A table is presented containing the following data: (1) relationship between the different types of acceleration (positive, negative, transverse prone, fluctuating positive, and cyclic) and direction of body movement, type of aircraft maneuver, and tolerance limits under various degrees of experimental exposures in man; and (2) pathological effects on animals of varying degrees of various types of acceleration.

5,843

Webster, A.P. 1956 ACCELERATION LIMITS OF THE HUMAN BODY Aviation Age, March 1956

5,844

Wechsler, R. L. August 1952 EFFECTS OF ACCELERATION UPON CEREBRAL METABOLISM AND CEREBRAL BLOOD FLOW. PHASE I. DEVELOPMENT OF A NEW METHOD FOR CONTINUOUS MEASUREMENT OF CEREBRAL BLOOD FLOW IN HUMANS UNDER ACCELERATION. NADC-MA-5202 (Rept. NM 001 060.03.01) 5 Aug 1952.

ABSTRACT: The radioactive krypton (KR) method was developed for the investigation of cerebral circulation during acceleration. This method is similar S. S. Kety's nitrous oxide method, substituting K79 for N_2O.

It permits measurement of cerebral blood flow as often as 2-4 times in 30 seconds. The maximum amounts of KR^{79} to which a normal subject would be exposed during the inhalation of Kr^{79} (in concentrations of 100 microcurie per liter) for 20 minutes was calculated to be 300 and 250 uc. in the lungs and in the remainder of the body, respectively. A scintillation counter, with a thallium-activated NaI crystal, will be used to record the Kr^{79} y - rays. (TIP abstract, modified).

5,845

Weddell, F.J. Jr. 1945 (INSTITUTE OF HYGIENE) Subcomm.) REPORT ON TARGET 24/17e, GOTTINGEN, GERMANY. (War Dept., Combined Intelligence Objectives Report #28, 20 April 1945

5,846

Weed, L. H. 1927 EXPERIMENTAL STUDIES OF INTRACRANIAL PRESSURE. AN INVESTIGATION OF THE MOST RECENT ADVANCES. Proceedings of Association for Research in Nervous and Mental Diseases, New York, Dec. 28, 29, 1927, 8(3):53.

5,847

Weil, Joseph 1962 REVIEW OF THE X-15 PROGRAM

Rept. No. NASA TN D-1278, Washington, June, 1962
(NASA, FLIGHT RESEARCH CENTER, Edwards, Calif.)

5,848

Weick, Fred E. SAFETY AND CRASH SURVIVAL ASPECTS OF PAWNEE DESIGN. Flight Safety Foundation.

5,849

Weiner, J. & M.C. Leikind, ed. J.R. Gibson 1952 VISIBILITY - A BIBLIOGRAPHY (The Library of Congress Reference Department Technical Information Division) July 1952; ASTIA AD-105 57

ABSTRACT: The bibliography is intended to provide reference information and background material for the many research and development projects in the field of vision being sponsored by the Vision Committee. It provides a survey of much of the literature published from 1925 to 1950 inclusive on the subject of visibility as influenced by the various physical, psychological, and physiological factors inherent in the observer, target, background and atmosphere, and the engineering applications of visibility data. Such material as optical physics, the anatomy and physiology of the eye, pathological effects on vision and routine optometrical theory has been excluded.

5,850

Weiner, M. 1955 EFFECTS OF TRAINING IN SPACE ORIENTATION ON PERCEPTION OF THE UPRIGHT J. Exp. Psychol 49:367-373

5,851

Weinstock, M. and W. Boaz 1958 INVESTIGATION OF THE PRINCIPLE OF CONTROLLED ACCELERATION OPERATION OF PERSONNEL ESCAPE CATAPULTS
(Pitman-Dunn Laboratories Group, Frankford Arsenal, Philadelphia 37, Pa.) Memorandum Report No. MR-712, WADC TN 58-372, MIPR 33-600-8-1375A-178, FA Subproject No. C180, OCO Project No. TS1-15, DA Project No. 502-06-001, October 1958, ASTIA AD 207612

ABSTRACT: The Pitman-Dunn Laboratories Division of Frankford Arsenal designed a pressure-sensitive relief valve in compliance with a request by the Wright Air Development Center. The basic project (TS1-15-C180) was aimed at developing a propellant charge for use in the M5 catapult in order to obtain a safe personnel ejection from an aircraft at runway level; the relief valve was conceived as an alternate means of obtaining this capability. The relief valve maintains the gas at the pressure level required for optimum acceleration of the catapult by venting the excess gases formed during the catapult stroke. In this configuration, the catapult propellant charge must be great enough to produce above-normal operating pressures over the range of operating temperatures, thus insuring, throughout the stroke, an abundant supply of gas for regulation by the relief valve. The test firings demonstrated that the pressure relief valve functioned satisfactorily. The test results established the soundness of the principle of controlled-acceleration operation in personnel escape catapults.

5,852

Weinwurm, G. F. 1959 X-15 WINDBLAST TEST. Rept. no. AFFTC TN-58-42; ASTIA AD 221 123.

ABSTRACT: The X-15 windblast tests performed on the Air Force Flight Test Center High Speed Track are analyzed to supply aerodynamic load information for the seat, and point out a number of deficiencies in the system. These include malfunction of the fin locking mechanism, oscillation of the extended skip flow generator, weakness of the parachute package, tendency of several parts of the seat to puncture the pressure suit, and material failure of the survival garment at a number of points. (Author) (See also AD 201 282)

5,853

Weis, E. B., J. W. Brinkley, N. P. Clarke, & W. E. Temple 1963 HUMAN RESPONSE TO LATERAL IMPACT. (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 29-May 2, 1963)

ABSTRACT: Thirty-two tests of human response to lateral impact were conducted (15 rightward and 17 leftward). This study was a joint effort between NASA (Manned Spacecraft Center) and this Laboratory, conducted in order to furnish previously undefined criteria for tolerance to impulsive loads applied through the Y axis for the purposes of attenuator design.

The acceleration impulses were applied on the Vertical Deceleration Tower at this Laboratory. The VDT water brake produces an approximately triangular acceleration pulse after a free fall. The series of graduated tests reached a maximum of 20 g peak acceleration, 22 fps impact velocity, 1,500 g per second onset rate, and pulse duration of 120 milliseconds (exclusive of free fall). Although human tolerance was not reached in these tests, a clinical evaluation of physiological response will be presented in consideration of potential tolerance limiting factors. The restraint system (integrated shoulder, chest, lap, thigh, and ankle straps) and the support system (microballoon couch) will be discussed and criticized on the basis of subjective response and force and acceleration measurements. The method and current status of mathematical analysis and mechanical modeling of human response to this stress will be presented.

5,854

Weiser, H.I. 1959 VERTIGO OF CERVICAL ORGIN.
Harefuah 57:61-2, 2 August 1959

5,855

Weisflog, G. 1957 UIVAGI NO TEMAT FIZJOMECHANIKI KREGOSLUPA(Remarks on the physiomechanics of the spine)
Polski Przeglad Radiologiczny(Warszawa) 21(3):141-58 May-June 1958

5,856

Weiss, H. S., R. Edelberg, P. V. Charland & J. L. Rosenbaum 1954. THE PHYSIOLOGY OF SIMPLE TUMBLING. PT. II. HUMAN STUDIES. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 53-139, Pt. 2; Jan. 1954. ASTIA AD 36 305. (Supersedes WADC TR 53-139, Pt. 2; ASTIA AD 27 890.)

ABSTRACT: In order to assess the tolerance limits to head-over-heels rotations or flat spins, as likely to be encountered in escape from aircraft, human subjects were spun on the horizontal spin-table. The experiments were guided by previous animal investigations but runs on human subjects were limited to 125 rpm because of the onset of pressure pain in the head or feet. During the spin, the physiological behavior of the humans closely resembled that of the dogs and, on the basis of this, curves for the responses of humans at speeds up to 110 rpm were extrapolated to the level of circulatory failure. By this procedure, it was estimated that the border line of unconsciousness would be reached after three to ten seconds of rotation at 140 rpm and complete unconsciousness after three to ten seconds at 160 rpm with the center of rotation at the heart. The data, together with performance tests and the observation of conjunctival petechiae, were used to determine the time intensity areas of safe and dangerous rotations. (AML)

5,857

Weiss, H. S., 1955. THE HUMAN ELECTROCARDIOGRAM DURING TUMBLING. J. Aviat. Med. 26(3):206-213.

SUMMARY: Vector analyses were made of simultaneous limb and precordial electrocardiograms taken from normal males exposed to the stress of tumbling. For the range of tumbling exposures employed (limited by the appearance of conjunctival petechiae and/or pain), the ECG records do not indicate any impairment of cardiac function; the top speed attained was 188 r.p.m. (for three seconds), center of rotation (C/R) at the heart, and 93 r.p.m. (for three seconds), C/R at the iliac crest. With the C/R at the heart, the only consistent effects noted were a clockwise rotation of the mean QRS and T vectors in the frontal plane, an increase in heart rate, and a prolongation of the corrected Q-T intervals. The degree of clockwise rotation was related to the speed of tumbling and the starting position of the electrical axes. With the C/R at the iliac crest, counterclockwise rotation of the QRS vector in the frontal plane, a slight widening of the QRS-T angle in the frontal plane, a decrease in heart rate, and shortening of the corrected Q-t interval were noted.

The rotation of the QRS vector with either C/R is best interpreted on the basis of the anatomical movements of the heart. The widening of the QRS-T angle and the changes in the corrected Q-T intervals are discussed in terms of a possible effect of tumbling on myocardial function.

5,858

Weisler, A. C., & C. C. Haygood 1959 BIOLOGICAL EXPERIMENTAL ACCELERATION ENVIRONMENT JUPITER MISSILE AM-18 (Flight Evaluation Branch, Aeroballistics Lab., DOD, Army Ballistic Missile Agency, Redstone Arsenal, Alabama), Report No. DA-TM-87-59, 10 July 1959.

5,859

Weissler, A. M., J. J. Leouard, and J. V. Warren 1957 EFFECTS OF POSTURE AND ATROPINE ON THE CARDIAC OUTPUT. J. Clin. Invest. 36:1656.

5,860

Weiss, D. E. 1947 DESIGN AND APPLICATION OF ACCELEROMETERS. Proc. SESA IV(2)

5,861

Weiss, H. S., R. Edelberg, P. V. Charland, and J. I. Rosenbaum. 1954. ANIMAL AND HUMAN REACTIONS TO RAPID TUMBLING. J. Aviat. Med. 25(1):5-22.

SUMMARY: Rates of tumbling between 180 and 240 rpm following seat ejection or during free-fall have been reported and may be a source of danger to an escaping crewman. Anesthetized dogs spun about a center of rotation (C/R) through the heart exhibit signs of circulatory collapse and severe hypoxia at speeds higher than 140-150 rpm. While caudad displacement of the C/R does not interfere with the circulation to as great an extent, the animals in this situation display severe edema and hemorrhage in the head region. Human spins about the heart were limited to 125 rpm and about the iliac crest to 90 rpm because of pain and hemorrhage in the head region. The degree of circulatory impairment encountered at these speeds was not serious. Nevertheless, extrapolation to higher speeds on the basis of comparison with animal studies led to the prediction of conditions under which circulatory collapse would occur. Strength-duration curves for conjunctival petechiae in humans were established, ranging from three seconds at 90 rpm to two minutes at 50 rpm, C/R at iliac crest, and from 25-30 rpm higher with the C/R at the heart. Blood pressure, ECG and performance analysis indicate that these curves can be used to differentiate known safe from possibly unsafe exposures to tumbling Only simple tumbling, that is, tumbling in the absence of a linear 'g' field, was considered in this study. The results therefore are strictly applicable only to the post ejection tumbling which persists after deceleration in the air stream ends, or to tumbling that occurs in free fall.

5,862

Welch, B.E. 1962 PHYSIOLOGIC NECESSITIES IN SIMULATED LUNAR FLIGHTS In USAF School of Aerospace Medicine Lectures in Aerospace Medicine, 1962. Pp. 77-96

ABSTRACT: The primary purpose of including man in a space mission is to utilize man's full and unique capabilities toward successful mission completion. This means, therefore, that the man portion of the space mission must be at maximum effective performance consistent with the mission profile. To insure that man will be at maximum effectiveness, it is necessary to satisfy the various physiologic requirements that man places on the space vehicle system. These physiologic requirements are not necessarily unique to space operations and, for this discussion, will be classified somewhat arbitrarily into atmospheric and metabolic requirements. This paper will be divided into two parts; the first consisting of a brief discussion of the physiologic necessities and the second consisting of data collected during space cabin simulator experiments.

5,863

Welle, B. 1962 COSMONAUT TRAINING PROGRAM FBIS, USSR & East Europe, Nr. 70, April 10, 1962

ABSTRACT: Special efforts are surely being made to improve the training program of future cosmonauts. German Titov experienced several disturbances--slight vertigo and sickness. This was probably because of the influence of weightlessness on the middle ear, the organ of equilibrium. This effect disappeared almost completely when Titov assumed his normal resting position and made no strong movements with his head. Experts are now investigating whether this is a biological effect, or an individual peculiarity of Titov's. A scientist stated that better methods will strengthen the organ of equilibrium. In other words, cosmonauts must spend even more time than previously on rotating disks and swings, on apparatuses which move in three directions simultaneously. If, despite all training, the troublesome effects show up during future flights, if they interfere with the ability to work of the cosmonauts, then--the principle possibilities are already known--artificial gravity will be created in the space crafts which will amount to about one-fourth or even only one-tenth of the Earth's gravity. Currently, stress is laid on cosmonauts exercising under considerable weight. (CARI)

5,864

Wells, H. S., J. B. Youmans, & D. G. Miller 1938 TISSUE PRESSURE (INTRACUTANEOUS, SUBCUTANEOUS, AND INTRAMUSCULAR) AS RELATED TO VENOUS PRESSURE, CAPILLARY FILTRATION, AND OTHER FACTORS. J. clin. Invest. 17:489-499

5,865

Wells, J. Gordon and Laurence E. Morehouse 1950 ELECTROMYOGRAPHIC STUDY OF THE EFFECTS OF VARIOUS HEADWARD ACCELERATIVE FORCES UPON THE PILOT'S ABILITY TO PERFORM STANDARDIZED PULLS ON AN AIRCRAFT CONTROL STICK. J. Aviat. Med. 21(1):48-54.

SUMMARY: Electromyographic analysis of the activity of the biceps brachii, triceps brachii, and latissimus dorsi during 10, 20, 30, 40, and 50 pound pulls on an aircraft control stick under conditions of 1, 2, 3, 4, and 5 g were made on a well-trained subject who exerted pulls with his arm held in a flexed position. These observations were repeated with the arm held in an extended position and again in an intermediate position. The findings are summarized as follows:

1. The biceps brachii, triceps brachii, and latissimus dorsi act as co-contractors in exerting a pull on an aircraft control stick. The extent of the contribution each muscle makes to the total action is altered when the arm position is changed. When the arm is pulling in an extended position, the biceps brachii dominates the action. With the arm held in flexion or in an intermediate position during the pull, the triceps brachii is brought strongly into action.

2. The effect of headward acceleration on stick pull is to increase the ac- during the light pulls (10 to 20 pounds) and least during heavy pulls (40 to 50 pounds).

3. The effect of headward acceleration on muscular activity is least when the arm is held in a position intermediate between flexion and extension.

4. The decrease in muscular activity required to exert pulls on an aircraft control stick as the arm position is shifted from flexion to extension is proportional to calculated values of increased involuntary pull due to gravity as the arm position is shifted from flexion to extension.

5. The linear relationship between calculated values of involuntary pull and experiental values of myographic activity indicates that the reduction in pulling effort as the arm is extended from a flexed position is a dynamic, not a physiological phenomenon.

6. As far as muscular dynamics is concerned, the best arm position of a pilot seated in a conventional upright position and operating a control stick is one which is intermediate between flexion and extension. The stick should be loaded from 40 to 50 pounds as the muscular adjustment to headward acceleration is minimal under these conditions.

5,866

Wells, R. 1961 ALIVE IN SPACE: THE SCIENCE OF BIO-ASTRONAUTICS (Boston, Mass., Little, Brown and Co., 1961)

ABSTRACT: This is an illustrated treatise on space flight dealing with the following topics: space instruments, space mechanics, space vehicle, weightlessness in space, living in space, safety in space, crewmen in space, man's mind in space, training for space, science in space, and the will to space.

5,867

Wendt, G. R. 1944 STUDIES IN MOTION SICKNESS: I. A STUDY OF THE SUBJECTIVE EFFECTS OF SMALL DOSES OF BENZEDRINE SULPHATE ON INDIVIDUALS SUSCEPTIBLE AND THOSE NON-SUSCEPTIBLE TO MOTION SICKNESS, INCLUDING OBSERVATIONS ON PSYCHOGENIC SYMPTOMS. (Civil Aeronautics Administration, Washington, D.C.) Dec. 1944; Rept. No. 40

SUMMARY: In the following investigation the experimenters selected, by means of a motion-sickness history questionnaire and by interview, 19 college students who were susceptible to motion sickness and 20 who had never been motion sick to any degree, and who were free of illness or other physiological abnormality. Each subject served three days, taking a capsule with breakfast. One day each received 2.5 mgm. benzedrine sulphate. On days 2 and 3 each received either a placebo or benzedrine (1mgm. per 30 lbs. of body weight). The subjects were told that they were getting two different "drugs." Twice each day (before lunch and after dinner) each subject completed a 29-item questionnaire concerning subjective effects. Twenty of these items were of the kind, "have you drunk (a) more water than usual_____, (b) less water than usual_____, (c) same amount of water as usual_____?" Questionnaires were scored both in terms of total number of abnormal items and in terms of preponderance of items in the direction expected after benzedrine.

Under the conditions of the experiment the questionnaire method was of almost no value for the detection of drug effects. There were as many abnormal items checked on the placebo day as on the drug day, and for the total group the nature of the abnormalities reported on the benzedrine day was only slightly more in the direction of the expected benzedrine effect than on the placebo day. The group of subjects susceptible to motion sickness checked approximately three times as many symptoms as the group of non-susceptibles on each of the three experimental days. When asked to note their most prominent symptoms the susceptibles wrote in approximately twice as many as the non-susceptibles.

A comparison of the kinds of symptoms reported by susceptibles and non-susceptibles on benzedrine and placebo days showed: (1) that of the 19 susceptibles, 12 reported a greater excess of benzedrine symptoms on the benzedrine day, 3 on the placebo day, 1 reported no difference, and 3 reported no symptoms on either day; and (2) that of the 20 non-susceptibles, 2 reported a greater excess of benzedrine symptoms on the benzedrine day, 6 on the placebo day, 4 reported no difference; and 8 reported no symptoms on either day. (CAA)

5,868

Wendt, G. R. 1944 STUDIES IN MOTION SICKNESS: III. A NOTE ON AN UNSUCCESSFUL EFFORT TO INVESTIGATE THE EFFECTS OF TEMPERATURE ON VESTIBULARLY INDUCED NAUSEA. (Civil Aeronautics Administration, Washington, D. C.) Dec. 1944 Rept. No. 40

SUMMARY: The Note on an Unsuccessful Effort to Investigate the Effects of Temperature on Vestibularly Induced Nausea summarizes two limited investigations in which the effects of environmental temperature on motion-sickness rates were studied. Subjects selected on the basis of motion-sickness history inventory

scores were matched and divided into two groups of 16 subjects each. One group was subjected to a modified form of the Dorcus tilting procedure at a room temperature of 70 degrees F. and the other group was subjected to the same procedure at a room temperature of 90 degrees F. While the subject was lying supine and before being tilted upright, his ear canal was irrigated with ice water, however, only 2 cases of vomiting and 4 cases of subjective nausea were obtained. Since it was suspected that the low sickness rate might be a consequence of malfunction of the irrigator a check experiment at a room temperature of 80 degrees F. was run, using 9 of the men who had shown no symptoms of illness, employing an irrigator of different design. This device insured massive irrigation of the far end of the canal. Two of the subjects vomited, 4 were nauseated, and 3 were without symptoms of sickness. (CAA)

5,869

Wendt, G.R. 1946 AIRSICKNESS AMONG SEVENTY-ONE STUDENT PILOTS AND FIFTEEN INSTRUCTORS AND ITS RELATIONSHIP TO PREVIOUS HISTORY OF MOTION SICKNESS (CAA Div. Res.) Report No. 60, April 1946

5,870

wendt, G. R. 1946 STUDIES IN MOTION SICKNESS: III. AIRSICKNESS AMONG SEVENTY-ONE STUDENT PILOTS AND FIFTEEN INSTRUCTORS AND ITS RELATIONSHIP TO PREVIOUS HISTORY OF MOTION SICKNESS. (Civil Aeronautics Administration, Washington, D. C.) April 1946; Rept. No. 60

SUMMARY: A questionnaire was administered to seventy-one civilian student pilots in the Civilian Pilot Training program of the CAA and to fifteen instructors in the same program. This required them to report the frequency and degree to which they had been airsick, and the conditions under which it occurred. The questionnaire included an inventory of motion sickness on boats, trains, autos, and other devices. The percentage frequency of airsickness was: vomiting, students 16%; instructors 20%; lesser sickness, students 52%; instructors 67%; not sick, students 32%; instructors 13%. An a priori scoring key was applied to the inventory of motion sickness on devices other than planes, and the writer sorted the questionnaires into categories of comparable airsickness records. The correlation of motion sickness-inventory score and airsickness category was .73 in the case of student pilots and .34 in the case of instructors. The pilots attributed their airsickness in large part to training maneuvers, especially when long continued, and to a lesser extent to other causes. (CAA)

5,871

Wendt, G. R. 1946 STUDIES IN MOTION SICKNESS: STUDIES OF SOMATIC, PHYSIOLOGICAL, AND PSYCHOLOGICAL CORRELATES OF HISTORY OF MOTION SICKNESS. (Civil Aeronautical Administration, Washington, D. C.) Rept. No. 66; Aug. 1946

SUMMARY: This paper consists of brief reports of methods and results of early attempts to discover somatic, physiological, and psychological correlates of history of motion sickness. Results on more than 200 variables are presented, showing their frequency of occurrence as related to history of motion sickness. Some of the variables were obtained from personnel records, some from laboratory investigations, and some from questionnaires. In general, the purpose of this paper has been to give indications of what may be expected from further research. (CAA)

5,872

Wendt, G. R. 1946 STUDIES IN MOTION SICKNESS: I. FREQUENCY OF SUSCEPTIBILITY TO MOTION SICKNESS AMONG YOUNG ADULTS. (Civil Aeronautics Administration, Washington, D. C.) Apr. 1946; Rept. No. 60

ABSTRACT: A series of questionnaire surveys was made by means of which the frequency of susceptibility to motion sickness among young adults was estimated. The groups reported in this study included seven groups of college students and a group of airline stewardesses. The questionnaires included items on sea, train, auto, street car, and bus travel, and on elevators, lawn awings, and amusement park devices. Four forms of questionnaires were used. Some groups were assembled for questionnaire; others completed it without supervision. The results have been presented for normative purposes. Such forms are useful both in the evaluation of the practical importance of the problem of motion sickness and for guidance in construction of motion sickness inventories or estimates of their possible usefulness as predictive devices.

According to the ov r-all data, taking no account of type of subject or form of question, among tra sportation devices boats were most frequently rated as nauseating, 42%; then buses, 25%; autos, 24%; street cars, 11%; and finally trains, 10%. The obtained percentages varied, however, depending upon the form of the question. For instance, the reported frequency of susceptibility on boats was 53% when the subjects were asked to report whether they had ever, at any age, been susceptible and were required to answer for each of three or four age periods; 46% when asked a similar question requiring less detail in the reply; 36% when asked "Have you ever been seasick?" and required to answer by "Yes," "No" or "Slightly"; and only 31% when the subjects were asked to state whether they would be affected by a future ride. Questions concerning susceptibility at various age levels showed the greatest frequency at the grade school ages. Comparison of women and men, on comparable questionnaire forms, showed that women reported more motion sickness than men and that accepted pilot applicants had less sickness in their histories than other college students. (CAA)

5,873

Wendt, G. R. 1948 OF WHAT IMPORTANCE ARE PSYCHOLOGICAL FACTORS IN MOTION SICKNESS. J. Avia. Med. 19:24-32

5,874

Wendt, G.R. and W. Berry 1950 REPORT OF CONFERENCE ON MOTION SICKNESS. (Symposium sponsored by the Naval Research Advisory Panel for Psychophysiology, Wash., D.C.) ASTIA AD-102213, 9 September 1950

ABSTRACT: The purpose of the Symposium on Motion Sickness was to review the present status of research, to discuss basic and applied research which should be expedited or initiated, and to plan ways and means of utilizing the results of research most effectively by the Armed Forces. This publication contains reports on the papers presented at the symposium. Those papers presented on recent and current research covered problems of the effects of drugs, the effects of physical forces, neurophysiological problems, effects of body and head movements and incidence of motion sickness. Other subjects of papers included the present military importance of the problems, present status of knowledge of preventive and therapeutic techniques, present and future research needs, and dissemination and utilization of research results.

5,875

Wendt, G.R. 1950 SOME CHARACTERISTICS OF VESTIBULAR EYE MOVEMENTS (Office of Naval Research, Washington, D.C., NAVEXOS P-966, October 1950

5,876

Wendt, G.R. 1950 SOME CHARACTERISTICS OF VESTIBULAR EYE MOVEMENTS (In: USONR Symposium, Psychophysiological factors in spatial orientation.) US NAS, Pensacola, Fla., 1950.

ABSTRACT: Laboratory research utilizing the Dodge mirror recorder revealed several unpublished facts. For example, when seated with head fixed, in the dark, or with eyes closed, normal subjects usually show some degree of spontaneous horizontal nystagmus. This has been called a "drift" or an "imbalance" . After a single acceleratory stimulus, there is not only the primary nystagmus, but following this there is a weak but long-lasting secondary nystagmus in the opposite direction. The primary nystagmus shows certain lawful relations of its speed, duration, and time-course to the stimulus given to the ears. A visual field inhibits vestibular eye movements, So-called "habituation to rotation" can be prevented by control of orientation.

5,877

Wendt, G.R. 1951 VESTIBULAR FUNCTION
(In: Stevens, S.S. (Ed.) Handbook of Experimental Psychology. N.Y.: Wiley, 1951) pp. 1191-1223.

5,878

Wen-Hwa Chu 1960 ON THE DEVELOPMENT OF A MORE ACCURATE METHOD FOR CALCULATING BODY-WATER IMPACT PRESSURES (Southwest Research Inst., San Antonio, Tex.) Technical rept. no. 2, Contract Nonr-272900, Proj. 23-834-2; 30 Sep. 1960; ASTIA AD-251 927

ABSTRACT: Details are presented of a theoretical investigation into the hydrodynamic forces and pressures developed during the early stages of water entry of a circular cylinder. The method employed is a numerical scheme developed from formulations of the governing equations and boundary conditions that are less restrictive than those usually employed, and is applicable to a wide class of body forms. Some comparisons with experimental data are made. It is concluded that the method is not yet suitable for general usage because of excessive requirements for computing machine time. (Author)

5,879

Wessler, S. 1953 EXPERIMENTAL INTRAVASCULAR THROMBOSIS INDUCED BY SERUM FRACTIONS CONTAINING SERUM PROTHROMBIN CONVERSION ACCELERATOR. (Yamins Research Lab., Beth Israel Hosp., and the Dept. of Medicine, Harvard Med. School, Boston, Mass.)

ABSTRACT: Previous studies (Federation Proceedings 11:309, 1952) suggested a technique whereby intravascular thrombosis may be produced in the dog under standard conditions. The method is based upon the ability of serum fractions containing SPCA to induce rapid clot formation in isolated bloodfilled jugular and femoral vein segments occluded while these serum fractions are infused into an antecubital vein. Upon releasing the occluding clamps, the clot is moved proximally by the flow of blood and can be arrested at a previously narrowed site at which the endothelium is normal. Intravascular thrombi were uniformly produced in the jugular veins of 20 dogs. Adherence to the vein wall was first noted on the fourth day, and was not always complete after 5 weeks. The sequential histopathology was that of a phlebothrombosis. In another series of experiments in 19 animals the right femoral vein was narrowed before, and the left fe-

moral vein after, infusion of SPCA into the antecubital vein. Thrombi developed in 15 of the right, and in only 5 of the left femoral veins. These findings are consistent with the concept that retarded venous flow combined with a temporary increase in SPCA activity may produce intravascular thrombosis in the absence both of endothelial damage and complete stasis. This investigation has provided a method for the study of intravascular thrombosis under conditions more nearly simulating those operative in man and has suggested a mechanism whereby spontaneous thrombosis may occur in vivo.
(Federation Proceedings 12(1):152-153, March 1953)

5,880

Westbrook, C.B. 1959 THE PILOT'S ROLE IN SPACE FLIGHT.
(Wright Air Development Center, Air Research and Development Command, Wright-Patterson AFB, Ohio) WADC TN 59-31, Feb. 1959. ASTIA AD 210228.

ABSTRACT: Man's basic capabilities as a control element and his capabilities as an actuator, sensor, computer, and as a part of a complete control system are discussed and conclusions formed as strong and weak points. Several factors which contribute to a change in thinking regarding flight control in space missions are reviewed briefly. These are reliability, the changed dynamic characteristics of the vehicles, and the new control systems required. The phases of a lunar soft landing mission are then reviewed to determine what functions should or must be performed automatically and what should or could be performed by the man. It is concluded that man has a place in certain missions not merely on the basis of curiosity or even as a scientific observer but on sound engineering reasons as a flight control element.

5,881

Westbrook, C.B. 1959 PILOT'S ROLE IN SPACE FLIGHT.
(Advisory Group for Aeronautical Research and Development, Palais De Chaillot, Paris) Report No. 252. Sept. 1959. ASTIA AD 243015

ABSTRACT: The capabilities of man as an actuator, sensor, computer, and as a part of a complete control system are discussed and conclusions formed as to man's strong and weak points. Several factors which contribute to a change in thinking regarding flight control in space missions are reviewed briefly. These are reliability, the changed dynamic characteristics of the vehicles and the new control systems required. The phases of a lunar soft landing mission are then reviewed to determine what functions should or must be performed automatically and what should or could be performed by the man. It is concluded that man has a place in certain missions not merely on the basis of curiosity or even as a scientific observer but on sound engineering reasons as a flight control element.

5,882

Weyl, A.R. 1958 TOWARDS SPACE FLIGHT Aeronautics 38:32-35.

ABSTRACT: Summaries of several published reports on astronautics appearing in British, US, and Soviet publications.

5,883

Whalen, W. J., & V. E. Hall 1953 ACCELERATION OF THERMAL POLYPNEA BY HYPOCAPNIA (Dept. of Physiology, School of Medicine, Univ. of California, Los Angeles, Calif.)

ABSTRACT: Urethanized cats were given artificial respiration during eupnea and thermal polypnea for 3 minutes at 4 different rates. The amount of hyperventilation sufficient to cause apnea at 'normal' body temperatures was found to be completely inadequate at higher temperatures. Often during thermal panting apnea could not be produced following the maximum available rate of artificial respiration. On the contrary the panting rate was accelerated by the hyperventilation although depth of respiration decreased. Since the carbon dioxide drive was presumably absent at the time, the acceleration might best be explained by a facilitating effect of hypocapnia on thermoregulatory centers. Several alterna-

5,884

Whateley, D.E., M.B. Riley 1960 TOLERANCE OF WHITE MICE TO THE COMBINED STRESSES OF ALTITUDE HYPOXIA AND TRANSVERSE ACCELERATION. (In Press, 1960).

5,885

Wheatley, George M. 1956 ACCIDENTS IN CHILDHOOD (Metropolitan Life Insurance Co., New York City, Feb. 1, 1956

ABSTRACT: A recent development in pediatrics in this country has been the growing interest of physicians in the prevention of childhood accidents. Preventive efforts must be based on statistical information which indicates the nature of the problem and the best points of attack. The tables presented here are based on data from the Metropolitan Life Insurance Co., the Eastern Health District of Baltimore, and the Chicago poisoning Control Program.

5,886

Whedon, G.D., J.E. Deitrick & E. Shorr MODIFICATION OF THE EFFECTS OF IMMOBILIZATION UPON METABOLIC AND PHYSIOLOGIC FUNCTIONS OF NORMAL MAN BY THE USE OF AN OSCILLATING BED Amer. J. Med. 6:668

5,887

Wheeler, R.V. 1952 PARACHUTE OPENING AND GROUND IMPACT
(Paper, presented at the 19th Symposium on Shock and Vibration
Wright Air Development Center, Wright-Patterson AFB, 10-11 Sept. 1952)

5,888

Wheeler, W.L., Jr., J.M. Howland, W. Smith and J.E. Corso 1959 THE USE OF PROCHLORPERAZINE IN SEASICKNESS. Industr. Med. Surg. 28:405-6, Sept 1959

5,889

Wheelwright, C. D. 1962 PHYSIOLOGICAL SENSORS FOR USE IN PROJECT MERCURY
National Aeronautical and Space Administration, Washington, D.C.
Rept. no. NASA TN D-1082, Aug. 1962

ABSTRACT: Results of tests of biosensors for measuring body core temperature, respiration rate and depth, and electrocardiogram on animals and humans are presented. Comments are made on the bioconnector and biosensor assembly and the possible use of blood-pressure sensors in space flight.

5,890

Whillans, M.G. 1942 SPONGE RUBBER ABDOMINAL BELT FOR USE WITH CRASH BOAT CREW TO PREVENT EFFECTS OF JOLTING.
(National Research Council, Canada) 4 February 1942, #C-2477

5,891

Whillans, M.G. 1960 BIOSCIENCES RESEARCH AND SPACE PROBLEMS (Defence Research Board (Canada). Reprint Jnl. of the Royal Astronomical Society of Canada 54:211-215; October 1960; ASTIA AD-244 464

5,892

Whillans, M. G. 1960 BIOSCIENCES RESEARCH AND SPACE PROBLEMS
The Journal of the Royal Astronomical Society of Canada 54(5):211-215, Oct. 1960

ABSTRACT: Brief reviews and proposed solutions for various problems in manned space flight are presented. The problems include the following: (1) radiations from the Van Allen belts and solar flares, (2) isolation, (3) disorientation and weightlessness, and (4) methods for providing food and oxygen. Inquiries into these problems have brought research into the areas such as the possibility of life on other planets, the relationship of biological rhythms to the health and efficiency of the human organism, mechanisms of navigation in birds and other animals, and possibilities of traveling in space or hibernating state.

5,893

White, A. S. 1958 X-15 TEST PILOTS.
S.A.E. Journal 66(9):51, Part 2

ABSTRACT: North American's engineering department has developed an X-15 simulator in order to prepare pilots for the type of "space" mission expected in an X-15 aircraft. By using wind tunnel data and predicted aerodynamic data, the design engineer can predict the type of control system required for a mission of this type, build the control system into the simulator, and test the ability of theis control system to handle various problems of research flight without having actually flown the airplane. In addition, stability and control parameters may also be predicted. To meet the challenge of g forces, an almost exact replica of the X-15 cockpit has been mounted on a centrifuge where actual g loads of the flight are duplicated. In the centrifuge tests at the Naval Air Development Center, Johnsville, Pa., thepilots will again be trained in flying a complete mission profile, at the same time undergoing at least the positive g loads that will be experienced during actual flight conditions.

5,894

White, C. S. and O. O. Benson, Jr., Ed. 1952 PHYSICS AND MEDICINE OF THE UPPER ATMOSPHERE (Proc. Sym. on the Phys. and Med. of the Upper Atmosphere, San Antonio, Tex., 6-9 Nov. 1951) (Albuquerque, New Mex.: Univ. New Mexico Press, 1952)

CONTENTS include:

Mayo, A. M.,	"Basic Environmental Problems Relating Man and the Aeropause," pp. 6-22, 12 figs., 15 refs.
Strughold, H.,	"Basic Environmental Problems Relating Man and the Highest Regions of the Atmosphere as Seen by the Biologist," pp. 23-34, 5 figs., 32 refs.
Haber, H.	"Gravity, Inertia, and Weight," pp. 123-136, 5 figs., 9 refs.
Campbell, A.,	"Human Orientation During Travel in the Aeropause," pp. 488-493, tbl., 13 refs.
Graybiel, A.,	"The Effect on Vision Produced by Stimulation of the Semicircular Canals by Angular Acceleration and Stimulation of the Otolith Organs by Linear Acceleration," pp. 494-508, 9 figs., 24 refs.

5,895

White, C. S. 1952 THE CHALLENGE OF SPACE MEDICINE
J. Avia. Med. 23(5):527-529

ABSTRACT: The founding of the Space Medicine Association represents the recognition of new possibilities in aviation medicine. At the same time it imposes on its members the responsibility of studying the biological possibilities of human existence in the aeropause. The cooperation of affiliated disciplines must be secured for this purpose and a strong basic research program must be developed. The symposium on "Physics and Medicine of the Upper Atmosphere", held in San Antonio, Texas, in November 1951, may be considered a result of this much needed cooperation. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space Medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903; ASTIA AD-227 817; Feb. 1959)

5,896

White, C. S. 1954 BIOLOGICAL TOLERANCE TO ACCELERATIVE FORCES.
(Paper, Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex., 10 June 1954) ASTIA AD-158 982

ABSTRACT: Information on human tolerance to accelerative forces was compiled from the literature and summarized in tabular and graphic form. Experimental data were discussed and deficiencies indicated; the most serious deficiency involves the lack of experimentation on combinations of g forces applied simultaneously and in a varied sequence. (ASTIA)

5,897

White, C. S. 1954 BIOLOGICAL TOLERANCE TO ACCELERATIVE FORCES. ADDENDUM I (Paper, Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.) ASTIA AD-158 983; 17 June 1954

ABSTRACT: Data are presented graphically showing the relative g loads imposed by automobile accidents, catapults, parachute opening and landing shocks, ejection seats, and the tolerance of the human head protected with crash helmets to impact loads. The actuation of ejection seat controls, when subjects were exposed to radial g along with pitch and roll, was investigated. The effect of g loads on a man's ability to move is discussed. Forces of 3 to 4 g, when properly directed, were near the limit against which the body extremities could be moved, and which would allow progression from one point to another and prevented rising from an aircraft seat. Loads between 1 and 3 g significantly increase the time to perform a given task; e.g., donning a back-pack parachute took 17 sec at 1-g gravity load; time increased to 21, 41, and 75 sec at a radial load of 1, 2 and 3 g, respectively. The task was impossible for some subjects. Difficulties with orientation and vision occurred when subjects were exposed to jostle in a radial g field. Nausea was experienced and post-exposure effects were noted for 2 hr after a 10 min exposure to a 1.14 resultant g force, when head movements and up and down bouncing was carried out during the exposure on the centrifuge. (ASTIA)

5,898

White, C. S., et al. 1955 COLLECTED PAPERS ON AVIATION MEDICINE (AGARD, Paris, France)

5,899

White, C.S., T.L. Chiffelle and others 1956 BIOLOGICAL EFFECTS OF PRESSURE PHENOMENA OCCURRING INSIDE PROTECTIVE SHELTERS FOLLOWING A NUCLEAR DETONATION (Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.) Oct. 1956; ASTIA AD-147 077

ABSTRACT: In two series of experiments 277 experimental animals, including 66 dogs 32 rabbits, 52 quinea pigs, 63 rats, and 44 mice, were exposed under selected conditions in six different general types of instrumented above- and below-ground shelters to blast produced by nuclear explosions. The distance of the several structures from Ground Zero ranged from 1050 to 5500 ft. The most severe alterations in the pressure environment occurring inside the structures followed the detonation of a nuclear device with a yeild approximately 50 per cent greater than nominal. The highest overpressure to which animals were exposed was 85.8 psi, the rise time of which was 4 msec. The overpressure endured for about 570 msec. Over-

pressures ranged from this maximum downward in 15 other exposure situations to a minimum of 1.3 psi enduring for nearly 1346 msec but rising to a maximum in about 420 msec. The latter pressure occurred inside a reinforced concrete bathroom at 4700 ft where the outside incident pressure was about 5 psi. Following the nuclear explosions, all animals were recovered, examined, sacrificed, and subjected to gross and microscopic pathological study. The most outstanding contribution of the field experiments and the related study of the literature was the unequivocal demonstration that the provision of adequate protective structures can indeed be an effective means of sharply reducing casualties which would otherwise be associated with the detonation of modern large-scale explosive devices. (Author)(See also AD-103 431)

5,900

White, C. S., T. L. Chiffelle, D. R. Richmond, W. H. Lockyear, I. G. Bowen, V. C. Goldizen, et al. 1957 THE BIOLOGICAL EFFECTS OF PRESSURE PHENOMENA OCCURRING INSIDE PROTECTIVE SHELTERS FOLLOWING A NUCLEAR DETONATION. (OPERATION TEAPOT) (Civil Effects Test Group, U. S. Atomic Energy Commission) Rept. WT-1179; Project 33.1; 28 Oct. 1957

ABSTRACT: In two series of experiments 277 experimental animals, including 66 dogs, 52 rabbits, 52 guinea pigs, 63 rats, and 44 mice, were exposed under selected conditions in six different general types of instrumented above- and below-ground shelters to blast produced by nuclear explosions. The distance of the several structures from Ground Zero ranged from 1050 to 5500 ft. The most severe alterations in the pressure environment occurring inside the structures followed the detonation of a nuclear device with a yield approximately 50 per cent greater than nominal. The highest overpressure endured for about 570 msec. Overpressures ranged from this maximum downward in 15 other exposure situations to a minimum of 1.3 psi enduring for nearly 1346 msec but rising to a maximum in about 420 msec. The latter pressure occurred inside a reinforced concrete bathroom shelter, which was the only surviving part of a house otherwise totally destroyed, at 4700 ft where the outside incident pressure was about 5 psi. Following the nuclear explosions, all animals were recovered, examined, sacrificed, and subjected to gross and microscopic pathological study. All lesions were tabulated and described. The results of pressure-time data, documenting the variations of the pressure environment, are presented and analyzed, and an exploratory attempt is made to relate the alterations in the pressure environment to the associated pathology observed. A critical review of selected material from the blast and related literature is presented. All data are discussed, and the several problems related to the design and construction of protective shelters are noted and briefly, but analytically, assessed. The most outstanding contribution of the field experiments and the related study of the literature was the unequivocal demonstration that the provision of adequate protective structures can indeed be an effective means of sharply reducing casualties which would otherwise be associated with the detonation of modern large-scale explosive devices. (AUTHOR)

5,901

White, C. S. 1958 BLAST BIOLOGY - A SUMMARY
(Contribution to Holifield Subcommittee Hearings, May 1, 1958)
In Report of Hearings before a Subcommittee on Government Operations, House of Representatives, Part I - Atomic Shelter Tests (Washington, D. C.: U. S. Government Printing Office, 1958) pp. 80-93

5,902

White, C.S. (ed.) 1958 AVIATION MEDICINE; SEL. REVIEWS
(Pergamon Press, Alburquerque, N.M., 1958) Agardograph No. 25

5,903

White, C. S. 1958 THE AEROMEDICAL REALITIES OF SPACE TRAVEL
J. Aviation Med. 29(10)707-715 Oct 1958.
See also Air Force 41(12):76-79, Dec. 1958.

ABSTRACT: A brief review is presented of pioneering efforts in balloon ascensions which demonstrate the contribution of Europe to space flight. Telescopic observations of space are discussed in order to provide orientation for the choice of obtainable goals in space flight. The limited nature of space travel under present concepts is indicated by analysis of the distances and time involved in travel beyond the solar system. It is concluded that exploration of the moon, Venus, and Mars will provide a significant contribution to medicine and scientific knowledge.

5,904

White, C. S. 1959 BIOLOGICAL BLAST EFFECTS
(U. S. Atomic Energy Commission) Report TID-5564; Sept. 1959

ABSTRACT: This presentation, though generally concerned with biological effects of airborne blast phenomena, is limited to deal briefly with three main topics. First, the scope and nature of the several blast hazards will be delineated. Secondly, tentative criteria for threshold damage to humans will be set forth. Thirdly, these criteria will be related to nuclear weapons in terms of ground ranges and areas involved for 1 MT and 10 MT surface detonations, and to allow appreciation of the relative importance of blast with other effects, appropriate values for ionizing and thermal radiation will be noted. (AUTHOR)

5,905

White, C.S. 1959 BIOLOGICAL EFFECTS OF NUCLEAR WAR (A report of Hearings before the Special Subcommittee on Radiation of the Joint Committee on Atomic Energy, U.S. Government Printing Office, Washington 25, D.C.) pp. 311-372

5,906

White, C. S., & D. R. Richmond 1959 BLAST BIOLOGY
(U. S. Atomic Energy Commission & The Lovelace Foundation for Medical Education & Research, Albuquerque, N. Mex.) Report TID-5764; 18 Sept. 1959

ABSTRACT: Selected information from the literature and new experimental data regarding the biologic consequences of exposure to the several environmental variations associated with actual and simulated explosive detonations were reviewed. As background, brief and elementary remarks concerning blast physics and terminology were set forth. The scope of what now comprises the field of blast biology was noted to include primary, secondary, tertiary and miscellaneous blast effects as those attributable, respectively, to variations in environmental pressure, trauma from blast-produced missiles (both penetrating and nonpenetrating), the consequences of physical displacement of biological targets by blast-produced winds and hazards due to ground shock, dust and thermal phenomena not caused by thermal radiation per se. Primary blast effects were covered in detail noting physical-biophysical factors contributing to the observed pathophysiology. Also, a simple hydrostatic model was utilized diagrammatically in pointing out possible etiologic mechanisms. The gross biologic response to single, "fast"-rising overpressures were described as was the tolerance of mice, rats, guinea pigs and rabbits to "long"-duration pressure pulses rising "rapidly" in single and double steps. Further, a few data were noted regarding biological response to "slowly" rising overpressures of "long" duration. Attention was called to the similarities under certain circumstances between thoracic trauma from nonpenetrating missiles and that noted from air blast. The association between air emboli, increase in lung weight (hemorrhage and edema) and mortality was discussed. Information relevant to the clinical symptoms and therapy of blast injury was presented and the needs for additional investigations were emphasized. The relation of blast hazards to nuclear explosions was assessed and one approach to predicting the maximal, potential casualties from blast phenomena was presented making use of arbitrary and tentative criteria. Finally, the sound sense of practicing blast, radiation and thermal prophylaxis as a means of minimizing casualties was urged as an essential step to enhance individual and national survival in the event of a nuclear war. (AUTHOR)

5,907

White, C. S. and D. R. Richmond 1960 BLAST BIOLOGY In Clinical Cardiopulmonary Physiology (New York; London: Grune and Stratton, 1960). Chapt. 63.

5,908

White, C. S. 1961 BIOLOGICAL EFFECTS OF BLAST (Paper, Armed Forces Medical Symposium, Field Command, Defense Atomic Support Agency, Sandia Base, Albuquerque, N. Mex., Nov. 28, 1961) (Defense Atomic Support Agency, U. S. Atomic Energy Commission) Contract No. DA-49-146-XZ-055, Dec. 1961 ASTIA AD-276 892

ABSTRACT: The current state of knowledge relevant to biological blast effects was summarized in a selective manner. Initially, five problems of concern to those who would relate the environmental variations produced by nuclear weapons with biological response and hazard assessment were pointed out. Primary, secondary, tertiary, and miscellaneous blast effects were defined and selected interspecies experimental data of a physical and pathophysiological nature useful in estimating human response were presented. Tentative biological criteria defining "safe" levels of exposure were set forth as were survival curves for different conditions of exposure in Hiroshima. These were discussed along with the comparative variations in range of the "free-field" effects as they vary with explosive yield. The fundamental requirement for surviving seconds, minutes, and hours to abet survival for days, weeks, months, and years was emphasized along with the necessity for planning protective measures against all hazardous weapons effects as one attractive alternative for minimizing casualties and maximizing survival in the event of a nuclear war.

5,910

White, C. S., I. G. Bowen, D. R. Richmond, & R. L. Corsbie 1961 COMPARATIVE NUCLEAR EFFECTS OF BIOMEDICAL INTEREST. (Civil Effects Test Operations, U. S. Atomic Energy Commission) Report CEX-58.8., 12 Jan. 1961

ABSTRACT: Selected physical and biological data bearing upon the environmental variations created by nuclear explosions are presented in simplified form. Emphasis is placed upon the "early" consequences of exposure to blast, thermal radiation, and ionizing radiation to elucidate the comparative ranges of the major effects as they vary with explosive yield and as they contribute to the total hazard to man. A section containing brief definitions of the terminology employed is followed by a section that utilizes text and tabular material to set forth events that follow nuclear explosions and the varied responses of exposed physical and biological materials. Finally, selected quantitative weapons--effects data in graphic and tabular form are presented over a wide range of explosive yields to show the relative distances from Ground Zero affected by significant levels of blast overpressures, thermal fluxes, and initial and residua penetrating ionizing radiations. However, only the "early" rather than the "late" effects of the latter are considered. (AUTHOR)

5,911

White, D.C. & M.M. Mozell 1957 WHOLE BODY OSCILLATION: PRELIMINARY REPORT (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR23, 1 April 1957.

ABSTRACT: In a study to set the upper limit of endurance to sinusoidal whole body oscillation, two subjects were studied on a vibration table while strapped securely in an A4D seat at 0.34 inch double amplitude and frequency of 10 cps (2-3G). An intolerable precordial pain radiating to the left shoulder developed in both subjects. At frequency levels of 20-25 cps and the same double amplitude (6-10G), a lower bowel disturbance was observed which was characterized by discomfort, followed later by bloody, mucloid discharge.

5,912

White, M. P., ed. 1946 EFFECTS OF IMPACT AND EXPLOSION (Office of Scientific Research & Development, and National Defense Research Committee, Division 2, Washington, D. C.) Vol. I; ASTIA ATI-37 735 See Schneider, W. G., E. B. Wilson, P. E. Cross, et al.

5,913

White, M. S. 1940 CORONARY THROMBOSIS OCCURRING IN A PILOT WHILE IN FLIGHT IN A SINGLE SEAT AIRCRAFT. J. Amer. Med. Ass'n. 115:447

5,914

White, Robert M. 1962 X-15 OPERATIONS IN PRE-LUNAR STUDIES
In: (School of Aerospace Medicine) Lectures in Aerospace Medicine, 1962 pp. 191-210

ABSTRACT: This paper is a discussion of the events and results of the X-15 project to the present time. The author discusses in detail structural problems, temperature problems, pilot preparation, and ground monitoring station function.

5,915

White, S. 1958 THE PROBLEMS OF MAINTAINING MAN AT EXTREME ALTITUDE In Alperin, M., M. Stern, & H. Wooster, eds., Vistas in Astronautics: Proceedings of the First Annual AFOSR Astronautics Symposium (New York: Pergamon Press, 1958) pp. 288-290

5,916

White, S.C. 1960 HUMAN FACTORS AND BIOASTRONAUTICS (Langley Research Center, NASA) Astronautics 5(11):35,98-99

5,917

White, Stanley C., Richard S. Johnston, & Gerard J. Pesman 1961 REVIEW OF BIOMEDICAL SYSTEMS FOR MR-3 FLIGHT
In: Results of the First U.S. Manned Suborbital Space Flight (NASA) pp. 19-27 6 June 1961

ABSTRACT: The successful conclusion of the manned ballistic flight of MR-3 was the culmination of approximately 2 years of preparation of the life support systems for the spacecraft and of the selection and training of the astronauts for space flight. The major spacecraft systems which are essential for sustaining the astronaut during flight are the environmental control system and the astronaut acceleration protection system. This discussion will be limited to a summary of the status of these two systems at the time of the flight of MR-3, a review of the biomedical portions of the astronaut training, and a discussion of the animal program preceding the manned flight.

5,918

White, S. C. 1961 PROGRESS IN SPACE MEDICINE
In; IL CONGRESSO MONDIALE E IV EUROPEO DI MEDICINA AERONAUTICA E SPAZIALE, Rome, 1:231-241, 1961

ABSTRACT: Both the X-15 and Mercury programs offer the opportunity to study men in space flight through the use fo instrumentation placed upon the crewman. The biological areas considered in these programs include: acceleration, deceleration, and weightlessness; acoustic energies (sound and vibration); atmosphere, temperature and humidity; decompression; radiation; work capacity and physical fatigue; orientation; day-night cycles; hygiene, illness; and diet and waste handling. The gathering of data under both programs has required a completely new approach to biological instrumentation.

5,919

White, S. C., & C. A. Berry 1963 RESUME OF PRESENT KNOWLEDGE OF MAN'S ABILITY TO MEET THE SPACE ENVIRONMENT. (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 29-May 2, 1963.)

ABSTRACT: The United States and Soviet Union Spaceflight programs continue to compile information on man's ability to operate in this

new environment. As more flight data becomes available, better insight into the performance of the body systems can be made while under weightlessness and other stresses of the environment. This information permits the reevaluation of the proposed problems associated with further extension of flight experience and the inclusion of multiple men into the crew. This paper will attempt to summarize the experience to date and present estimation of the problems being encountered or expected in the next phases of flight. (Aerospace Medicine 34(3):269, March 1963)

5,920

White, T. D. 1959 THE INEVITABLE CLIMB TO SPACE.
Air University Quarterly Review, Winter 1958-1959

5,921

White, V.J. 1959 PERFORMANCE TESTS ON TWO SERVO ACCELEROMETERS
National Bureau of Standards Report No. 6603

ABSTRACT: Two model 4310, Serial Nos. 166 and 167, servo accelerometers of ± 2g range, manufactured by the Donner scientific Company were tested to determine static and dynamic characteristics. Static calibrations are made in the range ± 1g by changing the orientation of the instrument in the earth's gravitational field. Frequency response of the instruments from 0 to about 25 c.p.s. was checked by rotating in the earth's field to provide a sinusoidally varying excitation.

5,922

White, W.J. 1954 THE EFFECTS OF GRAVITATIONAL STRESS UPON VISUAL ACUITY (Wright Patterson, AFB, Ohio) WADC Technical Report 53-464, 1954

5,923

White, W. J., & W. R. Jorve 1955 GRAVITATIONAL STRESS AND VISUAL ACUITY.
WADC TR 53-469

5,924

White, W. J., and M. B. Riley 1956 THE EFFECTS OF POSITIVE ACCELERATION (G) ON THE RELATION BETWEEN ILLUMINATION AND DIAL READING. (In Finch, G., and F. Cameron, eds., Symposium on Air Force Human Engineering, Personnel and Training Research.) (Wash., D. C.: Nat. Acad. of Sci., Nat. Res. Council, 1956) Pub. 455, Pp. 306-310.
See also J. Avia. Med. 28:306-309, 1957.

ABSTRACT: Commencing at 3 to 4 G the subject experiences a dimming of vision which is most noticeable in the peripheral field. At 4 to 5 G the condition progresses to temporary blindness, and finally at slightly higher levels of G unconsciousness occurs.

A number of investigators have shown that acceleration induces visual symptoms by causing a decrease in arterial pressure at eye level.

Results: (a) At the highest brightness there are no differences in the percentage of errors among the various values of G. (b) At the three highest brightness levels for values up to 3 G there are no differences in the percentage of errors. (c) At the two lower brightness levels errors are inversely related to the value of G. (d) At the 4 G condition there is a systematic increase in errors with decreasing brightness. (DACO)

5,925

White, W. J., & W. Jorve 1956 THE EFFECTS OF GRAVITATIONAL STRESS UPON VISUAL ACUITY (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TR 56-247; ASTIA AD-110 444; Nov. 1956

ABSTRACT: It was the purpose of this study to determine the relationship between increased gravitational force and visual acuity when the factor of reduced cerebral circulation is minimized by the use of protective measures known to ameliorate the gross visual symptoms associated with g stress.
It was found that gravitational stress has a significant and progressive effect upon visual acuity. Hypotheses are advanced to account for the difference in visual performance during gravitational stress.

5,926

White, W. J. and M. B. Riley 1957 THE EFFECT OF POSITIVE ACCELERATION (G) ON THE RELATION BETWEEN ILLUMINATION AND DIAL READING
J. Avia. Med. 28:306-309
See also Finch, G., & F. Cameron, eds., Symposium on Air Force Human Engineering, Personnel and Training Research (Wash., D. C.: Nat'l. Acad. of Sci., Nat'l. Res. Council, 1956) Pub. 455, Pp. 306-310, 1956.

ABSTRACT: Commencing at 3 to 4 G the subject experiences a dimming of vision which is most noticeable in the peripheral field. At 4 to 5 G the condition

progresses to temporary blindness, and finally at slightly higher levels of G unconsciousness occurs.

A number of investigators have shown that acceleration induces visual symptoms by causing a decrease in arterial pressure at eye level.

Results: (a) At the highest brightness there are no differences in the percentage of errors among the various values of G. (b) At the three highest brightness levels for values up to 3 G there are no differences in the percentage of errors. (c) At the two lower brightness levels errors are inversely related to the value of G. (d) At the 4 G condition there is a systematic increase in errors with decreasing brightness. (DACO)

5,927

White, W.J. 1958 STUDIES PERTAINING TO THE EFFECTS OF ACCELERATION ON VISION(USAF WADC, Dayton, Ohio) May 1958.

5,928

White, W. J. and M. B. Riley 1958 THE EFFECTS OF POSITIVE ACCELERATION ON RELATION BETWEEN ILLUMINATION AND INSTRUMENT READING. (USAF, Wright-Pat. AFB, Ohio) WADC TR 58-332, Nov. 1958. ASTIA AD 206 663
NOTE: CARI P&S 2.11

ABSTRACT: This study is concerned with the manner in which accuracy of quantitative scale reading varies as a function of illumination and acceleration. Six subjects were exposed to accelerative levels ranging from one to four g and reading errors and time were measured for various levels of illumination of the indtrument panel. Thus it was possible to determine whether or not a pilot's ability to read aircraft instrument dials at various levels of illumination is impaired by positive g forces less than that required to produce blackout.

SECOND ABSTRACT: This study concerns the manner in which the accuracy of quantitative scale readings varies as a function of illumination and acceleration. The following basic findings resulted from an analysis of the data from this experiment: 1. At the higher levels of instrument illumination, increasing acceleration and decreasing luminance produce relatively small increases in reading errors. 2. At marginal levels of illumination, acceleration and luminance interact to produce a relatively large increase in error. 3. Intensity of illumination can compensate for the decline in visual performance at stress levels above 1 g.

5,929

White, W. J. 1958 ACCELERATION AND VISION.
(Wright-Patterson AFB, Ohio) WADC TR 58-333; ASTIA AD 208 147, Nov. 1958
NOTE: CARI P&S 2.11

Summary (a): This report is a review and evaluation of research pertaining to the effects of acceleration on human vision. Studies of gross qualitative changes in vision such as blackout and loss of peripheral in headward (positive) acceleration and the less dramatic effects in other body orientations to the acceleration vector are discussed first, together with the physiological basis of these symptoms. Then the quantitative and analytic studies of the influence of acceleration on vision are reviewed including the use of electrophysiological techniques and the application of the threshold method of psychophics [sic; psychophysics?]. Finally a number of areas are pointed out where there is a need for more investigation.

SECOND ABSTRACT: Research pertaining to the effects of acceleration on human vision is reviewed and evaluated. Studies of gross qualitative changes in vision such as blackout and loss of peripheral vision in headward (positive) acceleration and the less dramatic effects in other body orientations to the acceleration vector are discussed, together with the physiological basis of these symptoms. The quantitative and analytic studies of the influence of acceleration on vision are reviewed including the use of electrophysiological techniques and the application of the threshold method of psychophics. A number of areas are pointed out where there is a need for more investigation. (Author)

5,930

White, W. J. 1958 SOME EFFECTS OF MODERATE ACCELERATION (G) ON OPERATOR PERFORMANCE. (Cornell Aeronautical Lab., Inc., Buffalo, N. Y.)
FDM 291, Nov. 1958

ABSTRACT: This report is an assessment of the empirical relations that have been found between reaction and response times and moderate accelerative force. Serious gaps in knowledge are pointed out. The application of the findings to future air traffic control simulators is presented. In addition, the possibilities of simulating the visual effects of acceleration are discussed.

5,931

White, W. J. 1958 EXPERIMENTAL STUDIES OF THE EFFECTS OF ACCELERATIVE STRESS ON VISUAL PERFORMANCE. (Dissertation, Ohio State University)

ABSTRACT: Two different aspects of visual behavior were examined during exposure to accelerative stress: absolute thresholds of foveal (cone) and peripheral

(rod) vision and the ability to read instrument dials. The threshold measurements were made on one seasoned observer at accelerative levels from one to four units (g) with and without protection from an anti-G suit. Six subjects, wearing an anti-G suit, read dials at five luminance levels and four acceleration levels (one to four G) The data from both were analyzed in detail for the effect of acceleration on visual performance An extensive review of previous studies in this area is included.

5,932

White, W. J. 1959 EXPERIMENTAL STUDIES OF THE EFFECTS OF ACCELERATIVE STRESS ON VISUAL PERFORMANCE. 30th Annual Meeting, Aero Medical Association, April 27-29, 1959.

ABSTRACT: Two different aspects of visual behavior have been examined during exposure to a common stress, an increased G force on the body. The WADC human centrifuge was used to produce the increased G forces. Measurements were reported on the effects of accelerative stress upon the absolute threshold of foveal (cone) and peripheral (rod) vision. The ability to read instrument dials was recorded as a function of acceleration and illumination. These experiments show that acceleration has a consistent and progressive effect on visual performance, the size of the effect being proportional to the magnitude of the positive acceleration. The following basic findings resulted from an analysis of the data gathered from these experiments:

1. Absolute threshold--(a) Acceleration levels of 3 and 4 G approximately double and triple foveal thresholds (b) Threshold levels in peripheral vision triple at 3 G and quadruple at 4 G. (c) This effect of peripheral vision is compensated in part by anti-G suits. (d) A rise in threshold (decline in visual sensitivity) is found with repeated exposure to acceleration, the rise being smaller than that associated with acceleration.

2. Instrument reading--(a) At the higher levels of instrument illumination, increasing acceleration and decreasing luminance produce relatively small increase in reading errors. (b) At marginal levels of illumination, acceleration and luminance interact to produce a relatively large increase in errors. (c) Intensity of illumination can compensate for the decline in Visual performance at stress levels above 1 G.

J. of Aviation Medicine, Vol. 30, No. 1. January, 1959)

5,933

White, W. J. 1960 VARIATIONS IN ABSOLUTE VISUAL THRESHOLDS DURING ACCELERATION STRESS. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 60-34; ASTIA AD-243 612; April 1960

ABSTRACT: Measurements are reported on the effects of moderate acceleration upon the absolute thresholds of foveal (cone) and peripheral (rod) vision. This experiment shows that accelerative stress has a consistent and progressive effect on visual performance, this effect being proportional to the magnitude of the positive acceleration. (AUTHOR)

5,934

White, W. J. 1961 VISUAL PERFORMANCE UNDER GRAVITATIONAL STRESS. (In Gauer, O. H. and G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine. (Boston: Little, Brown, and Co., 1961) pp. 70 - 89

5,935

White, W. J. 1961 THE EFFECT OF ACCELERATION ON THE RELATION BETWEEN VISUAL ACUITY AND LUMINANCE LEVEL. (Paper, 32nd Annual Meeting, Aerospace Medical Assoc., 24-27 April 1961, Chicago, Ill.)

ABSTRACT: Measurements made in the WADD centrifuge using an Ortho-Rater visual testing apparatus show the effects of positive acceleration on the relation between visual acuity and luminance level. Under conditions of 1 g the expected increase in resolving power of the eye with increasing luminance was found. In repeating these measurements at [illegible] 4 g the following relation appeared: acceleration has a significant and progressive effect on visual acuity at all luminance levels, but this effect is most profound at low brightness levels. Thus at the luminance of 0.01 millilamberts the minimum resolvable angle increased from 4.0 minutes at 1 g to 7.59 mins of arc under conditions of 4 g. At the highest brightness level, 150 millilamberts, the change in visual angle was 0.25 mins of arc between these two values of acceleration. The data have been interpreted both in terms of decreased blood flow to the head and in terms of distortion of the optical imagery of the eye. (J. Aerospace Medicine 32(3):252, Mar.1961)

5,936

White, W. J. 1962 A SURVEY OF BIOASTRONAUTICS 1961-1962 RESOURCES FOR RESEARCH AND DEVELOPMENT
(Cornell Aeronautical Lab., Inc., Buffalo, N. Y.)
Feb. 1962 ASTIA AD 274 053

ABSTRACT: Foremost among the questions to be answered by future exploration of space are those concerned with bioastronauties. A research and development program for manned space flight during the next two decades will serve both to establish human productivity in space-based systems and to stimulate the advancement of concepts of military action for exploiting human capabilities. Information and ideas which must be considered in the formulation of a long range program aimed at manned exploration and use of outer space are discussed. (Author)

5,937

White, W.J. 1962 QUANTITATIVE INSTRUMENT READING AS A FUNCTION OF ILLUMINATION AND GRAVITATIONAL STRESS.
J. Engineering Psychol., 1(3):127-133, July 1952.

ABSTRACT: This study investigated whether or not a pilot's ability to read aircraft instrument dials at various brightness levels is impaired by accelerative force less than that required to produce temporary blindness. Six subjects with a visual acuity of 20/20 or better, clad in a CSU-3/P anti-G suit, were exposed to positive acceleration levels ranging from 1 to 4 g (at least 1 g unit below that at which dimming of peripheral vision would occur). The results indicate the following: (a) at the highest luminance level there are no differences in the percentage of errors among the four acceleration conditions; (b) at the three highest luminance levels, for values up to 3 g, there are no significant differences in the percentage of reading errors; (c) at the two lower luminance levels errors are inversely related to luminance and directly related to acceleration; (d) at the 4-g conditions there is a systematic increase in errors with decreasing brightness; and (e) the 2-g level of acceleration cannot be distinguished from the 1 g or static condition.

5,938

White, W. J., & M. L. Braunstein 1963 ACCELERATION AND VISION: BRIGHTNESS DISCRIMINATION. (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 28 - May 2, 1963)

ABSTRACT: Brightness discrimination thresholds were determined at positive acceleration levels of 1, 2, e, and 5 G and transverse acceleration levels of

1, 2, 3, 5, and 7 G. Four background luminance levels, ranging from .03 to 31 foot lamberts, were studies. Contrast required to detect an increment in illumination increased with acceleration. This increase was present for both directions of acceleration and for all background levels, but was most marked for positive acceleration, and for the dimmest background. At .03 ft. l., 16 per cent contrast was required to detect a target of 5 G positive, as compared to 9 per cent at 1 G. The differential effects of positive and transverse acceleration permit a comparison of the mechanical and haemodynamic effects of acceleration on brightness discrimination. These results will be related to previous research, and the role of these factors in other aspects of visual functioning will be discussed.

5,939

White, William J. 1962 A SURVEY OF BIOASTRONAUTICS 1961-1962 RESOURCES FOR RESEARCH AND DEVELOPMENT
Andrews Air Force Base, HQAFSC-TDR-62-1 Contract No. AF 18(600)-1916 by Cornell Aeronautical Laboratory, Inc. ASTIA AD-274 053

ABSTRACT: This report outlines information and ideas which must be considered in the formulation of a long range program aimed at manned exploration and use of outer space. This report attempts to achieve the following objectives: (1) An accounting of the men, money and skills invested in bioastronautics work by universities, not-for-profit and industrial concerns; (2) An evaluation of the usefulness of their effort to the National program; (3) An appraisal of the research and development now in progress, together with a prognosis of technical accomplishments, and recommendations for research that recognize the magnitudes of the country's scientific skills, facilities, and manpower.

5,940

Whiteside, T.C.D., and F.W. Campbell 1959 SIZE CONSTANCY EFFECT DURING ANGULAR AND RADIAL ACCELERATION Quart. J. Exp. Psychol 11:249, November 1959

5,941

Whiteside, T. C. D. 1960 MOTION SICKNESS
(RAF, Institute of Aviation Medicine, Farnborough) FPRC Memo 156; ASTIA AD-264 112; Dec. 1960

ABSTRACT: Motion sickness is the syndrome characterised by nausea and malaise which is initiated by exposure to changing accelerations. It includes sea sick-

ness, air sickness, car sickness, etc. Although the mechanism has not yet been determined with certainty it is clear that changing acceleration acting on the labyrinths is a basic factor, although it is not known with certainty whether the syndrome is initiated by the labyrinthine stimulus per se or by a secondary mechanism. Therapeutic measures include: immobilization of the head insofar as possible; avoidance of rapid and repeated head movement; mental relaxation; avoidance of anxiety; and comfortable clothing. (AUTHOR)

5,942

Whiteside, T. C. D., & A. J. Benson. 1961 THE EFFECT OF LINEAR ACCELERATION ON THE RESPONSE TO ANGULAR ACCELERATION IN MAN. J. Physiol.

5,943

Whiteside, T. C. D. 1962 PROBLEMS OF EMPTY VISUAL FIELDS IN AGARD, VISUAL PROBLEMS IN AVIATION MEDICINE (Oxford, N.Y.: Pergamon Press) p. 118-120; NASA N62-17156.

ABSTRACT: The problems associated with scanning totally empty fields and with perceiving a single object against a featureless background are reviewed. The search of an empty field for an undetected target poses physiological problems of accommodation and fixation, since these reflexes both depend on the stimulus of visual detail in the external scene. Another problem is man's dependence upon vision for confirmation of the positional stability of his body as a whole and of his eyes in particular. As a result of these factors, scanning a totally empty field is often reduced to random eye motions. Even when a target has been spotted on an otherwise empty background, perceptual problems remain. The threshold of relative motion perception is dependent upon the texture of the background and further complicated by turbulence and coriolis effects, so that the relative motion of the target cannot be determined with any certainty. The size and distance of the object also appear different when no other detail is present; the target is judged to be further away because it appears smaller, and a converging flight path results in approach speeds which appear greater than in reality. M.P.G.

5,944

Whiting, A. A. 1946 PRELIMINARY REPORT ON DECELERATIVE FORCES ON AIR CREWS. (Cornell Aeronautical Laboratory) Army Contract W 33-038 AC-14230, Phase I, 2 April 1946. Cornell Aeronautical Lab Report No. OG-410-D-1, 17 May 1946.

5,945

Whiting, A. A. 1946 DECELERATIVE FORCES ON AIR CREWS. (Cornell Aeronautical Laboratory, Buffalo, New York) Final Report No. 410-D-2, Army Contract W33-038 AC-14248, Phase I, 6 June 1946 (Technical Proposal - Decelerator Apparatus) 16 August 1946.

5,946

Whiting, A.A. et al. 1951 HEAD IMPACT AND HELMET INVESTIGATION (Cornell Aero. Lab., Inc., Buffalo, N.Y.) Rept. No. OG-675-D-5, Contract No. N6ori-11917, 30 April 1951.

5,947

Whiting, A. A. 1951 DETERMINATION OF OPTIMUM CONSTRUCTION OF A BOXING PLATFORM TO REDUCE DANGER OF HEAD INJURY ON IMPACT. (Cornell Aeronautical Lab., Inc., Buffalo, N. Y.) Contract SC-1. Rept. No. OG-742-D-1; 10 April 1951

5,948

Whitlock, C.M. n.d. MAN IN SPACE: METABOLIC DATA, STRESSES ENCOUNTERED, AND GROUND TEST FACILITIES (Convair Document 44059 (U)

ABSTRACT: The purpose of this paper is to present some of the problems posed in providing man with an operational environment in space vehicles and some of the answers.

5,949

Whittingham, H. E. 1939 MEDICAL RESEARCH AND AVIATION Int. Congr. J. R. Nav. Med. Serv. 26:15-24 Jan. 1940.
See also Milit. Med 2:95-103, 1939.

5,950

Whittingham, H.E. 1939 PREVENTIVE MEDICINE IN RELATION TO AVIATION. J. Roy. Army M. Corps, 73:278-81

ABSTRACT: The author described "blacking out" resulting when the pilot makes sharp turns at high speed and centrifugal forces greater than 4 g. are develop-

ed. The first symptom is the feeling of being forcibly pressed into the seat of the plane. Then increasing dimness of the visual field, and sudden blindness ensue. The "blacking out" lasts from 2 to 5 seconds depending on the force and the duration of the"g". The phenomenon is considered due to the centrifugally induced splanchnic pooling of the blood. There is a reduction of blood pressure in the head, especially in the central retinal artery, with a temporary interference with the retinal circulation.

The preventive measures suggested are: (1) keeping flying personnel fit, (2) use of belts to support the abdominal wall, and (3) the adoption of a crouching posture by the aviator.

5,951

Whittingham, H.E. 1946 REPORT TO THE SECRETARY FOR AIR ON THE COMMITTEE'S ACTIVITIES FOR THE PERIOD JUNE 1940 TO DECEMBER 1945. F.P.R.C. Report #651, 5 March 1946

5,952

Whittingham, H. E. 1953 MEDICAL ASPECTS OF AIR TRAVEL. MEDICAL FITNESS. (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. No. 828; ASTIA AD-142 597
See also Reprint British Medical Journal, Pp. 556 and 610, 7 and 14 Mar. 1953 London 1 (4810): 610-612.

ABSTRACT: The second part of the paper covers common medical conditions which should preclude travel by air. They are: anemia, cardiovascular diseases, gastrointestinal conditions, respiratory disorders, mental disorders, and infectious diseases. Some difficulties may be experienced by travelers because of age or because of pregnancy. Statistics show that only 0.3% of the total number of passengers traveling by air suffer from diseases. Medical emergencies arise during flight among diseased passengers as well as among persons whose medical conditions were heretofore unknown. In some cases, distress due to flight is delayed up to 48 hours after travel. (CARI)

5,953

Whittingham, H.E. 1954 MEDICAL SCIENCE AND PROBLEMS OF FLYING. (Flying Personnel Research Committee, Gt. Brit.) Report no. FPRC-915; ASTIA AD-65 152; May 1954

5,954

Whittingham, R. A. 1959 TRIALS WITH "SAFELAND"TYPES 4:3 AND 6:3 OVER-RUN EMERGENCY BARRIERS MANUFACTURED BY BORGS FABRIKS A. B. OF SWEDEN. Royal Aircraft Establishment August 1959 Tech Note No. Nval 38

These barriers are of the deep net type and are designed to arrest aircraft overshooting the ends of runways either on take-off or landing. They engage around the mainplanes of the aircraft and the arrest is by multi disc type brake units.

The Royal Air Force have given these barriers the nomenclature of the Mk.5 and Mk.6 airfield barrier installations respectively.

5,955

Wiant, H. W. 1956 THE EFFECTS OF SIMULTANEOUS DECELERATION, TUMBLING, AND WIND-BLAST ENCOUNTERED IN ESCAPE FROM SUPERSONIC AIRCRAFT. WADC TN 54-18, Mar.1956 ASTIA AD-99 656

ABSTRACT: The angular motion of the seat was quite different in the two drops. In general the magnitude of angular velocity about the three axes averaged higher shortly after seat ejection for the second test. The axes about which the highest angular velocities occurred were also different. In test No. 1 the highest value was about the Z axis and in test No. 2 about the X axis. A final steady rotation about the Z axis was widened in the first drop while in test Drop 2 a steady rotation about the Y axis developed. These rotations approached 2.9 rps and 1.5 rps, respectively.

The differences in accelerations are very evident in the two tests. The magnitudes of the accelerations in test Drop 2 exceed those of Drop 1 and sense at the maxima are reversed. For example in Drop 1 the maximum is along the positive X axis. Table 5 compares maximum values of the accelerations and angular velocities along the coordinate axes.

A comparison of chest and helmet pressure variations at seat ejection cannot be made because of damage to the chest and helmet instrumentation as a result of failure of the seat frame in Drop test 2.
Chest pressure records of the first test show a pressure differential of 12.35 psi in 0.2 of a second elapsed time. This was after hatch ejection and through seat ejection. The maximum chest pressure that exists for drop 2 is 7 psi. After this point the record is meaningless.

Both tests failed in recovery of animal subject and seat. The first failure was the result of a malfunctioning mechanical timer. In the second test the seat recovery pilot parachute deployed but immediately fouled itself on the broken seat parts.

The missile recovery system in both tests failed. The failure of the first missile was due to premature deployment of the second stage brake parachute and unpredictable parachute damage due to afterburning of the JATO unit. The failure in the second test was a result of the pilot parachutes being unable to extract the brake parachutes from their respective storage pods. In both instances the final 88 ft diameter recovery parachute was destroyed because of excessive missile velocity at the time of deployment. The damage due to windblast in test No. 1 was negligible. Test No. 2 produced an indirect effect due to windblast; namely the damaging of the roller mounting frame on the ejection seat. This is the main structural component of the seat back.
(DACO)

5,956

Wiant, H. W. 1956 THE EFFECTS OF SIMULTANEOUS DECELERATION, TUMBLING, AND WINDBLAST ENCOUNTERED IN ESCAPE FROM SUPERSONIC AIRCRAFT. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TN 54-18; ASTIA AD-99 656, Mar. 1956

ABSTRACT: Two chimpanzees were emitted by ejection seats from missiles traveling at Mach 1.1 and 1.5 respectively at 21,500 feet. Physiological data were obtained from accelerometers, rate gyros, electromanometers, and heart and respiratory rate recorders attached to the seat during ejection. Maxima of 180 r.p.m. and 25 g were observed for brief periods. In each case, the recovery parachute failed and the animal free fell to earth. Maximum pressure change occurred at ejection at which time the pressure at the chest rose from 3.05 psi to 15.4 psi in 0.2 seconds. Findings on postmortem examination were inconclusive. Microscopic examination of the lungs revealed no signs of explosive decompression, although signs of trauma due to impact were diffuse and severe. A large angular impulse arising from the airloads was applied to the seat during ejection, which was of sufficient magnitude to cause the seat to rotate from its initial horizontal position to a nearly head-down attitude shortly after separation from the missile. The results indicate that tumbling is somewhat higher than might be reasonably tolerated by a human subject.

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Wicke, Walter 1958 PROGRESS REPORT ON MANUFACTURE & EVALUATION OF 50 INTEGRATING ACCELEROMETERS
Contract No. DA-19-059-501-ORD-2757

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Wielunski, Stefan 1961 THE INVESTIGATION OF LIVING ORGANISMS IN ROTATING SYSTEMS
(Paper 49, XIth International Astronautical Congress, Stockholm, 1960, pp. 483-488) Prepared by: Translation Services Branch, Foreign Technology Division, SP-AFB, Ohio FTD-TT-61-248/1+2 ASTIA AD 269153

ABSTRACT: An apparatus constructed at the physical laboratory of the Polytechnical Institute of Lublin, Poland permits the observation by a stationary observer of the phenomena occurring in a rotating system as seen by an observer resting in this system.

The author's apparatus enables a stationary observer to follow the behavior of a living animal in a rotating cage, in natural size and colors.

The apparatus consists of a horizontal disc on which a cage with the animal under observation is fastened. The disk rotates about the vertical axis and the behavior of the animal is ovserved in a mirror rotating at one-half the speed above the same axis. The mechanism may be driven either manually or electrically. Many experiments illustrating the centrifugal and Coriolis' forces may be made with it. The apparatus should prove useful in the investigation of the physiological effects of high accelerations in rap dly rotating cosmic vehicles of the future in which the Coriolis' forces on the subjects blood will be 10,000 to 20,000 times greater than on the surface of the earth. The author hopes that his inexpensive apparatus will make such investigations possible even in laboratories of l'mited means.

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Wiesehofer, H. 1939 FLIGHT TESTS ON THE INCREASES OF G TOLERANCE BY ACCOMMODATION OF THE CREW IN THE PRONE POSITION. (Edited by Deutsche Versuchsanstalt for Luftfahrt. E. V. Berlin-Adlershof, 12 June 1939) German Aviation Research Rept. 1075

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Webb Associates 1962 FORCE FIELDS
In: NASA Life Sciences Data Book (National Aeronautics and Space Administration, Washington, D.C.) Contract NASr-89. June 1962

ABSTRACT: This handbook provides 28 pages of charts and summaries from the various force fields. Areas covered include: acceleration (experience, impact, transverse G limits, acceleration terminology, variations in G tolerance, G vector and consciousness, direction of force, maximum tolerable acceleration profiles, G protection by water immersion); tolerance to tumbling; deceleration (abrupt transverse, positive and negative G decelerations, tolerance to vertical impact, human impact sensitivity, impact tolerance); G fields in rotating space vehicles; vibration, (response, tolerances, physiological effects, psychophysical factors, performance functions, transmission, oxyge consumption, respiratory ventilation, and tracking performance); resonance of the abdominal wall; oscillations; high dynamic pressures; blast injury.

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Wiesehofer, H. 1940 UBER FLUGVERSUCHE ZUR FRAGE DER ERTRAGLICHKEIT HOHER BESCHLEUNIGUNGEN BEI LIEGENDER UNTERBRINGUNG DER FLUGZEUGINSASSEN (Question of Tolerance of High Rates of Acceleration by Pilot While Lying Down; Experimental Studies)
Luftfahrtmedizin 4: 145-155

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Wiesehoefer, H. 1943 FLUGMEDIZINISCHE GRUNDLAGEN ZUM BAN VON SCHLEUDERSITZEN. (Aero-Medical Basis for Construction of Catapult Seats) Oct. 1943. ASTIA ATI 52016

ABSTRACT: A detailed discussion is presented on the aero-medical principles for construction of catapult seats. The main topic of the discussion is the determination of how well the human body is able to withstand the strain connected with high acceleration, and how these stresses can be reduced, and other safety measures are outlined. Numerical tables are given showing the stress resistance of various vertebrae to various stresses. One proposed measure to reduce acceleration is to catapult the seat downward. Results of tests showed that accelerations of 18 to 20 g for a period of 1/10 to 2/10 sec are permissible causing no serious effects to the body.

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Wiesehoefer, H. 1944 SCHLEUDERSITZABECHUESSE MIT MENSCHEN ZUR.... FLUGZEUGMUSTER. (Tolerance of Human Subjects to Acceleration During Catapult Seat Ejection) Oct. 1944. ASTIA ATI 43761

ABSTRACT: Tests were performed with catapult ejection seats with human subjects to determine tolerance to high acceleration. Catapult seats intended for the Do 335 and He 219 fighters were used, at ejection pressures of 60 to 135 atmospheres corresponding to actual flight of both aircraft. Attention is directed to the difference in construction of both assemblies. On the basis of results obtained it is shown that these ejection seats may be used without causing injuries to pilots due to excessive acceleration. It is considered premature to regard accelerations up to 28 g, which have been well tolerated in the tests, as lying invariably below the breaking load of skeletal structures.

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Wiesehofer, H., tr. J.B. Bateman 1945 AVIATION MEDICAL PRINCIPLES FOR THE CONSTRUCTION OF EMERGENCY EJECTION SEATS. (Deutsche Versuchsanstalt fur Luftfahrt, E.V., Berlin-Aldershof) Rept. Rf 301/12, UM 1175(150)2402, 27 Oct. 1943. Translated as Appendix 2 to Lovelace, W.R., E.J. Baldes, & V.J. Wulff, The Ejection Seat for Emergency Escape from High-Speed Aircraft, Aug. 31, 1945. ASTIA ATI 7245

ABSTRACT: Following a review of the dynamic processes occurring in the ejection of the catapult seat, the effects on the human subject resulting from accelerations and air resistance are set forth. The limiting conditions are established under which the thresholds of tolerance of the human body, and particularly of the spinal column, are not exceeded. The procedures for reducing the forces involved and certain safety measures are discussed.

I. Introduction
II. Technical Details of the Ejection Seat.
III. Tolerance Toward Impact-Like Accelerations.
IV. Experiments on Tolerance to Wind Blast.
V. Flight Tests with Catapult Seat in the Ju 87.
VI. Possible Methods of Reducing the Acceleration During Ejection.

(Author)

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Wiesohofer, H., tr., J.B. Bateman 1945 CATAPULT SEAT EJECTION WITH HUMAN SUBJECTS: TOLERANCE TO ACCELERATION OF PERSONS EJECTED FROM THE Do 335 AND He 219. (Deutsche Versuchsanstalt Fur Luftfahrt, E.V., Berlin-Adlershof) Deutsche Luftfahrtforschung: Investigation and Report No. 1393, 31 Oct. 1944. Translated as Appendix 14 to Lovelace, W.R., E.J. Baldes, & V.J. Wulff, The Ejection Seat for Emergency Escape from High-Speed Aircraft, ASTIA ATI No. 7245

ABSTRACT: The report deals with the effects on human subjects of seat ejection from a stationary mounting using high driving forces.
Using a catapult seat assembly intended for model Do 335, twenty-seven ejections have been performed with ten subjects, using pressures of 60 to 135 atmospheres.
Using that intended for model He 219, fourteen ejections have been made with five subjects at pressures of 60 to 90 atmospheres.
Attention is drawn to the differences between the two assemblies; the requirements for each are set forth, and the results of the experiments are discussed.
(Author)

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Wiesehofer, H. CATAPULT SEAT LAUNCHINGS OF MEN TO DETERMINE ACCELERATION TOLERANCES FOR APPARATUS USED IN THE DO. 335 AND HE.219 AIRCRAFT (ZWB-U & M 1393) (TIB Ref. GDC 10/5725)
R.A.E. Translation No. 226

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Wiesinger, K. 1953 THE ROLE OF ANALYSIS OF FINDINGS IN THE RECONSTRUCTION OF AVIATION ACCIDENTS(Le rôle de l'analyse des traces dans la reconstruction des accidents d'avion.
Médecine aéronautique(Paris). 8(1):85-86. 1953

ABSTRACT: Serious military airplane accidents are evaluated by a special committee in Switzerland; the members of this committee are: a police official, a flight surgeon, and a technical expert. The methods of evaluation of their findings are the same as those employed in forensic medicine. Microscopic physical, chemical, and biological examination of the findings is done by experts. The role of the flight surgeon is to collect and preserve all available evidence.--This method seems to be of considerable value in the investigation of airplane accidents.

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Wiggers, C.J. 1944 AVIATION PHYSIOLOGY, Chapters 28-29 4th ed.
Lea and Febiger Philadelphia,

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Wiggers, C.J. 1950 PHYSIOLOGY OF SHOCK.
(New York: Commonwealth Fund, 1950)

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Wiggers, C. J. 1952 CIRCULATORY DYNAMICS
(New York: Grune & Stratton, 1952) p. 8

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Wilber, C.G. THE USE OF ANIMALS, PLANTS, MICROORGANISMS AND TISSUE CULTURE IN SPACE RESEARCH. (US Atomic Energy Comm.) COM-7-T24.

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Wilbur, C.E. THE FLIGHT SURGEON AND AIRCRAFT ACCIDENTS. New York, Institute of Aeronautical Sciences, Inc.; ASTIA

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Wilbur, C. E. 1961 MEDICAL INVESTIGATION OF CIVIL AIRCRAFT ACCIDENTS (Paper, 32nd Annual Meeting of the Aerospace Medical Assoc., Palmer House, Chicago, Illinois, April 24-27, 1961)

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Wild, H. B. 1931 FLYING WITH THE PIONEERS. Pop. Sci. Mon. 118:40; 61.

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Wildhack, W.A. & R.O. Smith 1955 A BASIC METHOD OF DETERMINING THE DYNAMIC CHARACTERISTICS OF ACCELEROMETERS IN ROTATION
(National Bureau of Standards, Washington, D.C.) March 1955 Paper No. 54-40-3
ASTIA AD 118 806

ABSTRACT: The earth's gravitational field furnishes a convenient sinusoidal forcing function for a vibrating system (e.g., an accelerometer) rotating in a vertical plane. The centrifugal field decreases the restoring force on the vibrating mass. Resonance occurs at lower frequencies and with greater amplitudes than in the case of excitation by linear vibration. The response ratio is greater than unity for all damping ratios up to unity. The resonant frequency for zero damping occurs at 0.707 times the natural undamped frequency. From measurements of the maximum response ratio, and of the frequency at which this ratio decreases to unity, one may determine both the damping ratio and the undamped natural frequency of any system whose damping ratio is less than unity. The response equation for the rotational excitation is given, and the solutions are presented in graphic form. Experimental test results obtained by this method are included. (Contractor's abstract)

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Wilhelm, Kaiser 1928 INJURIES DUE TO CHANGE OF AIR PRESSURE IN PARACHUTE DESCENT. Die Medizinische welt, (Berlin) 2:1192, Aug 11, 1928

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Wilkes, W.H. 1952 ESCAPE FROM MULTIPLACE SUPERSONIC AIRCRAFT (Paper, Symposium on Problems of Emergency Escape In High Speed Flight, Wright Field, Ohio, Sept 29-30, 1952)

ABSTRACT: The principal dangers involved in escape from an aircraft at supersonic speeds and high altitudes are as follows: (1) explosive decompression; (2) immobility due to uncontrollable airplane or injury; (3) possibility of collision with the airplane structure such as wings, fin, wheels, etc.; (4) possible high temperatures due to aerodynamic heating of the crewman; (5) extreme horizontal deceleration after entering the airstream; (6) physical harm due to air blast on face and body; (7) lack of oxygen; (8) extreme cold; and (9) inability to open the parachute due to unconsciousness. The implications of these dangers are briefly discussed, in as much as they apply to multiplace bombers operating at altitudes up to 60,000 feet and speeds up to Mach 2.

5,978

Wilkins, R. W., C. K. Driedland, & S. E. Bradley 1943 ESTIMATIONS OF CARDIAC AND VASOMOTOR RESERVE ESPECIALLY IN RESPONSE TO STRAINS DESIGNED TO SIMULATE THOSE OF ACCELERATION. CAM No. 177; 1 Sept. 1943

ABSTRACT:
(a) Release of occlusion of circulation in the limbs is followed by intense local hyperemia and fall of systemic arterial blood pressure, rise in pulse rate and cardiac output and fall in venous pressure. Reocclusion reverses this.
(b) External compression of the abdomen raises intra-abdominal pressure slightly, but not enough to occlude circulation, although blood flow and kidney functions are retarded.
(c) Abdominal muscular straining raises intra-abdominal pressure much higher than does external abdominal compression.
(d) Valsalva maneuver causes initial sharp rise in arterial pressure followed by a fall in the arterial and pulse pressure plus a rise in pulse rate.
(e) Release of Valsalva strain is followed by brief further fall in arterial pressure, then a rise into hypertensive levels for one half minute or more.

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Wilkins, R. W. 1944 BIMONTHLY PROGRESS REPORT NO. 17 TO THE CMR-OSRD ON CONTRACT OEMcmr-143; 2 Oct. 1944

ABSTRACT: An anti-"g" suit has been constructed out of cotton netting which works on the principle of the "Japanese finger trap". Tests at the Wright Field Centrifuge show that it gives a protection of ½ to 1 "g". The experimental model is now being strengthened and simplified.

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Wilkins, R. W., S. Bradley, & C. K. Friedland 1946 CIRCULATORY EFFECTS OF THE HEAD-DOWN POSITION (NEGATIVE G) IN NORMAL MEN AND MEASURES DESIGNED TO COUNTERACT THEM. (Nat'l Research Council) C. A. M. Final Rept. OEMcmr-143 May 1946.

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Wilkins, R. W., S. E. Bradley, & C. K. Friedland 1946 CIRCULATORY ADJUSTMENTS TO THE HEADDOWN POSTURE. J. Clin. Invest. 25:937.

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Wilkins, R. W., S. E. Bradley, & C. K. Friedland 1950 THE ACUTE CIRCULATORY EFFECTS OF THE HEAD DOWN POSITION (NEGATIVE G) IN NORMAL MAN WITH A NOTE ON SOME MEASURES DESIGNED TO RELIEVE CRANIAL CONGESTION IN THIS POSITION. J. Clin. Invest. 29(7):940-949

SUMMARY: Studies of the circulatory effects of the head-down position have revealed venous, and to a lesser extent, arterial hypertension in the head to be among the more important changes. Because of moderating physiological mechanisms, the increase in cerebral venous pressure in the inverted position is less than might otherwise be expected, but is still formidable, and presumably the chief cause of the ill effects reported to follow exposure to higher negative G. In the inverted position there was a decreased and often irregular pulse rate and an increased cardiac output (ballistocardiographic). After the initial passive (hydrostatic) change in arterial pressure there was a further moderate decrease, indicating vasodilation. A study of renal clearance showed that the kidneys did not participate in this vasodepressor response. Several simple methods of lessening cranial venous hypertension in the head-down position were found to give considerable relief from the usual symptoms and signs of cranial congestion caused by this posture. (DACO)

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Williams, D. 1944 ANALYSIS OF FPRC/450 (RAF, Institute of Aviation Medicine, Farnborough) FPRC 450a, November 1944

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Williams, D. C. 1959 T33 AIRCRAFT EJECTION SEAT TRIALS LOW LEVEL CASE USING D-RING LANYARD SYSTEM (Royal Canadian Air Force Central Experimental and Proving Establishment) Report No. CEPE-1363, March 1959.

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Williams, D.J. 1943 EPISODES OF UNCONSCIOUSNESS, CONFUSION, AND AMNESIA WHILE FLYING. (Flying Personnel Research Committee, Air Ministry) F.P.R.C. Report # 562, November 1943

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Williams, E.R.P. 1942 BLAST EFFECTS IN WARFARE (Hunterian lecture). Brit. J Sur., 30:38-49

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Williams, G.O. 1945 NATURE AND SITE OF INJURIES RECEIVED IN FLYING ACCIDENTS. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 639, Sept. 1945.

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Williams, G.O. 1945 NATURE AND SITE OF INJURIES RECEIVED IN FLYING ACCIDENTS: SECOND REPORT. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 639(a), Jan. 1946.

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Williams, G.O. 1946 NATURE AND SITE OF INJURIES RECEIVED IN FLYING ACCIDENTS: THIRD REPORT. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 639(b), June 1946.

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Williams, G.O. 1946 NATURE AND SITE OF INJURIES RECEIVED IN FLYING ACCIDENTS: FOURTH REPORT. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 639(c), Aug. 1945.

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Williams, G. O. 1946 NATURE AND SITE OF INJURIES RECEIVED IN FLYING ACCIDENTS. (Flying Personnel Research Committee) November 1946.

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Williams, M. M. D., E. J. Baldes, R. K. Ghormley, & C. F. Code 1944 ARE THE INTERVERTEBRAL DISKS COMPRESSED OR DISPLACED DURING POSITIVE ACCELERATION? (Mayo Clinic) CAM Rept. No. 255, 18 Feb. 1944

ABSTRACT: Anterioposterior and lateral X-ray pictures were taken of the lower spinal region in 4 subjects before and during exposure to 2 to 6 "g". No significant change was detected in the measurements of the lumbar intervertebral spaces and the total length of the lumbar spine. It is concluded that there is no compression or displacement of the lumbar spine under these values of "g".

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Williams, K. G. 1959 THE NEW FRONTIER: MAN'S SURVIVAL IN THE SKY (London: William Heinemann Medical Books, 1959)

ABSTRACT: Of special interest are chapters on the basic man-machine control system; the problem of input, man versus automatic control; fatigue, prevention of fatigue; selection of the man, teamwork in flying; problems and psychological dangers of weightlessness.

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Williams, P.C. LESIONS OF THE LUMBOSACRAL SPINE: PT I, II. Journ. Bone Joint Surg. 19(1937): 343, 690.

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Williams, R.B. & R.J. Benjamin 1960 ANALYSIS OF WEBBING IMPACT DATA AND DETERMINATION OF OPTIMUM INSTRUMENTATION TO BE USED IN CONJUNCTION WITH THE IMPACTING OF WEBBING. (Cook Technological Center, Morton Grove, Ill.) Contract No. AF 33(616)-6440, Project No. 7320, WADC TR 59-694, March 1960. ASTIA AD 237 171.

ABSTRACT: Quantities of data have been obtained at Edwards Air Force Base, California, concerning the impact behavior of nylon webbing. The basic aims of this investigation are:

(1) To evaluate and analyze the methods used to obtain data acquired during nylon webbing impact tests conducted at Edwards Air Force Base, California.

(2) To interpret these data and to judge their reliability.

(3) To recommend, if necessary, improved or modified testing methods and instrumentation techniques which would result in obtaining data of greater value in future tests.

Analysis and interpretation of the test data indicated that these data were of intermediate reliability. Certain trends were apparent, but relatively large experimental scatter existed. Possible causes of the scatter were investigated and recommendations were made for improvement of testing methods, equipment, data reduction technique, and data interpretation.

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Williamson, F., Jr. 1963 FEASIBILITY STUDY AND DEMONSTRATION OF VARIABLE-THRUST PROPULSION FOR A SOFT-LANDING VEHICLE. (Naval Ordnance Test Station, China Lake, Calif.) NAVWEPS-7900; NOTS-TP-2901; NASA N63-13759; Jan. 1963

ABSTRACT: The soft-landing vehicle was designed and tested to demonstrate the feasibility of using the NOTS Variable Area Injector to softly land a rocket vehicle without the aid of aerodynamic forces. The vehicle was tested in a vertical track which restricted freedom of movement to the direction of the vertical axis. Propellant tank capacity of the soft-landing vehicle was 200 lbs. of inhibited red fuming nitric acid and 100 lbs. of unsymmetrical-dimethylhydrazine. Total loaded weight of the vehicle was 700 lbs. and maximum thrust was 1,300 lbs. The vehicle successfully completed four captive flight tests. During these tests a maximum height of 155 ft. and landing velocities between 3.8 and 8.3 ft. per sec. were achieved. Thrust control was sufficient to allow the observer to hover the vehicle. (AUTHOR)

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Willis, J. M. 1962 THE ROLE OF MOTION INFORMATION AND ITS CONTRIBUTION TO SIMULATION VALIDITY: DESCRIPTION OF THE EXPERIMENTAL APPARATUS. (Bell Helicopter Co., Ft. Worth, Texas) TR D228-370-005, Apr. 1962

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Willis, M. P. & F. Siroky 1960 SIMULTANEOUS VS SUCCESSIVE PRESENTATION OF RELATIVE MOTION PROBLEMS (U. S. Naval Training Devices Center, Port Washington, New York) 26 August 1960 AD 248 419.

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Willmorth, N. E., & G. A. Green 1950 THE EFFECT OF INCREASED POSITIVE RADIAL ACCELERATION ON THE SPEED AND ACCURACY OF REACHING MOVEMENTS. (Paper, 30th Annual Meeting of the Western Psychological Assoc., 27-29 April 1950, Santa Barbara, Calif.)

ABSTRACT: The purpose of this study was to compare speed and accuracy of reaching movements for up, down, right, and left target positions at increased g-levels.
Results show that reaction and movement times increase, and accuracy decreases, significantly, with increased g. Errors of underestimation and negative-inertia determined the position of strikes on the targets. (Amer. Psychologist 5(9):465, Sept. 1950)

6,000

Willmorth, N.E., and G.A. Green 1950 THE EFFECT OF INCREASED POSITIVE RADIAL ACCELERATION ON THE SPEED AND ACCURACY OF REACHING MOVEMENTS. Abstract: Amer. Psychol., 5(9):466. 1950

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Wilson, A.G. 1958 THE SPACE ENVIRONMENT. (The Rand Corp., Santa Monica, Calif.) Report. No. P-1427, Feb 1958

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Wilson, C. L. 1959 PROJECT MERCURY CANDIDATE EVALUATION PROGRAM. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 59-505; ASTIA AD-234 749; Dec. 1959

ABSTRACT: The National Aeronautics and Space Administration (NASA), a U. S. Government civilian agency, has been assigned the task of exploring the feasibility of space travel. As a result of thorough and exhaustive study, NASA has concluded that certain aspects of space travel are feasible and, furthermore, that some will be practicable in the very near future. One profile of space travel envision that a human pilot, transported in a life support system (capsule), could be

thrust into orbit by a liquid fuel rocket, maintained there for several revolutions around the earth, and successfully and safely recovered from orbit. Project Mercury intends to realize this vision.
Among the many strategic questions to be answered is: "Who will the pilot be?" This report describes how and why the Aerospace Medical Laboratory participated in the selection of the seven Mercury Astronauts. (CARI)

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Wilson, C.W.J. 1957 BIBLIOGRAPHY ON LOW DENSITY WIND TUNNELS (Royal Aircraft Establishment (Gt. Brit.) Library Bibliography no. 194, Nov. 1957, ASTIA AD-217 324

6,004

Wilson, C.W.J. 1957 BIBLIOGRAPHY ON LOW DENSITY WIND TUNNELS (Royal Aircraft Establishment (Gt. Brit.) Library Bibliography no. 194, Nov. 1957, ASTIA AD-217 324

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Wilson, J.S., E.H. Estes, J.T. Doyle, W.L. Bloom, & J.V. Warren 1951 THE USE OF DEXTRAN IN THE TREATMENT OF BLOOD LOSS AND SHOCK. (U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.) NM 001 050. 01.03, 1 Oct. 1951. ASTIA ATI 122250.

ABSTRACT: A solution of dextran, a glucose ploymer, has been fiven to five normal individuals previously subjected to experimental blood loss of from 450 to 900 cc., and to 52 patients suffering from clinical shock. The use of dextran following experimental blood loss resulted in hemodilution and an increase in the circulating plasma volume. In the treatment of shock due to blood loss, trauma and dehydration, dextran brought about satisfactory clinical improvement. Results were poor in those patients with cerebral trauma or infection, even though satisfactory hemodilution occurred. In general, the therapeutic results were essentially the same as might have been expected from plasma. Dextran appears to be a satisfactory plasma volume expander offering advantages of large scale production, storage stability, and convenient reaction-free use in clinical practice.

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Wilson, James V. 1946 THE PATHOLOGY OF TRAUMATIC INJURY. (Aberdeen, Great Britain: The Central Press, 1946)

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Wilson, J.W. 1949 THE EFFECT OF PRONE POSITION UPON THE DURATION OF USEFUL CONSCIOUSNESS AT ALTITUDE (Aero Medical Laboratory, Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio) MCREXD-696-1071, 4 January 1949

ABSTRACT: One may conclude therefore, from these studies, that the aviator will be neither better nor worse if he assumes a prone or sitting position if loss of oxygen at altitude occurs. His duration of useful consciousness will probably depend upon factors other than posture.

6,008

Wilson, R. C. 1950 THE EFFECT OF INCREASED POSITIVE RADIAL ACCELERATION ON PERCEPTUAL SPEED AND SPATIAL ORIENTATION ABILITIES. (Paper, 30th Annual Meeting of the Western Psychological Assoc., 27-29 April 1950, Santa Barbara, Calif.)

ABSTRACT: Perceptual Speed Ability and Spatial Orientation Ability were studied using test items adapted from the Guilford-Zimmerman Aptitude Survey and the AAF Discrimination Reaction Time Test. Test items were administered to subjects at 1 g and under conditions of increased g. Results indicate no significant change in these abilities attributable to increased g forces below the blackout threshold. (J. Amer. Psychologist 5(9):465-466, Sept. 1950)

6,009

Wilson, R.B., et al. 1951 REPORT ON PILOT SAFETY AND FAILURE WARNING SYSTEM FOR ATLAS/CENTAUR/DYNA SOAR (Convair Astronautics, San Diego, Calif 13 April 1951) Report AZP-096

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Wilson, R.C. 1950 THE EFFECT OF INCREASED POSITIVE RADIAL ACCELERATION ON PERCEPTUAL SPEED AND SPATIAL ORIENTATION ABILITIES. (Abstract) Amer. Psychol., 5(9): 466

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Wilson, R.C., G.A. Green, G.L. Bryan, N.E. Willmorth and N.D. Warren 1950 AN INVESTIGATION OF CERTAIN AFTER EFFECTS OF INTERMITTENT POSITIVE RADIAL ACCELERATION. (University of Southern Calif., Psychological Lab., Los Angeles) Contract no. N6ori77, Task order 3, 19 pp., October 1950

ABSTRACT: Healthy young male students were employed as subjects in an attempt to determine the aftereffects of prolonged exposure to moderate g intensities.

The subjects were dividied into experimental and control groups. A battery of six tests was administered to each group before rotation on the human centrifuge and again at the conclusion of the rotation.

The following general conclusion was reached:

a. In the main, the abilities tested were unaffected by the prolonged exposure to g. With the following exceptions:
   (1) the improvement of the experimental group was significantly less than the improvement of the control group in the time required to name colors (significant at the 1% level); and
   (2) the improvement of the experimental group was significantly less than the improvement of the control group in the number of contacts made in the Steadiness Test (significant at the 5% level)

6,012

Wilson, R.C., and A.A. Canfield 1951 THE EFFECTS OF INCREASED POSITIVE RADICAL ACCELERATION UPON PUPILLARY RESPONSE in PHYSIOLOGICAL RESEARCH ON THE HUMAN CENTRIFUGE: FINAL REPORT (Department of Psychology, University of Southern California, Los Angeles, California) Technical Report N6 or 177, 1951

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Wilson, R. C., G. L. Bryan, G. A. Green, N. E. Willmorth, A. A. Canfield, and N. D. Warren. 1951 AFTER EFFECTS OF INTERMITTENT POSITIVE RADIAL ACCELERATION. J. Aviat. Med. 22(5):509-517.

CONCLUSIONS: In general, intermittent exposure to positive radial acceleration does not significantly affect the performance on the tests of this battery. However, two exceptions to this general statement occur: (1) the improvement of the experimental group was significantly less than the improvement of the control group in the time required to name colors; and (2) the improvement of the experimental group was significantly less than the improvement of the control group in the number of contacts made in the Steadiness Test. The evidence from this study does not support the hypothesis that exposure to g, per se, is a significant factor in producing the post-flight fatigue which pilots have reported. On the basis of these results, no changes or modifications in design of aircraft controls or flight procedures are recommended.

6,014

Wilson, R. C., & A. A. Canfield AN EXPERIMENTAL INVESTIGATION OF THE EFFECTS OF INCREASED POSITIVE RADIAL ACCELERATION ON THE REPRODUCTION OF SHORT TEMPORAL INTERVALS (10 SECONDS). (Dept. of Psychol., Univ. of Southern Calif.) Contract No. N6 ori 77, Task Order 3

6,015

Wilson, R. C. and A. A. Canfield 1951 THE EFFECTS OF INCREASED POSITIVE RADIAL ACCELERATION UPON PUPILLARY RESPONSE. (In Warren, M. D., ed., Psychological Research on the Human Centrifuge: Final Report) (Dept. of Psychology, Univ. of Southern Calif., Los Angeles, June 1951) Tech Rept. N6-ori-77, Task Order 3.

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Wilson, W.S. 1960 HUMAN FACTORS IN SPACE FLIGHT: A BIBLIOGRAPHY COMPILED BY AIRCRAFT AND MISSILES
(Chilton Research Services: Philadelphia) 1960 (Mimeo Report)

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Wimperis, H. E. 1931 HIGH SPEED FLYING J. R. Aero. Soc. 35:1040-1046.

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Windle, W. F., R. A. Groat, & H. W. Magoun 1944 FUNCTIONAL AND STRUCTURAL CHANGES IN CENTRAL NERVOUS SYSTEM, DURING AND AFTER EXPERIMENTAL CONCUSSION Trans. Amer. Neurol. Ass. 70:117-122.

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Wimperis, H.E. 1939 NATURAL LIMITS TO HUMAN FLIGHT
Smithsonian Inst. Annual Report 579-593.

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Windes, S. L. Feb. 1942 REPORT OF INVESTIGATIONS, DAMAGE FROM AIR BLAST, PROGRESS REPORT 1. (U. S. Dept. of Interior, Bureau of Mines) RI 3622, Feb. 1942.

6,021

Windle, W. F., R. A. Groat, & C. A. Fox 1944 EXPERIMENTAL STRUCTURAL ALTERATIONS IN THE MAIN DURING AND AFTER CONCUSSION. Surg., Gynecol. Obstet. 79:561

6,022

Windle, W. F. and R. A. Groat 1945 DISAPPEARANCE OF NERVE CELLS AFTER CONCUSSION. Anat. Rec. 93:201-209.

6,023

Winfield, B.J.O. 1948 SOME MEDICAL ASPECTS OF PARACHUTE TRAINING (Air Ministry, Flying Personnel Research Committee) Report No. FPRC/674

6,024

Winfield, B.J.O. & C. Crichton-Miller 1942 ABBREVIATED FORM OF A STATISTICAL REPORT ON PARACHUTING BASED ON 11,000 DESCENTS MADE AT RINGWAY DURING NOVEMBER, DECEMBER, AND JANUARY, 1941/2
Flying Personnel Research Committee, Farnborough, England FPRC 445
ASTIA ATI 206 834

ABSTRACT: The object of the investigation was to secure some information about parachute descents, based on a sufficiently large number of cases to be fairly definite and reliable. All injuries occurring within the period were analysed and the variation of the injury rate with the physical characteristics of the man, his experience, and the wind and weather conditions were examined. Wind speed measurements were reocrded on the actual dropping ground for 4,165 descents, and the actual landings were noted and descriptions recorded in 2,792 cases. A note was also kept on the frequency of various other occurrences, e.g. thrown lines, twisted rigging lines, interference between men and containers or their parachutes, men landing in trees, on obstructions, etc. A general survey of the injuries sustained in 11,190 descents was also undertaken. Some deductions have been drawn from the information which may or may not be considered acceptable; but it is hoped that the raw information will prove useful to those desiring to draw their own conclusions and desiring statistical information on which to base their own theories.

6,025

Winfield, R.H. 1940 INCIDENCE AND CAUSATION OF AIRSICKNESS IN OPERATIONAL AIRCREWS. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 220(a), Dec. 1940.

6 026

Winfield, R.H. 1941 AIRSICKNESS IN PARACHUTE TROOPS. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 277, March 1941.

6,027

Winfield, R.H. 1942 DISCUSSION ON THE EFFECTS OF FLYING ON THE NOSE AND EAR. OBSERVATIONS ON AIR SICKNESS. Proc. R. Soc. Med., 35:257-258. Also: J. Laryng., 57:23-25

6,028

Winfield, R.H. 1946 FLYING PERSONNEL RESEARCH COMMITTEE REPORT ON THE PROBLEM OF AIRSICKNESS IN PARACHUTE TROOPS (RAF, Institute of Aviation Medicine, Farnborough Dec. 1946

ABSTRACT: The object of this investigation was twofold. First to determine the incidence of airsickness among parachute troops and secondly, to consider means by which it might be prevented. It was found that airsickness occurs in a very high proportion of casual troops flown in troop-carriers. This is in part due to lack of control of the accessory factors. No cases of airsickness have been recorded on the twenty minute flights made by parachute troops during training. Three cases of airsickness out of thirty-six troops were reported on the ten and a half hour flight made to the advanced base on the Colossus operation. This relatively low incidence of airsickness as compared with the condition in troop carriers is consistent with the care taken in dealing with the accessort factors in transplorting parachute troops. Airsickness on long flights with parachute troops could be still further reduced by eliminating those liable to vomiting by giveing all prospective troops a trial flight of three or four hours.

6,029

Winfield, R.H. 1947 MEDICAL PROBLEMS OF THE MERCHANT SHIP FIGHTER UNIT (M.S.F.U.) (RAF, Institute of Aviation Medicine, Farnborough) FPRC Report 469; Oct. 1947, ASTIA ATI-206 859

ABSTRACT: This paper gives an account of the Merchant Ship Fighter Unit and the medical problems which have arisen in connection with it. The question of selection and training of personnel is considered and the various ways of raising the morale of the unit on land and at sea are discussed.

6,030

Winfield, R.H. & Crichton-Miller, C. 1942 PARACHUTING: BASED ON 11,0000 DESCENTS MADE AT RAF RINGWAY. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 445, March 1962.

6,031

Wing, C. W. and G. E. Passey 1950 THE PERCEPTION OF THE VERTICAL: XI. The Visual Vertical under Conflicting Visual and Acceleratory Factors. (USN. School of Aviat. Med., Naval Air Stat., Pensacola, Fla.) Rept. No. NM 001 063.01.20. 15 Nov. 1950. Research Project NM 001 110 500.20, 11-15-50.

SUMMARY:
1) Four Ss made adjustments of the visual vertical in both presence and absence of a visual frame of reference under varying resultant acceleratory forces produced in a human centrifuge.

2) In the absence of a visual frame of reference the subjectively accepted vertical to which S adjusted a target was aligned with the resultant acceleratory force. The adjustment was made whether or not the resultant force was aligned with S's body axis or acted at some angle to it.

3) In the presence of a visual frame of reference which was alignment with the resultant forces S adjusted the visual vertical to a position which placed the target in alignmnet with the resultant force and the main lines of the visual framework.
4) In the presence of a visual frame of reference which is aligned with S's body axis and a resultant force which acts at some angle with S's body axis and the visual frame of reference S adjusts the visual vertical to a position of compromise. Neither visual or postural cues are accepted to the exclusion of the other. With increased intensity of the postural cues furnished by an acceleratory force the visual vertical is located relatively nearer to the vertical determined by the resultant force.

5) The results are related to the work of Asch and Witkin (1), (2), and Witkin and Asch (9) and to the work of Gibson and Mowrer (3). On the basis of the results of this experiment we find judgment of the visual vertical to be a function of both visual and postural factors.

6,032

Wing, M. E. 1962 THE RESPONSE OF THE OTOLITH ORGANS TO TILT. (School of Aerospace Medicine, Brooks AFB, Texas) SAM-TDR-62-132; Nov. 1962

ABSTRACT: Action potentials and their changes in response to tilt were recorded from 60 units in the vestibular ganglion, presumably supplying the otolith organs of 10 cats. The action potentials in all units were infrequent and irregular

after position was maintained for some time. The majority of the units showed no response to any change in position. In most cases, of those which exhibited a response, the responses were delayed an average of 40 seconds. The evidence presented supports the view that the utricle and saccule may be vestigial organs, or at least do not function meaningfully in the orientation of the cat with respect to the gravitational field. (AUTHOR)

6,033

Winget, C.M., and A.H. Smith 1962 QUANTITATIVE MEASUREMENT OF LABYRINTHINE FUNCTION IN THE FOWL BY NYSTAGMOGRAPHY. J. Appl. Physiol. 17: 712-18, July 1962.

ABSTRACT: It is commonly known that some of the most important mechanisms governing posture and equilibrium of vertebrates are located in the labyrinth of the inner ear. Stimulation of this region by rotation, heat, or electricity leads to a variety of compensatory motions, one of the most obvious being nystagmus, a spasmodic oscillation of the eyes. A detailed description of this process and discussion of its neurological origin is given. Anatomical and functional descriptions of the labyrinth also are available as well as a summary of experiments, usually involving surgical alteration of the organ.

Under some circumstances, birds suffer postural or equilibrium difficulties which appear to result from labyrinthine damage or malfunction. In birds with Newcastle disease, peculiar portural attitudes are assumed as well as abnormal movements. Chronic exposure of birds to a relatively low accelerative force, produced by centrifugation, also appears to affect labyrinthine function. An apparatus functionally similar to the Bárány chair for the determination of labyrinthine characteristics of birds, and the conditions for its use are described herein.

6 034

Winget, C.M., A.H. Smith & C.F. Kelly 1962 EFFECTS OF CHRONIC ACCELERATION ON INDUCED NYSTAGMUS IN THE FOWL. J. Appl. Physiol. 17(4):709-711, July 1962.

ABSTRACT: Domestic fowl exposed to chronic acceleration (prolonged centrifugation) do not appear to "habituate" to repeated rotatory stimulation, as do similarly treated birds maintained at normal gravity. Chronically accelerated birds frequently exhibit postural or locomotor abnormalities, and such individuals lack a nystagmus response to rotary stimulation.

6,035

Wingrove, R. C. & R. E. Coate 1961 PILOTED SIMULATOR TESTS OF A GUIDANCE SYSTEM WHICH CAN CONTINUOUSLY PREDICT LANDING POINT OF A LOW L/D VEHICLE DURING ATMOSPHERE RE-ENTRY.
(National Aeronautics and Space Administration, Washington, D. C.)
NASA TN D 787, March 1961.

ABSTRACT: The guidance system studied is based on the concept of fast continuous trajectory computation from conditions existing along the trajectory. A method of display compares desired touchdown points with the maximum range capability and heating or acceleration boundaries, so that a proper decision and choice of control inputs can be made. Results from piloted fixed-simulator tests for typical re-entries with lunar mission velocities and for recoveries from aborts are presented. (Tufts)

6,036

Wingrove, R. C. & R. E. Coate 1961 PILOTED STIMULATION STUDIES OR RE-ENTRY GUIDANCE AND CONTROL AT PARABOLIC VELOCITIES.
(Institute of the Aerospace Sciences, New York, N. Y.)
Paper 61 195 1889, June 1961.

ABSTRACT: The results of piloted simulation studies are presented and compared for two piloted re-entry guidance methods for controlling lifting vehicles through a planetary atmosphere to a desired touchdown point. One method continuously predicts from present conditions the remainder of the re-entry trajectory with trim conditions held constant, and the pilot judges what control inputs to apply from these predictions. The second method uses feedback control in combination with a predetermined fixed trajectory to guide the pilot in correcting trim conditions. Usable range, usable entry corridor, and pilot's time-tolerance to acceleration are compared for the two methods. (Tufts)

6,037

Winquist, P.G. & P.M. Stumm 1952 ABRUPT DECELERATION STUDIES OF SURVIVAL LIMITS IN HOGS WITH A MONORAIL DECELERATOR, 51 EXPERIMENTS.

6.038

Winquist, P. G., P. W. Stumm, & Robin Hansen 1953 CRASH INJURY EXPERIMENTS WITH THE MONORAIL DECELERATOR. (Air Force Flight Test Ctr., Edwards, Calif.) AF Technical Rept. No. AFFTC 53-7; ASTIA AD-16 297; 27 Apr. 1953

ABSTRACT: Nineteen deceleration tests were conducted on anesthetized hogs in a carriage which was suspended from a monorail, propelled by an ejector seat, and decelerated by striking a lead cone. Thirteen hogs were allowed to leave the carriage and strike an impingement block and 6 hogs were restrained by harness straps. The range of survivable impingements was below velocities of 24 fps and kinetic energies of 1600 ft-lb. The lower abdominal region appeared more vulnerable than the thorax; one hog survived a chest impact against the impingement block, while another hog died from a comparable abdominal impact. One hog wearing an abdominal belt was killed, while another wearing the belt survived. Three hogs survived decelerations of 130, 148, and 176 g, respectively, when each was wearing a shoulder strap, abdominal belt, and a pelvis-restraining strap. The monorail decelerator was considered a useful and economical test instrument. (ASTIA)

6 039

Winter, K. 1961 DER ERSTE SCHRITT INS WETTAL (The First Step into the Universe) (Weltrumfahrt (Frankfurt), 12(4):101-103, July-August 1961, in German)

ABSTRACT: This is a description of Yu. Gagarin's orbital flight as compiled from open Soviet literature and newspapers. Education, training and background of Soviet astronauts are similar to those in the United States. According to Gagarin's own notes, he ate and drank, wrote, and was not adversely affected by weightlessness. Gagarin wore a space suit throughout the flight. Preparation for the flight included parabolic flight, centrifuge rides, and parachute jumps.

6.040

Winters, W. D. 1961 NEUROPHYSIOLOGICAL ASPECTS OF SPACE FLIGHT. (Paper, AAS Lunar Flight Symposium, 29 Dec. 1961, Denver, Colo.)

6 041

Wisniewski, V. 1937 ETAT DU SYSTEME CIRCULATOIRE AVANT ET APRES LES VOLS DE CHASSE. (State of the circulatory system before and after pursuit flights.) Polski przeglad medycyny lotnicz., 6:15-23

ABSTRACT: Rapid speed flights will produce in young pilots after the flight an increase in systolic arterial pressure and of the pulse rate with a fall in the Schneider index of two to three points, demonstrating fatigue of the circulatory system caused by hyper-adrenalinemia and the emotional factors involved.
ABSTRACT: (Limited) Journal of Aviation Medicine, 9(1):77, March 1938

6,042

Wit, G. de Seasickness 1953 MOTION SICKNESS, A LABYRINTHOLOGICAL STUDY. Acta oto-laryng. Stockh. Suppl., No. 108

6,043

Witkin, H.A. and S.E. Asch 1948 STUDIES IN SPACE ORIENTATION. IV. FURTHER EXPERIMENTS IN PERCEPTION OF THE UPRIGHT WITH DISPLACED VISUAL FIELDS. Journal of Experimental Psychology, 38(6):762-782, Dec 1948

ABSTRACT: To determine how perception of the upright is affected by position of a simple luminous visual frame (28 degrees right, 28 degrees left, erect) and body position (28 degrees left, erect), 53 adult subjects in a completely darkened room adjusted a luminous rod (set within the frame) to the horizontal and vertical for all above combinations. In supplementary experiments judgments were made for : 1) additional frame positions, 2) frame within a frame situations, 3) rod with and without a frame situations. All results are discussed in terms of amount and direction of errors as a function of articulation of the visual field.

6,044

Witkin, H. A., & S. E. Asch 1948 STUDIES IN SPACE ORIENTATION; PERCEPTION OF THE UPRIGHT IN ABSENCE OF VISUAL FIELD. J. Exper. Psychol. 38:603-614, Oct. 1948.

6,045

Witkin, H.A. 1949 PERCEPTION OF BODY POSITION AND OF THE POSITION OF THE VISUAL FIELD. Psychological Monographs, 63(7):1-46

ABSTRACTS: To investigate factors involved in perception of body and visual field position, several experiments were employed a tilting room-tilting chair apparatus were performed. These included: 1) judging body and room orientation during changing relations between body and field, 2) adjusting body or room position to true upright, 3) adjusting body position to upright with and without visual field, 4) judging body and room position and adjusting pointer to upright. Qualitative differences in performance including illness brought on by unstable visual field are discussed. Quantitative differences in performance are discussed as a function of the relative importance of visual and postural sensations.

6,046

Witkin, H. A. 1950 PERCEPTION OF THE UPRIGHT WHEN THE DIRECTION OF THE FORCE ACTING ON THE BODY IS CHANGED. J. exp. Psychol. 40:93-106

6,047

Witkin, H. A. 1950 FURTHER STUDIES OF PERCEPTION OF THE UPRIGHT WHEN THE DIRECTION OF THE FORCE ACTING ON THE BODY IS CHANGED (Brooklyn Coll., Brooklyn, N. Y.) 1950

6,048

Witkin, H. A. 1952 FURTHER STUDIES OF PERCEPTION J. OF THE UPRIGHT WHEN THE DIRECTION OF THE FORCE ACTING ON THE BODY IS CHANGED Exper. Psychol. 43(1):9-20, DLC (BF1.J6, v.43)

ABSTRACT: The effect of rotation upon perception of the position of the body and the immediate environment was measured with the following apparatus: a small fully enclosed room moving around a circular track contained a chair which could be tilted to the right or left. The subject was asked to "straighten" the room if it appeared tilted and, in other trials, to "straighten" his body. The latter experiment was carried out with the room lighted or darkened (i. e. with or without a visual field). During rotation the room had to be tilted from the true upright toward the center of rotation to be perceived as upright. However, the magnitude of the shift of the force on the body was not proportional to the amount by which the room

was tilted. The amount of body shift (usually directed toward the center of rotation) was less with than without the visual field. Marked individual differences were observed. Reliance on visual or postural standards in orientation variation with different subjects. The judging of body position on the degree to which the body aligned with the displaced force acting upon it. Women appeared to adhere more closely to visual standards than men.

6,049

Witkin, H. S. 1954 THE SPACE-ORIENTATION TESTS.
In Personality Through Perception (New York: Harper & Brothers, 1954) Chapt. 3

6,050

Witt, M.C. & R.F. Gray May 1958 HUMAN TOLERANCE TO HIGH ACCELERATION STRESS. (Lett. Rept. FED ADC AE 1411, 2 May 1958)

6,051

Witts, L. J. 1941 FLYING PERSONNEL RESEARCH COMMITTEE REMEDIES FOR SEA-SICKNESS AND AIR-SICKNESS. (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. No. 318, July 1941; ATI-206 430

CONCLUSION: The non-proprietary remedies for sea- and air-sickness with most reputation are the belladonna alkaloids, amphetamine (benzedrine) and cerebral sedatives particularly chlorbutol (chloretone). (AUTHOR)

6 052

Witwer, R. G. 1943 AIR SICKNESS.
U.S. Nav. M. Bull., 43:34-6

6,053

Wodak, E. Mar. 1956 ROTARY AND MOTOR INDUCED ILLUSIONS OF OPTIC AND OTHER SENSORY IMPRESSIONS DUE TO VESTIBULAR REACTION. Pract. Otorhinolar, Basel. 18(2).

6 054

Woellner, R.C. 1957 THE PERCEPTION OF VERTICAL IN THE PRESENCE OF INCREASED ACCELERATIVE FORCES. (Naval School of Aviation Medicine, Pensacola, Fla.) Research Project No. NM 17 01 11, Report no. 45 October 31, 1957.

ABSTRACT: Nine normal subjects were tested for their estimations of vertical and body axis when tilted to the side in a tilting chair and when exposed to a change in direction and magnitude of resultant force on a human centrifuge. It was found that the estimation of vertical lay close to the true vertical on the tilt chair and close to the angle of resultant force on the centrifuge. The constant error inboth cases lay toward the subject's body axis, consistently but not significantly, and was slightly greater under increased resultant force on the centrifuge. The estimation of body axis had considerable deviation in each subject and also varied considerably from subject to subject.

6,055

Wojcik, W. 1936 OBSERVATIONS DU MEDECIN D'AVIATION CONCERNANT LES SAUTS AVEC PARACHUTES DANS L'ECOLE DE PILOTAGE (AVIATION MEDICAL OBSERVATIONS CONCERNING THE TUMBLING WITH PARACHUTES IN PILOT TRAINING) (poln., franzosische Zusammenfassung) Polski Przegl. Med. Lotn. 5, Nr 1, 20-33. Ref. J. aviat. Med. 7, 218

6,056

Woellner, R. C., & A. Graybiel 1958 REFLEX OCULAR TORSION IN HEALTHY MALES. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-6001. 1.47., 30 July 1958

6,057

Woellner, R. C., & A. Graybiel 1959 THE LOSS OF COUNTER-ROLLING OF THE EYES IN THREE PERSONS PRESUMABLY WITHOUT FUNCTIONAL OTOLITH ORGANS. (Naval School of Aviation Medicine, Pensacola, Fla.) Research Proj. MR005.13-6001, Rept. No. 50; ASTIA AD-235 887; 15 Dec. 1959

ABSTRACT: In three subjects with bilateral defects of the inner ear, ocular torsion was determined using a method of subconjunctival sutures in an effort

to determine whether counter-rolling occurred in these persons when they were tilted or when exposed to a change in direction of centripetal force on a human centrifuge. No regular dependence was found between counter-rolling and gravitational or inertial force in the three subjects. The findings suggest that counter-rolling is a response to stimulation of the otolith organs but do not eliminate the possibility of other causes. (AUTHOR)

6,058

Woellner, R. C., & A. Graybiel 1959 COUNTERROLLING OF THE EYES AND ITS DEPENDENCE ON THE MAGNITUDE OF GRAVITATIONAL OR INERTIAL FORCE ACTING LATERALLY ON THE BODY. J. Appl. Physiol. 14(4):632-634, Jul 1959

ABSTRACT: Counterrolling of the eyes was measured in five healthy persons when inclined on a tilt-chair and when exposed to a change in direction of force on a human centrifuge. For equivalent changes in direction of force incident to the subject, the magnitude of the force was greater on the centrifuge. When the amount of roll was plotted as a function of the incident angle of force, divergent curves were obtained for tilt-chair and centrifuge data. When the amount of roll was plotted as a function of magnitude of laterally-acting force as the independent variable, a single curve resulted indicating a straight line relation within the range of 1 G. These findings not only constitute definite proof that the counterrolling reflex can be released by gravitational (and inertial) force, but also are consistent with the current theory of the functioning of the otolith organs. (AUTHORS)

6,059

Wolbers, H. L. 1961 RECENT DEVELOPMENTS IN BIO-MEDICAL INSTRUMENTATION. ARS J. 31(10):1422-1428, Oct 1961.

ABSTRACT: New techniques of sensing and analyzing physilogical changes in human Ss were considered. Bioelectronic recording techniques that were developed to record physiological and psychological changes with stress as supplementary to work output changes were described. "Minisensors" combining the sensing device, signal amplification stages, and an FM transmitter were developed and used to transmit physiological changes over a distance of 50 ft. or more. The possible uses of the system in other situations were discussed. Improvements possible in the data analytic methods were illustrated by applying the techniques used in detecting and classifying sonar returns to EKG recordings. (Tufts)

6,060

Wolf, Robert A., B. J. Campbell, M. I. Macht; M. A. Kraft; and J. W. Garrett 1961 THE INJURY-PRODUCING AUTOMOBILE ACCIDENT: A primer of facts and figures.
(Automotive Crash Injury Research of Cornell University) August 1961

ABSTRACT: Since 1953 Automotive Crash Injury Research (ACIR) of Cornell University has collected, processed, and analyzed approximately 25,000 case reports on automobiles involved in injury-producing accidents, and 17,000 case reports on automobiles involved in property damage accidents.

The charts in this primer are based on data collected through random or administrative sampling plans designed to provide representative injury-producing accident data from a number of states. Although certain "special" study samples were also collected -- property damage, recent model cars, seat belt cases, etc. -- these have been excluded from this presentation in order to provide a cohesive accident picture. Tabulations are therefore based on a total of 11,892 cars involved in rural injury-producing accidents: 1,807 collected during the period 1953 to 1955, and 10,085 collected from 1956 to 1959. It is planned that other time periods will also be presented in the future.

6,061

Wolf, Robert 1961 AUTOMOBILE CRASH INJURY RESEARCH - CORNELL UNIVERSITY
(Paper, Symposium On Impact Acceleration Stress, Brooks Air Force Base, San Antonio, Texas, November 27-29, 1961)

6,062

Wolf, R.A. 1962 CAUSES OF IMPACT INJURY IN AUTOMOBILE ACCIDENTS
(In: Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, pp. 45-60)

ABSTRACT: The Automotive Crash Injury Research project (ACIR) of Cornell University has collected and analyzed a sufficiently large number of automobile accidents to allow ranking some of the major causes of injury attributable to interior configuration of the American automobile. This paper deals with ranking ten of the major identifiable "causes"of injury to passengers (physical features of automobile interiors) according to the magnitude of their injury producing effects. Special emphasis is directed to the differences in ranked pattern of the "causes" as they vary with direction of external impact on he injury-producing car; the principla directions being considered are forward, side, rear and rollover.

6,063

Wood, E.H., C.F. Code, & E.J. Baldes 1943 THE PROTECTION AFFORDED THE HUMAN BY HYDROSTATIC AS COMPARED TO PNEUMATIC ANTI-G DEVICES. (National Research Council, Committee on Aviation Medicine) CAM # 207, 12 Nov. 1943. ASTIA AD 212 870

ABSTRACT: Nine hundred centrifuge runs were made on 12 subjects to compare the "g" protection afforded by:

a. Immersion in water to xiphoid process.....0.9 "g"
b. FFS containing 4.7 liters water.....0.9 "g"
c. FFS fully inflated with water.....1.5 "g"
d. Water immersion to 3rd rib at sternum.....1.7 "g"
e. Pneumatic gradient pressure suit.....1.9 "g"
f. Arterial occlusion suit.....2.9 "g"

Arterial occlusion (Clark-Wood) suit has 4 pneumatic cuffs, one on each extremity close to the body and an abdominal bladder, which are inflated by "g" -activated valves. All blood vessels are occluded by it.

Conclusion of paper: Pneumatic pressure devices are definitely superior to hydraulic ones in affording "g" protection.

6 064

Wood, E. H., C. F. Code, & E. J. Baldes 1943 PROTECTION AGAINST THE EFFECTS OF ACCELERATION AFFORDED THE HUMAN BY ASSUMPTION OF THE PRONE POSITION. C. A. M. Rept. No. 158, 10 July 1943

ABSTRACT: Thirty centrifuge runs were made by 3 trained subjects. Vision dimmed at 3 "g" and blackout occurred at 4 to 5 "g" when subjects were sitting upright. In prone position vision was unaffected by 9 "g" for 10 seconds.

6,065

Wood, E. H., E. J. Baldes and C. F. Code 1944 CHANGES IN THE EXTERNAL APPEARANCE OF THE HUMAN BEING DURING POSITIVE ACCELERATION. (Mayo Clinic) CAM No. 391, 18 October 1944
See Also Air Surgeon's Bull 2:117, April 1945.

ABSTRACT: Special equipment used for the testing of a human subject while undergoing different ranges of acceleration.

6,066

Wood, E.H., E.H. Lambert, & R.E. Strum 1944 SYSTOLIC BLOOD PRESSURE IN MAN DURING EXPOSURE TO HIGH ACCELERATIONS OF THE CENTRIFUGE
National Research Council, Division of Medical Sciences, Committee on Aviation Medicine. Report No. CAM 338. August 4, 1944

ABSTRACT: (a) An instrument has been developed which records systolic pressure in humans using finger opacity pulse as an indicator. It has been used on three subjects in over 100 centrifuge runs in which the forearm was supported at brain level.
(b) In control runs for 15 seconds at maximum g with subjects unprotected, the maximum decrease in systolic pressure averaged 28 mm Hg per g above 1 g and occurred within the first 7 seconds after exposure.
(c) In centrifuge runs which did not produce unconsciousness, systolic pressure rose during exposure, the maximum recovery taking place 12 seconds after the onset of g. The average recovery was 35 mm Hg above the lowest blood pressure level.
(d) Blood pressure varied inversely as the maximum g attained. Clear vision persisted to 56 mm Hg; peripheral lights were lost at 39 mm Hg, and blackout occurred at 19 mm Hg.
(e) Blood pressure varied directly with ear opacity, (although ear opacity changes lagged behind blood pressure) and inversely as the changes in the heart rate.

6,067

Wood, E.H., E.H. Lambert, C.F. Code, & E.J. Baldes 1944 FACTORS INVOLVED IN THE PROTECTION AFFORDED BY PNEUMATIC ANTI-BLACKOUT SUITS.
(Mayo Clinic) CAM No. 351, 24 Aug. 1944.

ABSTRACT: Field tests show that a suit giving 1.5 "g" protection on the centrifuge gives ample protection in aircraft.

(a) Three types of experiments were carried out on FFS, GPS, and AOS. Variation in blackout threshold was determined.
  (1) With leg and abdominal bladders inflated to the same pressure.
  (2) With abdominal bladder pressure only varied, with and without constant pressurization of leg bladders.
  (3) With leg bladder pressure only varied, with and without constant pressurization of abdominal bladders.

(b) In general, as pressure increases, suit protection increases. The most important factor affecting the amount of protection afforded by the suit is the amount of pressure applied to the abdomen and trunk.

(c) Pressurizing leg bladders alone gives very little protection. (Average 0.2 "g"). However, pressurizing abdominal bladder alone gives 50 percent less protection than is afforded by abdominal plus leg bladders.

(d) High pressures in suit, which uniformly give greatest protection, may also cause considerable discomfort. The most important factor is abdominal pressure. Hence the optimum suit pressure is the highest abdominal pressure the subject can stand comfortably. This varies with subject, type, and fit of suit. In general, the larger and more efficient the abdominal and trunk bladders, the lower is the optimum pressure.
(e) Arm bladders are not necessary. When used alone they offer no protection at all although when used with a complete suit they increase protection 0.6 "g".
(f) Recommended pressures for suits are as follows:

FFS..... 1/2 to 1 lb/g
GPS and Mark V AOS..... 1 to 2 lb/g

6 068

Wood, E. H., E. F.Code & E. J. Baldes 1945 THE SEQUENCE OF PHYSIOLOGIC EVENTS IN MAN DURING EXPOSURE TO POSITIVE ACCELERATION.
Fed. Proc. 4(1):14-15.

ABSTRACT: There is a definite sequence to the physiologic events that occur in the comfortably seated human being during exposure to positive acceleration. This sequence is divided into two distinct periods: the period of progressive failure and the period of compensation.

During the period of progressive failure, the pulse rate progressively increases, the amount of blood in the ear is progressively reduced, the pulse in the ear may be gradually reduced or abruptly lost, the blood pressure at the level of the base of the brain declines and reductions of vision and consciousness, if they occur, become evident. As accelerations of greater intensity are experienced, the extent of these changes is increased.

The period of progressive failure is usually terminated by compensatory reactions, which become effective about six to eleven seconds after the onset of acceleration.

During the period of compensation, the blood pressure rises, the ear pulse may return or increase, the amount of blood in the ear increases, the pulse rate increase is checked and the pulse may slow and, if these compensatory changes are sufficiently effective recovery from symptoms (both loss of vision and consciousness) will occur.

This consistent pattern has been observed in a total of more than 250 subjects. Measurement of the magnitude of the changes has allowed the development of an accurate quantitative assay procedure for the determination of man's g tolerance and for the measurement of the efficacy of any device designed to prevent or offset these physiologic changes.

6,069

Wood, E.H., D.M. Clark and E H. Lambert 1945 AN ANALYSIS OF FACTORS INVOLVED IN THE PROTECTION AFFORDED MAN BY PNEUMATIC ANTI-BLACKOUT SUITS. Fed. Proc. 4:79

ABSTRACT: Establishment of the sequence of physiologic events that occur in man during positive acceleration has allowed a quantitative and orderly approach to the problem of protecting the aircraft pilot against blackout. The problem becomes: How may this physiologic sequence be altered so that the period of progressive failure is reduced or eliminated? Inflatable bladder system suits have proved a convenient and effective means of accomplishing this in man. By the use of suits that allowed application of pressure to the legs, thighs, abdomen and arms separately and in combination, a quantitative analysis of the factors involved in the protection afforded by such suits has been made.

In general, as the pressure within the suits was raised, the protection afforded increased. The most important single factor in the amount of protection obtained was the amount of pressure applied to the abdomen and trunk. In general, raising this pressure increased the protection afforded.

Application of pressure to the lower extremities alone afforded a barely perceptible amount of protection (average of 0.2g). Pressure to the lower extremities, while providing little protection alone, was found to increase by a factor of (approximately) two the protection afforded by application of pressure to the abdomen.

The findings revealed the simplicity of the essential requirements for a simple, effective anti-blackout suit. They led to the development and use of a simple, uniformly pressurized bladder system, which may be built into any type of garment—be it underwear, trousers, coveralls, cutaway and so forth.

6,070

Wood, E.H. & E.H. Lambert 1945 FACTORS INFLUENCING THE EFFICACY OF ANTI-G EQUIPMENT AT PRESENT IN USE. (National Research Council, Division of Medical Sciences) Report No. 442 CARI P & S 4.63.

ABSTRACT: This report reviews the different models of anti-blackout suits which have been developed and considers the major changes made during the process of development.

6,071

MOTION PICTURE

Wood, E. H. & G. A. Hallenbeck 1945 VOLUNTARY (SELF PROTECTIVE) MANEUVERS WHICH CAN BE USED TO INCREASE MAN'S TOLERANCE TO POSITIVE ACCELERATION. Fed. Proc. 4(1); 78-79.

ABSTRACT: Systolic blood pressure is a most important factor in determining man's tolerance to sudden exposure to high positive accelerations in the sitting position. Exposure to 5 grams for a duration greater than the symptom latent period of the retina or cerebrum to acute ischemic anoxia (2-10 seconds) usually porduces blackout or unconsciousness. At this acceleration due to the height of the brain above the heart a systolic pressure of 120 mm. of mercury at heart leve' affords a systolic pressure of only 5 mm. of mercury at brain level and symptoms therefore result.

It has been found that voluntary maneuvers producing a temporary hypertension and aiding venous return will enable many individuals to m intain vision at 9 g. These maneuvers utilize either the pressor effect attained by coordinating muscular straining with a type of forced respiration or self-induced pressor reflexes such as occur immediately after a Valsalva maneuver of ten seconds' duration. Blackout prevention of 8 grams by one such maneuver (M-1) is illustrated. This maneuver is described to pilots as follows: "Just before the g comes on with all your strength pull your chin in and your shoulders up. Simultaneously push your belly against a tightly drawn safety belt as if straining at stool. As you do this, yell the word "Hey" as continuously as possible. Use up nearly all your breath on each "Hey", then grab a very fast breath and immediately start yelling again. Keep this up as long as you hold the g."

6,072

Wood, E. H., E. H. Lambert, E. J. Baldes, & C. F. Code 1946 EFFECTS OF ACCELERATION IN RELATION TO AVIATION. Federation Proceedings 3(5):327-344

ABSTRACT: Although this report is entitled, in part, "Effects of acceleration," actually the discussion is chiefly concerned with the effects of force on man.

Anti-blackout suits, especially simplified suits used by our air forces, are not the answer to the problem of prevention of blackout among aviators. Since in any given turn centrifugal force is proportional to the square of the velocity, it can be predicted that, with the advent of super-speed planes, the present anti-blackout suits soon will be as obsolete as the planes in which they were used. Additional physiologic investigations will be necessary before methods can be developed which will enable pilots ot utilize the full potentialities of the new aircraft.

6,073

MOTION PICTURE

Wood, E. H., & G. A. Hallenbeck 1946 VOLUNTARY (SELF-PROTECTIVE) MANEUVERS WHICH CAN BE USED TO INCREASE MAN'S TOLERANCE TO POSITIVE ACCELERATION. (Acceleration Lab., Mayo Aero Medical Unit, Rochester, Minn.)

ABSTRACT: Systolic blood pressure is a most important factor in determining man's tolerance to sudden exposure to high positive accelerations in the sitting position. Exposure to 5 g for a duration greater than the symptom latent period of the retina or cerebrum to acute ischemic anoxia (3-10 seconds) usually produces black-out or unconsciousness. At this acceleration due to the height of the brain above the heart a systolic pressure of 120 mm. of mercury at heart level affords a systolic pressure of only 5 mm. of mercury at brain level and symptoms therefore result.
It has been found that voluntary maneuvers producing a temporary hypertension and aiding venous return will enable many individuals to maintain vision at 9 g. These maneuvers utilize either the pressor effect attained by coordinating muscular straining with a type of forced respiration or self-induced pressor reflexes such as occur immediately after a Valsalva maneuver of ten seconds' duration. Blackout prevention to 8 g by one such maneuver (M-1) is illustrated. This maneuver is described to pilots as follows: "Just before the g comes on with all your strength pull your chin in and your shoulders up. Simultaneously push your belly against a tightly drawn safety belt as if straining at stool. As you do this, yell the word "Hey" as continuously as possible. Use up nearly all your breath on each "Hey" then take a breath as quickly as possible and immediately start yelling again. Keep this up as long as you hold the g." (Federal Proceedings 5(1):115, 1946)

6 074

Wood, E.H., & E.H. Lambert 1946 THE EFFECT OF ANTI-BLACKOUT SUITS ON BLOOD PRESSURE CHANGES PRODUCED ON THE HUMAN CENTRIFUGE. (Acceleration Lab., Mayo Aero Medical Unit, Rochester, Minn.)

ABSTRACT: Direct arterial pressure (radial artery) was recorded in thirteen men during exposure to positive acceleration with and without anti-blackout suit protection. The procedures used are described in another abstract (see Lambert and Wood).
At the level of the eyes the decrease in blood pressure per g increase in acceleration averaged 32 mm. Hg. systolic and 19 mm. Hg. diastolic without the suit and 20 and 14 mm. Hg. respectively with the suit. At heart level with onset of acceleration, the pressures decreased on the average without the suit 3.0 mm. Hg. systolic and 0.0 mm. Hg. diastolic per delta g, while with the suit these pressures increased 5.0 mm. Hg. per delta g.
The anti-blackout suit increased g tolerance by 1.4 g, 1.5 g, 1.7 g and 1.7 g as determined by visual symptoms, blood content of the ear, ear pulse and blood pressure at eye level, respectively. The protection afforded blood pressure was significantly greater than that afforded vision (P 0.001). This was associated with a tendency for visual symptoms to occur at higher levels of

blood pressure with the suit than without it.
Inflation of anti-blackout suits produces an increase in blood pressure at heart level which is most marked during exposure to positive acceleration. This effect is responsible for the increased g tolerance produced.
Federal Proceedings 5(1):116, 1946)

6,075

Wood, E. H., E. H. Lambert, & C. F. Code 1947 DO PERMANENT EFFECTS RESULT FROM REPEATED BLACKOUTS CAUSED BY POSITIVE ACCELERATION? J. Avia. Med. 18(5):471-482, Oct. 1947

ABSTRACT: The purpose of this project was to determine if the average pilot would develop residual or permanent effects as a result of blackouts or episodes of unconsciousness experienced in flight.

Data collected on four of the members of the personnel of the Mayo centrifuge laboratories who have undergone the greatest number of exposures to acceleration. The majority of these exposures were experienced on the Mayo centrifuge. This group of subjects also experienced a relatively large number of exposures to high accelerations in a specially instrumented Douglas Dauntless Divebomber. It was concluded that the average pilot has little to fear in regard to the development of residual or permanent effects as a result of the blackouts or episodes of unconsciousness he may experience in flight. The greatest danger to the flyer is reduction in, or loss of control of, his aircraft at the time of loss of vision or consciousness.

6,076

Wood, E.H., C.F. Code & E.J. Baldes 1947 THE PHYSIOLOGICAL BASIS OF VOLUNTARY (SELF-PROTECTIVE) MANEUVERS CAPABLE OF INCREASING MAN'S TOLERANCE TO POSITIVE ACCELERATION. (Proceedings of the 17th International Physiological Congress, Oxford, 1947. pp. 2.)

6,077

Wood, E.H. 1947 USE OF THE VALSALVA MANEUVER TO INCREASE MAN'S TOLERANCE TO POSITIVE ACCELERATION. Fed. Proc. 6:229

6,078

Wood, E. H. 1950 SPECIAL INSTRUMENTATION PROBLEMS ENCOUNTERED IN PHYSIOLOGICAL RESEARCH CONCERNING THE HEART AND CIRCULATION IN MAN. Science. n. s. 112:707.

6,079

Wood, E.H. & E.H. Lambert 1952 SOME FACTORS WHICH INFLUENCE THE PROTECTION AFFORDED BY PNEUMATIC ANTI-G SUITS.
J. Aviation Med. 23:218-228

ABSTRACT: Various factors which affect the protection against positive acceleration afforded by pneumatic anti-blackout suits, were studied on the human centrifuge. Inflation of the suit at 1 g produced a rapid increase in arterial blood pressure, which was followed by a slowing of the heart rate (carotid sinus and arotic depressor reflexes). This slowing could be prevented by administration of tetraethylammonium chloride. The effects of inflaction of the component parts of the anti-blackout suit were compared with those of the whole suit: protection afforded by the leg bladders along was 0.2 g; by the abdominal bladder alone, 0.6 g; and by both combined, 1.2 g. -Straining or pulling on a stick with 19 lb. of force per g afforded a protection of 0.7 g which was added to that of the pressure suit. Performing the Valsalva maneuver (voluntary maintenance of intrathoracic pressure) increased acceleration tolerance when a pressure suit was worn, but decreased it when it was done without a suit. The M-1 maneuver (a series of brief Valsalva maneuvers) alone afforded a protection of 0.4 to 5.2 g; when combined with the wearing of a pressure suit, the effect was less than the sum of the individual protective effects. Pressure breathing as well as a crouching position enhanced the protection afforded by the suit.

6,080

Wood, E.H. 1960 COMPENSATORY REACTIONS OF THE CARDIOVASCULAR SYSTEM TO ACCELERATION STRESS
(Mayo Aero Medical Unit, Rochester, Minn.) Contract AF 33(616)-5938; Project 7220(805); WADD, MD

ABSTRACT: The aim of this research is the continuous measurement by dye dilution method, or methods to be developed, of cardiac output in man exposed to acceleration stress acting in various vectors in relation to the long axis of the body. Work will include studies of the relationship between the blood pressure at head level and the changes in blood control of the ear produced by headward acceleration.

6,081

Wood, Earl H., Evan F. Lindberg et al. 1960 MAN'S CARDIOVASCULAR RESPONSE TO HEADWARD ACCELERATION WHILE IMMERSED IN WATER
Paper: 31st Annual Meeting of the Aerospace MedicalAssociation, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960

ABSTRACT: Variations in ear opacity, ear opacity pulse, heart rate, respiration and reaction times to auditory and visual stimuli were recorded continuously in a series of 15 subjects during 15-second exposures to acceleration while seated in a steel tub mounted in the cockpit of the Mayo centrifuge. The level of acceleration was increased by increments of 0.5 to 1.0 G until complete loss of vision (blackout) was produced when the tub was empty (control) and when filled with water to the level of the xyphoid and also to the third rib at the sternum. A total of 200 centrifuge exposures to accelerations ranging from 2.0 to 9.0 G was carried out. It is believed that at head level a higher blood pressure is required to maintain vision during immersion in water than when no external pressure is applied to the lower part of the body; and that the protection afforded to blood pressure at head level and to maintenance of consciousness is greater than the protection afforded to vision.

6,082

Wood, E. H. et. al. 1961 EFFECT OF HEADWARD AND FORWARD ACCELERATIONS ON THE CARDIOVASCULAR SYSTEM
(USAF Biomedical Lab., Wright-Patterson AFB, Ohio) (AF 33(616)5938, Proj. 7220, Task 71742) WADD TR 60 634, Jan. 1961.

ABSTRACT: To measure cardiac output and related physiological variables in human Ss exposed to acceleration stress in various body orientations, seven Ss were studied under three conditions: 1) headward (positive) acceleration of one-min. duration, 2) of ten-min. duration, and 3) forward (transverse) acceleration for ten-min. duration. In all cases the Ss were in a seated position on a human centrifuge. The indicator-dilution technique with sudden single injections of dye into the right strium and continuous recording of the resulting curves from arterial blood was used to evaluate changes caused by acceleration. (Tufts)

6,083

Wood, E.H., P.F. Scholander & S.L. Allen PILOT G-TOLERANCE AND ACCELERATION-TIME CURVES IN FIGHTER AIRCRAFT
A CAM Report in preparation

6,084

Wood, Earl H., William F. Sutterer, Hiram W. Marshall, Evan F. Lindberg & Robert N. Headley 1961 EFFECT OF HEADWARD AND FORWARD ACCELERATIONS ON THE CARDIOVASCULAR SYSTEM
(The Mayo Foundation, Mayo Clinic, Rochester, Minnesota)
(Wright Air Development Division, Aerospace Medical Laboratory, Wright-Patterson Air Force Base, Ohio) Proj. 7220; Task 71742; Contract AF33(6160-5938) WADD Technical Report 60-634 ASTIA AD 255298

ABSTRACT: The purpose of this research was to measure cardiac output and related physiological variables in human subjects exposed to acceleration stress in various body orientations. Results of these experiments indicate that an average decrease in cardiac output of 22% of control values occurs in subjects exposed to headward accelerations of 4 g. No systematic change in cardiac output could be demonstrated when these same subjects were exposed to forward accelerations of up to 5 g. As the duration of these exposures to acceleration were increased to 10 minutes, no further alterations in output were demonstrable.

Exposure to headward acceleration caused decreases in right atrial and esophageal (intrathoracic) pressure and in the oxygen saturation of arterial blood which were proportional to the magnitude of the acceleration. Forward acceleration, however, caused relatively large increases in right atrial and esophageal pressure but a decrease in arterial oxygen saturation. The decrease in arterial oxygen saturation was prevented by breathing 99.6% oxygen.

6,085

Wood, E. H., A. C. Nolan, & D. E. Donald 1963 EFFECT OF FORWARD ACCELERATION ON CIRCULATORY, PLEURAL AND RELATED PRESSURES. (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 29 - May 2, 1963)

ABSTRACT: Pleural pressures were recorded simultaneously from the ventral and dorsal regions of the thorax using fluid-filled catheters inserted through the chest wall via No. 17 needles using an air-tight technic. Pressures were referenced to the catheter tip levels determined by A-P and lateral roentgenograms taken prior to and after a series of 1 to 3 minute exposures of 8 anesthetized dogs to accelerations of 2, 4 and 6 G in the supine horizontal and 15° head-up and head-down positions.

The negativity of intrapleural pressure in the ventral thorax was uniformly increased during exposures while intrapleural pressure in the dorsal thorax became positive. These changes are believed to result from the increase in weight of the lungs and other intrathoracic elements during acceleration and would be compatible with an average specific gravity of the thoracic contents of about 0.5 since the increase in gradient between the dorsal and ventral recording sites averaged about 0.5 cm. H_2O per cm. of vertical distance between the sites per G to which the animal was exposed. Esophageal and pericardial pressures were similar or somewhat less negative than the intrapleural pressures at the same horizontal plane in the thorax. All dogs showed decreases in arterial oxygen saturation during exposures to 6 G when breathing air or 99.6 per cent oxygen similar to those previously observed in normal human subjects. Collapse of alveoli and consequent arterial-venous pulmonary shunting of blood appears to be the most likely mechanism for the arterial desaturation observed.

6,086

Wood, J., C.C. Cain & D. Mahoney n.d. PHYSIOLOGICAL EVALUATION OF THE PARTIAL PRESSURE SUIT. Memo Rept. MCREXD-696-104P. (unpublished)

6,087

Wood, P. W. 1961 LIGHT WEIGHT HIGH ACCELERATION CREW SEAT. (Vought Astronautics, Dallas, Texas) Progress Rept. No. 2, AST/EIR-13502, June 1961

6,088

Wood, P.W. 1961 INVESTIGATION OF A NET CREW SEAT CONCEPT FOR ADVANCED FLIGHT VEHICLES, PART I. (Aeronautical Systems Division, Wright-Patterson AFB, Ohio) Report 61-546. Oct. 1961.

6,089

Wood, P.W., Jr. 1962 INVESTIGATION OF A NET CREW SEAT CONCEPT FOR ADVANCED FLIGHT VEHICLES: INVESTIGATION AND DESIGN. (Aeronautical Systems Division, Dir/Aeromechanics, Flight Dynamics Lab., Wright-Patterson AFB, Ohio) Report No. ASD-TR-61-546, Final Rept. June 1962.

ABSTRACT: This report describes the investigation and design of a Net Crew Seat Support-Restraint System, for use in laboratory experiments to demonstrate the feasibility of using this concept in advanced flight vehicles. An investigation was conducted to determine seating and restraint requirements, and define solutions to certain support-restraint problems. Several design concepts for the solution of these problems were developed. Trade studies were conducted and the optimum solution to each problem determined. Experiments were conducted to determine some of the physical characteristics of Nylon and Dacron Raschel Knit cloth. Load-deflection curves and load-time curves were developed. A Net Crew Seat Support Restraint System was designed and analyzed structurally for the loads anticipated in vehicles which are recovered vertically or horizontally.

6,090

Woodbridge, D.D. 1962 V[illegible] PHENOMENA POSSIBLE TO BE ENCOUNTERED BY ASTRONAUTS (Vought Astronautics. Div. of Chance Vought Aircraft, Inc., Dallas) CVA-Q-1, 24 May 1962

6,091

Woodham, R.M. & J. Lederer 1955 SAFETY THROUGH STEEP GRADIENT AIRCRAFT. (Daniel & Florence Guggenheim Aviation Safety Center).

6,092

Woodling, C. H., J. B. Whitten, R. A. Champine, & R. E. Andrews 1958 SIMULATION STUDY OF A HIGH-PERFORMANCE AIRCRAFT INCLUDING THE EFFECT ON PILOT CONTROL OF LARGE ACCELERATIONS DURING EXIT AND REENTRY FLIGHT (Langley Research Center, Langley Station, Virginia) NACA RM L58E08a, July 1958, NASA N62-64798 AD (NACA, Wash. D. C.) ASTIA AD 221849.

ABSTRACT: A discussion is given of a simulation study of a high-performance aircraft conducted on the human-centrifuge at the U. S. Naval Air Development Center, Johnsville, Pa. The centrifuge, in combination with an analog computer, provided a pilot-controlled simulator which subjected the pilot to linear accelerations similar to those he would encounter in exit and reentry flight. This simulator was found to be useful in the evaluation of pilot restraint, controls, instrument display, and pilot and airplane response.

6,093

Woodling, C. H. & C. C. Clark 1959 STUDIES OF PILOT CONTROL DURING A LAUNCHING AND REENTRY OF SPACE VEHICLES UTILIZING THE HUMAN CENTRIFUGE. Institute of Aeronautical Sciences Report 59-39. (Paper, Institute of Aeronautical Sciences 27 th Annual Meeting, 26-29 Jan. 1959, New York)

ABSTRACT: Description of the design and operation of the centrifuge, and discussing of its potentialities and use as flight simulator.

6,094

Woodward, C. et al. 1957 INVESTIGATION, DESIGN AND DEVELOPMENT OF AN F7U-3 EJECTION SEAT ENERGY-ABSORPTION SYSTEM FOR REDUCTION OF CRASH FORCE-LOADS.
(Air Crew Equipment Laboratory, Naval Air Material Center, Philadelphia, Pa.) NAMC-ACEL-335, 24 June 1957.

ABSTRACT: Spinal injuries resulting from failure of the nose landing gear during carrier landings caused an investigation of the forces involved and research into a method of reducing these forces.

A simulated crash test determined that forces along the vertical plane of the seat, corresponding to forces in the vertical plane of the spinal column, were far in excess of the tolerable limits of the human body. An energy-absorption system, consisting of a stainless steel strap with attaching devices, coupled with an energy-absorbing seat cushion, was devised and tested. etc.

6,095

Woodward, Fletcher D. 1957 GENERAL MEDICAL ASPECTS OF AUTOMOBILE CRASH INJURIES AND DEATHS
(The Journal of the Americal Medical Association, Vol. 163, No. 4, Jan. 26, 1957)

ABSTRACT: The increase in the absolute number of fatal automobile accidents per year in the United States is offset somewhat by a decrease in number of deaths per million miles of travel. This encourages hopes of further success in a program of prevention. Public apathy must be overcome by education, traffic laws need continued revision; and safer automobiles must be provided. The requisite basis of facts for this program should be obtained by research. A foundation for this purpose should be financed by contributions from the many agencies who would benefit by its findings.

6,096

Woodward, F. D. 1959 PROGRAM ON MEDICAL ASPECTS OF AUTOMOBILE INJURIES AND DEATHS J. American Medical Assoc. 169(14):117/1577-119/1579, Apr. 1959
NOTE: Reel 7, Flash 7, Item 24

ABSTRACT: The Board of Trustees of the American Medical Association appointed a committee to study and report on the medical aspects of automobile crash injuries and deaths in 1955. This committee was to determine the magnitude of the problem, study the epidemiology and methods of prevention and cure primarily from a purely medical standpoint, and determine the role of the physician in obtaining these objectives. In 1956, the committee presented a symposium to the board. The symposium was accompanied by a scientific exhibit and film.
The committee decided that its first duty was to prepare three pamphlets. The first one is intended for the general public and is entitled "Are you fit to drive?" The second pamphlet is designed to serve as a guide to the physician in determining a patient's fitness to drive.

6,097

Worchel, P., & K. M. Dallenbach 1948 MINOR STUDIES FROM THE PSYCHOLOGICAL LABORATORY OF CORNELL UNIVERSITY. XCVI. THE VESTIBULAR SENSITIVITY OF DEAF-BLIND SUBJECTS. American J. Psychology 61(1):94-99, Jan. 1948
NOTE: Reel 7, Flash 6, Item 33

DISCUSSION AND CONCLUSIONS: The result of Tests A and B show that the non-acoustical organs of the inner ears were functional and normal for DB, and that they were completely lacking for the other 9 Ss. Whether these tests are concerned with the same or different functions, or whether our results are due to errors of sampling, cannot be determined from this study. Our Ss were too few in number and their deficiencies were not diversified; with them it was a case of all or none. From the results at hand, however, it appears that the "standing test" (Test A) may serve as a rapid means of differentiating normal Ss from those with vestibular deficiencies. Further work is needed, particularly with deficient Ss, to determine the relationship of the standing and rotation-tests.

Few studies have been made of the vestibular sensitivity of the deaf, and none, insofar as we are aware, has before been made of the deaf-blind. The first to use deaf subjects was James. In 1882, he tested 519 deaf mutes on a rotating swing and found that 186 (36%) did not become dizzy. Of the 333 who did, 134 (26% of the total number of cases) reported it in a mild degree and 199(38% of the total) reported it in a marked degree. From these results, James concluded that in deaf mutes the semi-circular canals or entire auditory nerves must often be disorganized. This conclusion was soon afterwards confirmed by Myding. From the study of histological sections of the inner ears of 118 deaf mutes, he discovered that pathological changes occurred in the labyrinths of 67% of the cases and in the semi-circular canals in 56% of them.

Myding's percentage of pathological changes in the semi-circular canals was found by Kreidl, in 1891 to approximate closely the percentage of deaf mutes who made no eye-movements when rotated. Of 109 Ss (51 girls and 58 boys) eye-movements were not made either during or after rotation by 63 of them -- 58% which is in close agreement with Myding's 56%.

After the completion of the rotation-test, Kreidl studied the posture and locomotion of 17 of his Ss whose semi-circular canals were presumed to be defective as they had made no eye-movements either during or after rotation. One of the tests used, was standing on one foot with eyes closed. In this test, 11 (65%) of the Ss failed utterly, 2 (12%) tottered and oscillated, and 5 (24%) experienced no difficulty in standing. Though Kreidl did not use time as a criterion of performance, and does not state what his criteria were, these results stand apparently in opposition to ours, as all of our Ss, who lacked post-rotation nystagmus, were unable to stand on one foot for longer than a few seconds at a time.

Standing and rotation-tests, among others, were also used with deaf mutes by Bruck and Beck. Their results regarding the point in question confirm Kreidl's: they found little correlation between an S's ability to stand on one foot with closed eyes and his experience and eye-movements during rotation.

Our results may be due, as we suggested above, to a sampling error, or to the age of our Ss (which varied from 34-55 yr. and averaged 45.9 yr.), or to the possibility

6,098

Woyczechowski, A. 1944 TAKE-OFF ASSISTS FOR ME 264 LONG-RANGE BOMBER (STARTVERCLEICH ME 264)
ASTIA ATI 43232

ABSTRACT: The possibilities were investigated of smoothly starting the Me 264 long-range bomber with excessive loads in take-off. The development of the landing gears had not advanced to the extent of building up a reserve with respect to shock power, consumption of energy, and the ability to roll. The take-off of aircraft with excessive loads could be accomplished by jettisonable landing gear, a type of gear to be used on the runway only, or by catapult. Each of these possibilities is discussed and the advantages and disadvantages occurring with the various types of take-off are outlined.

6,099

Wright, W. L. 1950 EFFECTIVENESS OF NEWER DRUGS IN SEASICKNESS
U.S. Armed Forces M. J., 1:570

6,100

Wright, Samson 1952 APPLIED PHYSIOLOGY. (Oxford University Press, 1952)

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Wu, William L.S. and Ferber, D. 1961 APOLLO MEDICAL INSTRUMENTATION.
(Convair Astronautics) AM-2 Oct. 27, 1961

ABSTRACT: The primary function of this subsystem is to ensure crew safety and its secondary function is to provide physiological details from each of the three Apollo astronauts. A third but very necessary feature is the capability for full duplex voice communications between the astronauts and between spacecraft occupants and the ground monitors.

6,102

Wulfeck, J.W., Weisz, A., and Raben, M.W. 1958 VISION IN MILITARY AVIATION.
(Wright Air Development Center, Wright-Patterson AFB, Ohio)
WADC Technical Report 58-399, ASTIA AD- 207780, November 1958

ABSTRACT: The requirements of vision in military aviation are analyzed in the

light of the human observer. Practical problems of perception encountered in many phases of flying are analyzed and discussed. A comprehensive bibliography is included in each section of the report for those who are interested in a more detailed approach to a particular subject.

6,103

Wulfeck, J.W., Weisz, A., and Raben, M.W. 1958 VISUAL PROBLEMS DUE TO SPEED. In: Wulfeck, J.W., Weisz, A., & Raben, M.W., editors, Vision In Military Aviation. (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC Technical Rept. 58-399, ASTIA AD-207780, November 1958

ABSTRACT: High speeds, altitudes, and accelerations, work load, airport density, complicated instrument panels, and the structure of the aircraft itself all create serious visual problems for the pilot and crew of high-performance aircraft. The most critical of these is high speed. At the speeds flown by today's jet aircraft, a perfectly ordinary situation, such as sighting an object a mile away, can turn into a calamity before the pilot can do anything about it. As speeds get higher, the problem will become worse in proportion. The trouble is simply that a man cannot see, identify, or act on an object the instant it comes into his field of view. Each of these things takes an inter al of time..... usually an exceedingly short interval, but worth hundreds or thousands of feet in a high-speed aircraft.

6,104

Wunder, C. C. Feb. 1958 GROWTH OF MICE DURING EXPOSURE TO INCREASED GRAVITY. (Paper, 1958 Meeting, The Biophysical Society, M. I. T. Cambridge, Mass., Feb. 5-7, 1958)

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Wunder, C. C. et al 1960 DECREASED OXYGEN REQUIREMENT FOR GROWTH OF FRUIT FLY LARVAE AFTER CONTINUAL CENTRIFUGATION. In Proc. Soc. Exp. Biol. Med. 104:749-751, Aug.-Sept. 1960.

6,106

Wunder, C. C., & S. R. Briney 1960 INFLUENCE OF HIGH GRAVITY UPON THE DIFFERENTIAL GROWTH OF MICE. (Paper, Meeting of the Biophysics Society, 25 Feb., 1960, Philadelphia, Pa.)

6,107

Wunder, C.C.; L. O. Lutherer; and C. H. Dodge 1962 SURVIVAL AND GROWTH OF ORGANISMS DURING LIFE-LONG EXPOSURE TO HIGH GRAVITY (Dept of Physiology, State Univ. of Iowa, Iowa City, Iowa.) 10 Apr. 1962

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Wunder, C. C. 1962 SURVIVAL AND GROWTH OF ORGANISMS DURING LIFE-LONG EXPOSURE TO HIGH GRAVITY. (Paper presented at Aerospace Medical Association, Atlantic City, New Jersey, 10 April 1962.)

6,109

Wunder, Charles C. Lorenz O. Lutherer & C.H. Dodge 1963 SURVIVAL AND GROWTH OF ORGANISMS DURING LIFE-LONG EXPOSURE TO HIGH GRAVITY
Aerospace Medicine 34(1): 5-11 Jan. 1963

ABSTRACT: Nine different forms have been subjected by various laboratories to a chronic centrifugation. Alterations in life span and development result. These forms are the bean and wheat seedlings, fruit fly larvae, turtles, chickens turkeys, rats, mice, and hamsters. In some cases, life span decreases and growth decelerates; in other cases, growth is enhanced. The nature of the response is a function of the field intensity, the age, size, and biological and physical characteristics of the organism, as well as other environmental factors. These experiments indicate that terrestrial forms of life could live and multiply at gravitational intensities differing from that of the Earth's. However, there would undoubtedly be developmental alterations of a type which are at this time too complex to accurately predict.

6,110

Wunder, C. C., D. Wombolt and E. N. Oberg 1962 GROWTH ANALYSIS OF MICE SUBJECTED TO HIGH GRAVITY.
In Nature (London) 195:50-51, July 7, 1962.

6,111

Wurdemann, H. V. 1935 PROBLEMS ARISING FROM THE EFFECT OF HIGH SPEED ON LIVING TISSUE. J. Avia. Med. 6-27-29

ABSTRACT: It has been estimated that the extreme speed which can be reached by airplanes is 660 miles an hour. This is based upon the reached by airplanes is 660 miles an hour. This is based upon the fact that air, moving at this rate, disintegrates the association of its molecules. The high droning sound of an airplane is said to be due to this effect upon the air by the ends of the propellers traveling at the rate of 1,250 to 1,500 miles an hour, which cause the molecules to bump against each other.

Living tissue cannot stand the strain of extreme speed, and it is doubted that turns can be made with safety at a speed of 660 miles an hour. Many pilots have made dives at the rate of 400 miles an hour; however, in rapid turns, descents, etc., some pilots have been incapacitated from brain and abdominal hemorrhages and lost sight through hemorrhages into the retina and cornea.

6,112

Würdemann, H.V. 1938 INFLUENCE OF FLYING ON THE CIRCULATION. J. Amer. Med. Ass. 110:2092-2093.

6,113

Wurdemann, H. V. 1939 ANOTHER KIND OF BLACKOUT Lancet 2:1125-1126.

6,114

Wurzel, E.M., L.J. Polansky & E.E. Metcalfe 1948 MEASUREMENT OF THE LOADS REQUIRED TO BREAK COMMERCIAL AVIATION SAFETY BELTS AS AN INDICATION OF THE ABILITY OF THE HUMAN BODY TO WITHSTAND HIGH IMPACT FORCES. (Naval Medical Research Institute, Bethesda, Md.) Research Proj. X-630 Rept. No. 12, Mar. 1948.

ABSTRACT: The force required to break aviation safety belts used in private aircraft was determined in order to correlate this force with the trauma recorded in the reports of private aircraft crashes. The force was determined by using a new method of testing which closely simulates the conditions believed to exist in actual aircraft crashes.

The results indicate that in private aircraft crashes man has frequently survived impact loads of 2500 pounds with no sign or symptoms of injury.

6,115

Wycis, H. T., & E. A. Spiegel 1946 FURTHER STUDIES OF CORTICAL AND RETINAL INFLUENCES UPON VESTIBULO-OCULAR REFLEXES. (Dept. of Exp. Neurology, Temple Univ. Medical School, Philadelphia, Pa.)

ABSTRACT: Continuing our previous experiments on the effect of cerebral lobectomies upon postrotatory nystagmus (Wycis and Spiegel, Fed. Proc. 4:79, 1945), we compared the effect of partial lesions of the frontal and the occipital lobes with that of complete lobectomies upon the excitability of the vestibulo-ocular reflex arc in dogs and cats. Furthermore retinal impulses were eliminated by transection of both optic nerves, and this operation was combined with lobectomies. Following the bilateral optic nerve section, the duration of the postrotatory nystagmus was increased to 2-3 times and the number of jerks to 1.4-7 times the preoperative values. In this stage of increased reactivity of the vestibulo-ocular reflex arc, some dogs displayed a pronounced "after-after" discharge following labyrinthine stimulation by turning, the rotation being followed first by a nystagmus in the opposite direction and then one beating in the direction of rotation. Occipital lobectomy in these dogs with cut optic nerves failed to produce the directional preponderance to the side of the lobectomy usually appearing in normal dogs after this operation. It is inferred that the increased reactivity of the vestibulo-ocular reflex arc following occipital lobectomy is due to a release of this system from an inhibitory mechanism originating in the retinas.

(Federation Proceedings 5(1):116, 1946)

ACCELERATION

X

6,116

Xhignesse, Louis V. 1958 . SELECTIVE SURVEY OF FRENCH DEVELOPMENTS IN FLIGHT SIMULATORS AND FLIGHT INSTRUMENTS: I. FLIGHT SIMULATORS. WADD TR 57-378; ASTIA AD 142 130:

ABSTRACT: A selective survey of French developments in aircraft and missile simulation was conducted. The survey covered the characteristics of a flight simulator for a primary trainer of the conventional engine type, three types of helicopter simulators, and a simulator for an air-to-ground or ground-to-ground missile.

ACCELERATION

Y

6,117

Yamasaki, S. & R.F. Karis 1962 AN ACCURATE METHOD OF AUTOMATICALLY PLOTTING "g" LEVELS OF VIBRATION SIGNALS. (Institute of Environmental Sciences, Mt Prospect, Ill.) Reprint 62-620

ABSTRACT: This is a report on the development of the vibration Data Reduction System. This new process provides the same quality of reduced data as the previous system. However, UDRS requires a much shorter time period.

6,118

Yanquell, C.C. 1932 NAVAL PROBLEMS IN AVIATION MEDICINE J. Aviation Med. 3(4):191-193

ABSTRACT: Briefly discusses effects of acceleration during dive bombing, problems of carrier operations, and carbon monoxide problems of naval aircraft. Suggests need for research in the following areas: Inquiry into the mechanism of the physical collapse of the flyer following sudden changes of direction in the recovery from high speed dive bombing, with tests to eliminate those who are peculiarly susceptible to such syncope; The design of an all-purpose airplane goggles, which will successfully eliminate injurious sunglare without changing the natural color of the terrain, further work on carbon monoxide poisoning from the exhaust of airplane engines, with the development of a routing field test, possibly, to indicate the flyer who has an idiosyncrasy to this gas.

6,119

Yanquell, C.C. 1939 AIRSICKNESS. Nav. Med. Bull., Wash., 37:486-489

6,120

Yarcho, W.B. 1957 ENVIRONMENT TEST FACILITIES OF WRIGHT AIR DEVELOPMENT CENTER. WADC TN 57-27, Jan. 1957. ASTIA AD 110 740

ABSTRACT: The purpose of this report is to provide a compilation of the

major environmental test facilities available at Wright Air Development Center for effective utilization. It is concluded that test facilities to meet most environmental conditions are available within Wright Air Development Center and their utilization is limited only by the size or weight of the test specimen.

6,121

Yasdovskiy, Y. J. 1958 BIOLOGICAL EXPERIMENTS ON ROCKETS AND ARTIFICIAL EARTH SATELLITES. (Paper presented at the Rocket and Satellite Symposium during the Fifth Reunion of the Committee Special Annee Geophysique Internationale, Moscow, July 30 - August 9, 1958)

ABSTRACT: The safety of living organisms during rocket flights can be guaranteed only under conditions which protect the organism from the action of a whole complex of unfavorable external factors: high degrees of rarefaction of the air, the absence of molecular oxygen, cosmic rays, ultraviolet radiation, meteors, weightlessness, etc. This paper discusses the programs conducted by the Russians to (1) select the most suitable biological specimen for conducting the experiments (2) develop methods of investigating the physiological functions of an animal suitable for use under the conditions of flight on a rocket, (3) determine the possibility of guaranteeing the conditions necessary for the animal to live with the aid of a small, regenerating, hermetically sealed cabin during rocket flights to an altitude of 100 km, and (4) determine the possibility of utilizing an ejectible cabin to recover animals and apparatus from high altitudes. A good description is given of the Laika experiment.

6,122

Yazdovskiy, V.I., & R.M. Baevskii 1962 MEDICO-BIOLOGICAL CONTROL IN COSMIC FLIGHT. (Joint Publications Research Service, Washington, D.C.) JPRS 16205, 15 Nov. 1962. ASTIA AD 299 170
Translation from Akademiya Nauk SSR. Vestnik 32(9):9-15, 1962

ABSTRACT: The task of this article is to give a general idea of the character of radiotelemetric systems of medicobiological control in their current state i.e. the state in which they were utilized partim in the vehicles "Vostok-3" and "Vostok-4" and to indicate the ways of their improvement in view, of the guarantee of bio-medical control in subsequent cosmic flights covering greater distances and having longer duration. (Author)

6,123

Yazdovskii, V. I. 1962 NEWS OF SOVIET BIOLOGY: ACHIEVEMENTS OF COSMIC BIOLOGY (Uspekhi Kosmicheskoi Biologii).
Trans. of Akademiya Nauk SSSR. Izvestiya. (Seriya Biologicheskaya) 27(2):308-311, 1962.
(Joint Publications Research Service, San Francisco, Calif.)
July 23, 1962 JPRS: 14553

6,124

Yazdovskii, V. I. 1962 ACHIEVEMENTS AND PRINCIPAL GOALS IN SPACE BIOLOGY. Trans. of Akademiya Nauk SSSR. Vestnik, 32(4):15-20, 1962. (Joint Publications Research Service, Washington, D.C.) July 26, 1962 JPRS: 14618

6,125

Young, C.A. 1941 HYPOTENSION IN AVIATION, WITH A REVIEW OF 159 FATAL CRASHES. U.S. Naval Med. Bull. 39:222-235.

ABSTRACT: Upper limits of hypotension taken as 110 mm Hg systolic blood pressure, 70 mm diastolic. Believes that 10% of cadets 18 to 25 years old are hypotensive. However, in 159 fatal crashes, 45.9% of the pilots were hypotensive. Of the pilots involved in crashes clearly due to pilot error, 85.6% were hypotensive.
Individuals with low blood pressure also tend to have higher than average standing pulse rate. It is suggested that they are more susceptible to blackout and fatigue and have less emotional stability.

6,126

Young, J. G. & I. Gray 1956 BIOCHEMICAL RESPONSE TO TRAUMA. III. EPINEPHRINE AND NOREPINEPHRINE LEVELS IN PLASMA OF RATS SUBJECTED TO TUMBLING TRAUMA.
Am. J. Physiology 186:67-70.

ABSTRACT: The effect of tumbling trauma on the concentration of epinephrine and norepinephrine in the plasma of rats has been followed using the fluorimetric method of Weil-Malherbe and Bone for the analysis of the catechol amines. Sprague-Dawley rats weighing 250 gm were used. The animals were tumbled for 300, 400, 500, 600, 700 turns giving a 24-hour mortality ranging from 0-100%. The epinephrine levels immediately after the tumbling were increased 2-5 times while the norepinephrine concentrations increased 5-10 times. When followed in time after tumbling, the epinephrine remained elevated for 1-2 hours and returned to normal within 4-8 hours, while the norepinephrine began to fall within 1 hour and had returned to normal within 4-8 hours. Although changed excretion is ruled out, the actual role of secretion and biotransformation cannot be ascertained.

6,127

Young, J. G., & I. Gray 1956 BIOCHEMICAL RESPONSE TO TRAUMA. III. EPINEPHRINE AND NOREPINEPHRINE LEVELS IN PLASMA OF RATS SUBJECTED TO TUMBLING TRAUMA. (Walter Reed Army Institute of Research, Washington, D. C.) WRAIR-87-56; ASTIA AD-112 802; Apr. 1956

ABSTRACT: Plasma levels of epinephrine and norepinephrine were determined in normal and traumatized rats using the fluorimetric method of Weil-Malherbe and

Bone. Trauma was produced by tumbling in a Noble Collip drum Eprinephrine levels increased 2 to 5 times with tumbling and norpinephrine 5 to 10 times. Epinephrine and norepinephrine were determined periodically from 0 to 24 hours after tumbling. In general, norepinephrine levels began to fall within 1 hour after tumbling and returned approximately to normal in 4 to 8 hours. The epinephrine levels remained elevated for 1 to 2 hours and returned to normal within 4 to 8 hours. (AUTHOR)

6,128

Young, J.W., and L.E. Barker, Jr. 1963 MOVING-COCKPIT-SIMULATOR STUDY OF PILOTED ENTRIES INTO THE EARTH'S ATMOSPHERE FOR A CAPSULE-TYPE VEHICLE AT PARABOLIC VELOCITY. (National Aeronautics and Space Administration, Wash.) Technical note D-1797, May 1963

ABSTRACT: The primary goal of this study was to determine the effect of angular motions on the ability of the pilot to perform the maneuvers required during supercircular entry and to compare the pilot's performance on the moving simulator with that obtained from similar entries on a fixed-base simulator. Consideration was also given to the development of a minimum instrument display for which the pilot used motion cues to aid him in performing the entry maneuvers.

6,129

Young, M.W. 1945 MECHANICS OF BLAST INJURIES War Med., Chicago 8:73-81

6,130

Young, M. W. 1946 ANATOMICAL FACTORS INVOLVED IN THE "BLACKING-OUT" PHENOMENON. Anat. Rec. 94:531.

6,131

Young, R. 1961 PACKAGING OF A HYPERVELOCITY RADIO TELEMETER TO WITHSTAND HIGH IMPULSE ACCELERATIONS. (Arnold Engineering Development Center, Arnold AF Station, Tenn.) Rept. no AEDC TN 61-119, ASTIA AD 265 688, October 1961

ABSTRACT: Telemeter transmitters, consisting of simple r-f oscillators incorporating variable-capacitance pressure transducers, operated successfully in aeroballistic ranges after gun launchings at peak accelerations of 100,000 g. Telemetered pressure data obtained from these telemeters after launchings at 200,000 g. however, were very inaccurate, partly as a result of

e frequency shifts of the oscillators. Tests, devised to determine the use of these shifts, showed that a single, most favorable, mounting ientation for each of the components exists. If the components are oriented operly, frequency shifts can be minimized. It was also found that launching complete oscillator without the transducer does not necessarily allow a rediction of the behavior of the individual circuit components. It was roven possible for each of the oscillator circuit components to change its lectrical value with no resulting change in oscillator center frequency. Author)

,132

oung, R.D. 1945 NOTE ON THE FLIGHT PATH OF A MAN EJECTED NORMALLY FROM AN AEROPLANE MOVING AT A HIGH SPEED.
(Royal Aircraft Establishment, Farnborough) Technical Note Aero. 1484, Aug. 1944. Appendix 7 to Lovelace, W.R., E.J. Baldes, & V.J. Wulff, The Ejection Seat from High Speed Aircraft, ASTIA ATI 7245

UMMARY: Calculations have been made of the flight path of a man ejected ormally from an aeroplane moving at speeds (U degrees) of 400 f.p.s., and 00 f.p.s. Ejection velocities ( ) of 20 f.p.s., 50 f.p.s. and 100 f.p.s. in oth up and down directions have been considered for each case, and the alculations are sufficiently valid for practical requirements. It is concluded that an upward ejection velocity of about 40 f.p.s. should be sufficient in most cases for the man to clear the aeroplane structure. The initial acceleration on the man required to give him this ejection velocity is estimated to be about 12 1/2 g acting for 1/10th sec.; this is not considered serious. The power required can be readily provided by a few ounces of cordite. (Author)

5,133

Young, R. S. 1959 SECURING THE DATA: PRACTICAL EXPERIMENTS IN SPACE BIOLOGY
In: Proceedings of the Pilot Clinic on the Instrumentation Requirements for Human Comfort and Survival in Space Flight. Ohio State University, Columbus, Ohio. October 26-27, 1959.
(Foundation for Instrumentation Education and Research, New York, N. Y., April 1960.) Pp. 27-35.

ABSTRACT: Some of the instrumentation problems that have been encountered by biologists in their experiments in space-type vehicles are presented and discussed. Such problems center around the vehicle itself and its environment. Two basic types of biological studies are being conducted: 1) effects of space flight on a living system and evaluation of the system as far as man is concerned, and 2) study of these effects simply as a scientific research effort. Illustrative examples of present research are given. (Tufts)

6,134

Young, R. S., & J. L. Johnson 1960 BASIC RESEARCH EFFORTS IN ASTROBIOLOGY Institute of Radio Engineers Transactions on Military Electronics MIL-4(2-3): 284-287, April-July 1960

ABSTRACT: The need is cited for the development of instrumentation capable of accurately measuring and telemetering various physiologic responses of a wide variety of cellular systems subjected to accelerative forces, to conditions of vacuum, and to zero-gravity.

6,135

Young, W. R. 1959 WHAT IT'S LIKE TO FLY INTO SPACE 46(15):132-149. 13 April

ABSTRACT: A very clear description, accompanied by full-page photographs, is provided of various physiological research for space flight in the U. S., including weightlessness, vibration, and acceleration. Subjective data on his rides on the Wright-Patterson Air Force (20 ft. arm) centrifuge, and the Navy's Johnsville (50 ft arm) centrifuge is given. (CARI)

6,136

Yudkofsky, P.L. n.d. PRIMATE RESPONSES TO PROLONGED LOW MAGNITUDE ACCELERATIONS AND TO SUDDEN WITHDRAWAL OF THESE ACCELERATIONS. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) Technical Report in preparation.

6,137

Yudkofsky, P. L. 1960 A MODIFIED SMALL ANIMAL CENTRIFUGE. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TN 60-245; ASTIA AD-247 181; Sept. 1960

ABSTRACT: A spin-table formerly used in tumbling studies has been modified to best compromise centrifuge radius with maximum speed, optimum electrical connections, ease of control, and maximum safety. The modified apparatus possesses a heavy-duty platform 8 ft. in diameter which may be rotated to a peak speed of 225 rpm while carrying a 500 pound load. The maximum acceleration produced at this speed is just under 70 g with a maximum rate of onset or braking of 11 g per sec at the full arm radius of 4 ft. Detailed operating instructions are included. (AUTHOR)

6,138

Yudkofsky, P.L. Sept. 1960 GROSS AND MICROCIRCULATORY EFFECTS OF TILTING AND ACCELERATION ON THE GOLDEN HAMSTER. ASTIA AD 249 260; WADD Tech Rept 60-373, Sept. 1960

ABSTRACT: The heart rate, respiratory rate, blood pressure, electrocardiogram, organ displacements, and microcirculation of the golden hamster were recorded and correlated during a wide range of gravitational stress, i.e., from 1 to 60 positive g. The effects of various anesthetics and hemorrhage on the observed responses were determined. Lastly, the cardiovascular responses of the hamster to occlusion of the carotid arteries were interpreting and necropsy examinations were performed to aid in interpreting the recorded physiologic data. It was found that tilting from the horizontal to head-up position elicited no pronounced physiologic responses in the test animal. The increased forces encountered during centrifugation elicit pronounced effects which appear to be primarily compensated for by increased heart rate. The microcirculation of the hamster cheek pouch did not appear to actively enter into the reactions to positive acceleration. Also, the cause of death at various magnitudes of acceleration is discussed. (AUTHOR)

6,139

Yugov, Ye and Serov, A. E. 1958 MAN BEFORE TAKING OFF TO SPACE
(Chelovek pered startom v Kosmos
Trans of Izvestiya (USSR) Oct. 4, 1958.
(Office of Technical Services, Washington, D.C.)
Feb. 12, 1959 59-16413

ABSTRACT: Physiological problems involved in space flight and during acceleration are described in laymen's terms.

6,140

Yurow, V. R. 1961 NOL WATER-ENTRY TEST FACILITY (Naval Ordnance Lab., White Oak, Md.) NAVORD rept. no. 6815; 15 March 1961; ASTIA AD-244 721

ABSTRACT: A high velocity, variable angle launcher has been placed in operation at the test pond of the Naval Ordnance Laboratory. Internally instrumented models and high speed motion picture photography are used to provide water-entry shock signatures and trajectory information. Scale and full size test vehicles up to 500 pounds in weight and 14' 25 inches in diameter can be launched at velocities that range from 350 fps for a 500 pound model to 1100 fps for a 5 pound model. The report describes the facility and its operation, discusses its advantages and limitations, and summarizes the test programs conducted in the facility since its completion. (Author)

6,141

Yustein, S.E. & R.R. Winans 1951 REPORT OF INVESTIGATION FOR DEVELOPMENT OF AN IMPACT TEST FOR PROTECTIVE HATS. (Material Lab., Naval Shipyard, Brooklyn, N.Y.) Report NS 181-013, 7 Aug. 1951. ASTIA AD 205 655

ABSTRACT: The object of this investigation is to develop the Brinell impression method as described in reference (f), with a view to its use in drop ball impact tests on protective hats for brand approval and inspection test purposes.

6,142

Zahm, A. F. 1911 STRESS IN AEROPLANES IN CURVILINEAR AND FANCY FLIGHT. Sci. Amer. 105:189; 196.

6,143

Zahm, A. F. 1913 STRESS CONSIDERATIONS IN AEROPLANE DESIGN. J. Franklin Instit. 175:601.

6,144

Zahm, A.F. 1919 DEVELOPMENT OF AN AIRPLANE SHOCK RECORDER J. Franklin Inst. 188:237

6,145

Zarriello, J. J., M. E. Norsworthy, & H. R. Bower 1958 A STUDY OF EARLY GREYOUT THRESHOLD AS AN INDICATOR OF HUMAN TOLERANCE TO POSITIVE RADIAL ACCELERATORY FORCE. (Naval School of Aviation Medicine, Pensacola, Fla.) Research Proj. NM 110211, 1.1, Subtack 1, Rept. 11 8 May 1958 July 1958, ASTIA AD 201 873.

ABSTRACT: To determine the relationship between several prerun clinical measures of cardiovascular response and criteria of visual impairment occuring during centrifuge, 52 subjects, ranging from 18 to 35 years of age, were studied. Five cardiovascular measures were taken for each subject and related to: (1) g level of greyout, (2) time, from onset of peak g to onset of greyout, (3) g level of blackout, and (4) time from onset of peak g to onset of blackout. The task was to respond (press a button) to both central and peripheral lights, presented randomly, while undergoing acceleration. The results are discussed in terms of prediction of man's g tolerance.

6,146

Zarriello, J.J., E. Norsworthy & H.R. Bower 1959 STUDY OF EARLY GREY-OUT THRESHOLD AS AN INDICATOR OF HUMAN TOLERANCE TO POSITIVE RADIAL ACCELERATORY FORCE. (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, 27-29 April 1959.)

ABSTRACT: The purpose of this study was to investigate the relationship under increased positive radial acceleratory force between peripheral light loss and blackout or unconsciousness when the light stimulus is located at 80° in the peripheral field; and to determine whether an 80° peripheral light stimulus was an earlier indicator than the 23° light for an endpoint of greyout in regards to magnitude of the G force. The time spread between onset of greyout (80° light loss) and onset of blackout or unconsciousness was determined, and this time spread was found to be slightly increased when compared to the use of a 23° light as an endpoint of greyout. The peripheral light loss has limited usefulness as an early indicator for the onset of critical symptoms of blackout or unconsciousness.
(J. Aviation Med. 30(3):210-211, March 1959.)

6,147

Zarriello, J. J., L. M. Seale, & M. E. Norsworthy 1958 THE RELATIONSHIP BETWEEN CARDIOVASCULAR RESPONSE AND POSITIVE G TOLERANCE. (N. Sch. Av. Med., Pensacola, Fla., Res. Proj. NM 11 01 11 Subtask 1, Report No. 11. ASTIA AD 201 873.
See Also: J. of Aviation Med. 29(11):815-820.

ABSTRACT: Relationships between pre - run clinical cardiovascular measures and criteria of positive G tolerance were determined in 52 inexperienced centrifuge subjects. Subjects were presented two peripheral lights and a central light. G levels and time at peak G at which greyout and blackout occurred were determined for each subject. The results indicated that diastolic blood pressure was significantly related to time during peak G and no cardiovascular measures were significantly related to G level at which blackout occurred. The G level at which greyout occurred was significantly related to the G level at which blackout occurred. (Author)

6,148

Zarriello, J. J. and L. M. Seale and Mary E. Norsworthy 1958 THE RELATIONSHIP BETWEEN CARDIOVASCULAR RESPONSE AND POSITIVE G TOLERANCE J. of Aviation Medicine 29(11):815-820, November 1958

SUMMARY: The relationships between pre-run clinical cardiovascular measures and criteria of G tolerance were determined in fifty-two inexperienced centrifuge subjects. The subjects were presented two peripheral lights, 80° right and left of the center of the visual field, and a central light. The G levels at which greyout and blackout occurred and the time at peak G at which they occurred were determined for each subject. The results incidated that the diastolic blood pressure was significantly related to both the time at which greyout appeared and the G level at which it appeared. Pre-run measures of pulse rate were negatively related to the time during peak G at which blackout occurred. No cardiovascular measures were significantly related to the G level at which blackout occurred.

6,149

Zarriello, J. J. 1958 SERUM GLUTAMIC OXALACETIC TRANSMINASE ACTIVITY IN HUMANS SUBJECTED TO POSITIVE RADIAL ACCELERATORY FORCE. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. No. NM 11 01 11; Research Rept. No. MR005.15-0001.1.12., 1/17/58; ASTIA AD-203 322
See also J. Avia. Med. 30(2):97-99, Feb. 1959

ABSTRACT: In young normal subjects, the serum glutamic-oxalacetic transaminase activity was not elevated within seventy-two hours following human centrifugation in which subjects are exposed to positive radial acceleratory stress leading to blackout.

SECOND ABSTRACT: The purpose of the study was to determine if any variation of activity of Serum glutamic oxalacetic transminase (SGO-T) occurs following human centrifugation when relaxed subjects experience the physiological state of blackout. It was found that the SGO-T activity is not elevated within seventy-two hours following human centrifugation leading to the physiological state of blackout. (AUTHOR)

6,150

Zarriello, J.J., M.E. Norsworthy & H.R. Bower 1959 STUDY OF EARLY GREYOUT THRESHOLD AS AN INDICATOR OF HUMAN TOLERANCE TO POSITIVE RADIAL ACCELERATORY FORCE
Paper: Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959

ABSTRACT: The purpose of this study was to investigate the relationship under increased poistive radial acceleratory force between peripheral light loss and balckout or unconsciousness when the light stimulus is located at 80° in the peripheral field; and to determine whether an 80° peripheral light stimulus was an earlier indicator than lights located at 23° in the peripheral field. Under conditions of our experiment, it was found that an 80° light stimulus was an earlier indicator than the 23° light for an endpoint of greyout in regards to magnitude of the G force. The time spread between onset of greyout (80° light loss) and onset of blackout or unconsciousness was determined, and this time spread was found to be slightly increased when compared to the use of a 23° light as an endpoint of greyout. The peripheral light loss has limited usefulness as an early indicator for the onset of critical symptoms of blackout or unconsciousness.

6,151

Zarriello, J. J. 1959 SERUM GLUTAMIC OXALACETIC TRANSMINASE ACTIVITY IN HUMANS SUBJECTED TO POSITIVE RADIAL ACCELERATORY FORCE. J. Avia. Med. 30(2): 97-99, Feb. 1959
See also (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. No. NM 11 01 11; Research Rept. No. MR005.15-0001.1.12., 1/17/58; ASTIA AD-203 322

ABSTRACT: In young normal subjects, the serum glutamic-oxalacetic transaminase activity was not elevated within seventy-two hours following human centrifugation in which subjects are exposed to positive radial acceleratory stress leading to blackout.

SECOND ABSTRACT: The purpose of the study was to determine if any variation of activity of Serum glutamic oxalacetic transminase (SGO-T) occurs following human centrifugation when relaxed subjects experience the physiological state of blackout. It was found that the SGO-T activity is not elevated within seventy-two hours following human centrifugation leading to the physiological state of blackout. (AUTHOR)

6,152

Zarriello, J. J., & P. B Phillips Jan. 1959 EPILEPTIFORM SEIZURE AND LOW G TOLERANCE; A CASE REPORT. J Avia. Med. 30(1):35-37

6,153

Zarriello, J.J. 1959 IDIOPATHIC ORTHOSTATIC HYPOTENSION AND ITS RELATIONSHIP TO POSITIVE G TOLERANCE
(U.S. Naval School of Aviation Medicine, U.S. Naval Air Station, Pensacola, Florida) Bureau of Medicine and Surgery Research Project NM 11 01 11, Subtask 1 Report No. 13, May 21. 1959 ASTIA AD 225 719

ABSTRACT: Symptoms of unconsciousness developed in two student pilots during aerobatic maneuvers. These student pilots were normal in all respects having no past history of classical symptoms of orthostatic hypotension but demonstrating a definite fall in blood pressure on assuming the upright position. They were subjected to human centrifugation and their respective greyout, blackout, and unconscious threshold levels were determined and compared to 115 normal cases subjected to centrifugation in a similar manner.

When subjected to centrifugation these individuals demonstrated a markedly reduced greyout, blackout, and unconscious tolerance to positive G as compared to 115 normal individuals.

Human centrifugation may be used as an adjunct to assist in the diagnosis of early cases of postural or orthostatic hypotension prior to the development of classical symptoms of this syndrome.

Candidates entering the naval flight program demonstrating a significant fall in blood pressure on assuming the upright position should be screened carefully, and their complete evaluation should include determination of their basic tolerance to positive G as determined by human centrifugation.

6,154

Zarriello, J. J. 1959 THE CORRELATION OF SCOTOPIC AND PHOTOPIC VISION IN RELATIONSHIP TO BLACKOUT TOLERANCE ON THE HUMAN CENTRIFUGE. (Naval School of Aviation Medicine, Pensacola, Fla.) Research Proj. No. NM 11 02 11, Rept. No. 2; ASTIA AD-225 720; 30 Apr. 1959

ABSTRACT: Blackout thresholds obtained under two levels of stimulus intensity on the human centrifuge are compared. One level of intensity employed was in the [illegible] and the other in the photopic. Under conditions of this experiment the results indicate significantly that lower blackout thresholds are obtained when low intensity lights are used and the subject is dark adapted that when standard lights are used in the same subject after he has been light adapted. This result pertains when the subject is unprotected or protected by an anti-blackout suit. Other significant correlations were found. (AUTHOR)

6,155

Zasosov, R. & A. Popov 1959 VESTIBULTARNAYA TRENIROVKA (Vestibular Training)
(Trans. from Bol'shaya Meditsinskaya Entsiklopediya, (USSR) v. 5, cols. 275-279, 1958)
(SLA Translations Center, Chicago, Ill.) 59-18445

6,156

Zborowzski, 1944 REVIEW OF ROCKET DEVELOPMENTS AT THE BMW UP TO NOVEMBER 1944
(B.I.O.S. GROUP 2, Halstead Exploitation Centre H.E.C. 10610)
R.A.E. Translation No. 146

6,157

Zdanis, B.R. 1956 NAVAL ORDNANCE LABORATORY NAVORD REPORTS PUBLISHED BY THE AEROBALLISTIC RESEARCH DEPARTMENT, 1 JANUARY 1955 - 31 DECEMBER 1955
(Naval Ordnance Lab., White Oak, Md.) 25 July 1956, Aeroballistic research report no. 350; NAVORD Rept. no. 4312, ASTIA AD115 337
See Also ASTIA AD-77 437

6,158

Zechman, F. W., N. S. Cherniack, & A. S. Hyde 1959 VENTILATORY RESPONSE TO FORWARD ACCELERATION. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 59-584; ASTIA AD-231 286; Sept. 1959
See also Fed. Proc. 19:376, 1960

ABSTRACT: The findings of two series of experiments dealing with the effect of forward acceleration on respiration in man are presented. In the first, the effect of 5, 8, and 12 g on respiratory frequency, tidal volume, minute volume, and nitrogen elimination were determined. Frequency increased reaching an average of 39.2 cycles per minute and tidal volumes decreased to an average of 318 cc at 12 g. The volume of nitrogen eliminated during a 30 second period, breathing oxygen at 12 g, was essentially unchanged suggesting that gross alveolar ventilation did not decrease. In the second series, O_2 consumptions were measured before, during, and after accelerations of 5, 8, 10, and 12 g. Oxygen consumptions increased with

acceleration and it is presumed that the extra work of breathing may be an important contributing factor. In both series of studies the trunk was inclined 12 degrees in the direction of acceleration and a rate of onset of 1 g per second was used. (AUTHOR)

6,159

Zechman, F. W., N. S. Cherniack, & A. S. Hyde 1960 VENTILATORY RESPONSE TO FORWARD ACCELERATION. Fed. Proc. 19:376
See also (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 59-584, Sept. 1959; ASTIA AD-231 286

ABSTRACT: The findings of two series of experiments dealing with the effect of forward acceleration on respiration in man are presented. In the first, the effect of 5, 8, and 12 g on respiratory frequency, tidal volume, minute volume, and nitrogen elimination were determined. Frequency increased reaching an average of 39.2 cycles per minute and tidal volumes decreased to an average of 318 cc at 12 g. The volume of nitrogen eliminated during a 30 second period, breathing oxygen at 12 g, was essentially unchanged suggesting that gross alveolar ventilation did not decrease. In the second series, O_2 consumptions were measured before, during, and after accelerations of 5, 8, 10, and 12 g. Oxygen consumptions increased with acceleration and it is presumed that the extra work of breathing may be an important contributing factor. In both series of studies the trunk was inclined 12 degrees in the direction of acceleration and a rate of onset of 1 g per second was used. (AUTHOR)

6,160

Zechman, F. W. 1958 THE EFFECT OF FORWARD ACCELERATION ON VITAL CAPACITY (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADC TN 58-376; ASTIA AD-209 411; December 1958
NOTE: CARI P&S 2.14

ABSTRACT: The effect of forward acceleration on vital capacity has been measured in human subjects. Vital capacities were reduced in a fairly uniform manner with increasing g. Values reached on average of 1.5 liters at 8 g when the trunk was inclined 25 degrees forward. This degree of reduction was reached at 6 g when the trunk was not inclined.

6,161

Zechman, F. W., N. S. Cherniack, & A. S. hyde 1960 RESPIRATORY EFFECTS OF FORWARD ACCELERATION. (Paper, 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Florida, May 9-11, 1960)

ABSTRACT: Since it is likely that pilots of rocket propelled vehicles will experience forward acceleration and since respiratory difficulties limit tolerance in this position, further studies have been conducted to determine the effect of forward acceleration on respiration. Two series of experiments were conducted.

In the first the influence of forward accelerations of 5, 8, and 12 G on respiratory frequency, tidal volume and nitrogen elimination have been studied. In the second series, the effect of forward accelerations of 5, 8, 10 and 12 G on oxygen consumption has been measured. Respiratory frequency increased and tidal volume decreased with increasing acceleration. Frequencies reached 39.2 cycles per minute at 12 G while tidal volume fell to 318 cc. The nitrogen eliminated during a 30-second period of oxygen breathing did not decrease suggesting that gross alveolar ventilation probably did not decrease. Oxygen consumption increased with increasing forward acceleration. Several factors presumably are responsible including the extra work in breathing and an increase in muscle tone.

6,162

Zechman, F. W., N. S. Cherniack and A. S. Hyde 1960 VENTILATORY RESPONSE TO FORWARD ACCELERATION.
In J. Appl. Physiol 15:907-910, Sept. 1960.

ABSTRACT: Two series of experiments dealing with the effect of forward acceleration on respiration in man were performed. In both series of studies the trunk was inclined 12 degrees in the direction of acceleration and a rate of onset of 1 g/sec. was used. In the first series, the effect of 5, 8 and 12 g on respiratory frequency, tidal volume, minute volume and nitrogen elimination was determined. Frequency increased, reaching an average of 39.2 cpm and tidal volumes decreased to an average of 318 cc at 12 g. The volume of nitrogen eliminated during a 30-second period, breathing O_2 at 12 g, was essentially unchanged, suggesting that alveolar ventilation did not decrease. In the second series, O_2 consumptions were measured before, during and after accelerations of 5, 8, 10, and 12 g. O_2 consumptions increased with acceleration and it is presumed that the extra work of breathing may be an important contributing factor.

6,163

Zechman, F. & G. Mueller 1962 EFFECT OF FORWARD ACCELERATION AND NEGATIVE PRESSURE BREATHING ON PULMONARY DIFFUSION.
J. Appl. Physiol. 17:909-912, Nov. 1962.

6,164

Zechman, F. W., & J. Taylor 1962 RESPIRATORY RESPONSE TO FORWARD ACCELERATION COMPARED WITH CHEST COMPRESSION IN DOGS. J. Applied Physiol. 17(3):410-412, May 1962

ABSTRACT: Six mongrel dogs were studied to determine if the increases in frequency of breathing characteristic of both chest compression and forward acceleration are initiated by the same vagal reflex. Since vagal section only abolished the response to chest compression, it is assumed that some other mechanism is primarily responsible for the rate increase characteristic of forward acceleration. Experiments are also described which suggest that the increased respiratory frequency may be attributed to a hypoxic drive. (AUTHOR)

6,165

Zechman, F. W., & G. Mueller 1962 EFFECT OF FORWARD ACCELERATION AND NEGATIVE PRESSURE BREATHING ON PULMONARY DIFFUSION. J. Applied Physiol. 17(6):909-912, Nov. 1962

ABSTRACT: Forward acceleration decreases lung volumes, resembling negative pressure breathing (NPB). At 4 g the relaxation pressure curve is shifted downward and to the right 15 mm. Hg. Pulmonary gas exchange and diffusion capacity were measured in nine human subjects during NPB (-15 mm. Hg) and forward acceleration (4 g). Pulmonary ventilation increased approximately 40% in each condition. The oxygen uptake increased with NPB (from 261 to 293 ml./min.) and was slightly decreased or unchanged at 4 g. Carbon dioxide elimination increased in both experimental conditions. The apparent steady-state carbon monoxide diffusion was unchanged by NPB but decreased from an average control value of 21 to 12 ml./min. mm. Hg at 4 g. Since lung volumes are decreased by comparable amounts in both conditions, it is believed that the deleterious effects observed with forward acceleration are associated with the increased hydrostatic gradient from chest to back. (AUTHOR) (Aerospace Medicine 34(3):276, March 1963)

6,166

Zeckwer, I. T. 1952 ACCELERATING EFFECT OF ADRENALECTOMY ON REGROWTH OF HAIR IN THE RAT CONSIDERED IN RELATION TO PITUITARY HISTOLOGY. (Dept. of Pathology, Univ. of Pennsylvania Medical School, Philadelphia)

ABSTRACT: Four groups of rats were studied: 1) thyroidectomized, 2) thyroidectomized and adrenalectomized, 3) adrenalectomized, 4) intact. Adrenalectomy was performed 5 to 17 weeks after thyroidectomy. Adrenalectomized rats received 1% NaCl drinking fluid. Hair was shaved by electric clippers from the back and sides of all rats, and the regrowth of hair photographed. Thyroidectomized rats showed large bald areas; rats with combined thyroidectomy and adrenalectomy showed rapid diffuse regrowth, nearly as marked as in adrenalectomized with thyroids intact, whose growth was much more rapid than in the intact rats. This proved that thyroidectomy, which caused loss of acidophils from the pituitary and stunting of somatic growth, did not prevent the accelerating effect of adrenalectomy on hair growth. A number of parabiotic rats were studied in which one partner was adrenalectomized. The adrenalectomized partner showed as rapid diffuse regrowth of hair as did single adrenalectomized rats. The intact partner in parabiosis with the adrenalectomized showed the slower patterns of regrowth characteristic of a single intact rat. The adrenalectomized partner, therefore, did not transfer to the intact parabiont any substance that stimulated hair growth. This suggests that adrenalectomy does not cause any increase in an accelerating substance, but occasions the removal of an inhibitory substance, and this removal is not modified by loss of pituitary acidophils consequent upon thyroidectomy. Regrowth of hair does not parallel somatic growth and does not depend on the presence of pituitary acidophils. (Federation Proceedings 11(1):177, 1952)

6,167

Zeigen, R. S. 1961 MUSCLE STRENGTH UNDER FORWARD ACCELERATION (Paper, 32nd Annual Meeting, Aerospace Medical Assoc., 24-27 April 1961, Chicago, Ill.)

ABSTRACT: Man's ability to utilize his mechanical characteristics under various degrees of forward acceleration is being studied. Maximum hand and arm strengths in six movements with the elbow flexed at a 90-degree angle have been tested thru 8 g using an isometric strain gage dynamometer. A nylon net supine seat with a 12-degree back angle served as the body support. Among the parameters studied were intra- and inter-subject variability under both rested and fatigued conditions. Selected anthropometric dimensions were measured on the twenty-two subjects used and possible correlations between these dimensions and the six arm strength movements investigated. (J. Aerospace Medicine 32(3):253, Mar. 1961)

6,168

Zeiner, E.A. 1962 XI. ENGINEERING RESEARCH. (Jet Propulsion Laboratory, California Institute of Technology, Pasadena, Calif.) Research Summary No. 36-13 for the period Dec. 1, 1961 to Feb. 1, 1962. ASTIA AD 274 011.

ABSTRACT: A drop capsule is being developed to provide an experimental chamber in which to perform free-fall (zero-g) [illegible] experiments. It is hoped that 10 sec. of free-fall with satisfactory [illegible] conditions can be achieved. Toward this objective, a prototype [illegible] was built. It was decided to drop two identically designed capsules from the Glen Canyon bridge at Page, Arizona, where 672 ft. of fall and a soft dirt impact area were available. By using the measured drop time and the total distance of fall, the drag coefficient of the first capsule was determined to be 0.082 [illegible], the [illegible] value had been assumed at 0.070. The capsule fell along a [illegible] impacting the desired ground point within the accuracy [illegible] of ± 1.5 ft. The first scan of the films indicated that the capsule fell without rolling, pitching, or yawing. The general result [illegible] the capsule is aerodynamically satisfactory within the accuracy of the external camera setup. The impact dispersion from the helicopter drops was estimated at ± 3.00 ft. but excessive oscillations were visually observed. No evaluation has yet been made on the second capsule dropped from the bridge.

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Zeitlin, L. R. 1960 THE INFLUENCE OF HEART ACTION AND THE CIRCULATION OF THE BLOOD ON MANNED SATELLITE ATTITUDE CONTROL. J. of the Astronautical Sciences 7(3):70-72, Fall 1960

ABSTRACT: The internal disturbing forces, particularly those produced by the heart action and blood circulation, are taken into consideration in the design of an attitude control system for a manned satellite.

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Zeller, A. F., & H. G. Moseley 1957 AIRCRAFT ACCIDENTS AS RELATED TO PILOT AGE AND EXPERIENCE. J. Avia. Med. 28:171-184

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Zeller, A. F., H. G. Moseley, & J. M. Burke 1957 FIGHTER ACCIDENTS. CENTURY SERIES. (F100, F101, F102, AND F104) (Aero Med Safety Div., Directorate of Flight Safety Research, The Inspector General, U. S. Air Force) Summary No. 20-57; 1 Oct. 1957

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Zeller, Anchard F. Mar. 1958 HUMAN ABILITY AND HIGH PERFORMANCE FLIGHT. AF Directorate of Flight Safety Research Rept. M-5-58, 26 Mar. 1958.

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Zeller, A. F., Ph. D. 1959 HUMAN ABILITY AND HIGH PERFORMANCE FLIGHT: AN ANALYSIS OF ACCIDENTS IN "CENTRUY SERIES" AIRCRAFT. The Journal of Aviation Medicine, 30(2):126-135. Feb. 1959.

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Zeller, Anchard F. 1959 AGE, EXPERIENCE AND AIRCRAFT ACCIDENTS Aerospace Medicine, 30(10):736-750

6,175

Zeller, A. F., G. H. Mormand, & J. M. Burke 1961 AIRCRAFT ACCIDENTS AND AIRCRAFT INSTRUMENTS Aerospace Medicine 32:(1)42-51.

ABSTRACT: Unfortunately aircraft accidents under instrument conditions are not rare. During the period of July 1, 1957 through June 30, 1958 the Air Force experienced 116 such major accidents. In those considered, 111 aircraft were destroyed and sixty-five pilot operators were fatally injured. Accidents of this kind emphasize the dependence of pilots on aids external to themselves, particularly when visual contact is lost. By far the greatest portion of the accidents under instrument reference occurred in flight under normal conditions. The most frequent accident type was collision with ground or water and the second most frequent was the abandonment of the aircraft while it was still in operating condition because of such emergencies as impending fuel depletion or because the pilot was lost. The collisions with the ground or water, in most instances, were completely unanticipated and gave the pilot no opportunity for escape. An accident under instrument conditions involves a breakdown of the equipment, the auxiliary aids, the man, or of the interaction between them. This article contains graphs, tables and information concerning tests conducted to improve instrument

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Zeller, A. F. 1962 CURRENT FLYING AND ACCIDENT POTENTIAL. J. Aerospace Medicine 33(8):920-929, Aug. 1962

ABSTRACT: There is a direct relationship in the anticipated direction between current flying and accident experience. This is affected by such variables as the age and experience level of the pilot. It is particularly related to the specific type of equipment, being much more emphasized where higher performance aircraft are involved. The combination of limited background experience and limited current flying in the high performance fighters particularly, result in a situation of extreme accident potential. The most immediate way of reducing this appears to be by substantial increases in the amount of current flying made available to the individual pilot. The operation of jet trainers and jet bombers is less related to current flying than is the jet fighter. The demonstrated relationship between the variables involved have a number of implications directly applicable to decisions regarding the apportionment of hours; the decision to transition pilots of various age and background and the type of equipment which is most desirable for maintaining flying proficiency where a direct operational assignment is not involved.

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Zeller, W. 1932 DEM MENSCHLICHEN KÖRPER AUFGEZWUNGEN BEWEGUNGSVORGÄNGE UND DEREN WAHRNEHMUNG. (Influence of motion on the body and its perception) Psychotechn. Ztschr. 7:139-147

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Zellmer, R. W., G. J. Womack, R. C. McNee, & R. G. Allen, Jr. 1962 SIGNIFICANCE OF COMBINED STRESSES OF G-FORCES AND IRRADIATION. (Paper, 33rd Annual Meeting of the Aerospace Medical Assoc., 9-12 April 1962, Atlantic City, N. J.)

ABSTRACT: The occupant of a space vehicle will be exposed to varying amounts of accelerative force upon injection into orbit, escape from Earth's gravitational field and reentry into the atmosphere. Effects of G-forces ideally will be minimized by proper positioning of the astronaut within the capsule, but malorientation of the capsule could well occur due to system dysfunction. In addition, to this stress, the crewman will be required to accept minimum radiation exposure in certain regions of the flight profile or possibly, additionally, larger doses due to unexpected solar flare activity. The additivity of these combined stresses, within time, is the subject of this paper. Groups of rats were exposed in an experimental array designed to explore the interaction of various amounts of positive, negative, and transverse G-forces with grades doses of Co^{60} gamma irradiation before and at various time intervals following the acceleration exposure. The end point investigated was the LD_{30} of the exposed animals. Data will be presented and the significance of these data discussed. (J. Aerospace Medicine 33(3):356, Mar. 1962)

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Zhukov-Verezhnikov, N. N., V. I. Yakovlev & I. N. Mayskii 1961 O TERETICHESKIKH PROBLEMAKH KOSMICHESKOY BIOLOGII (Theoretical Problems of Cosmic Biology)
(Trans. of Voprosy Filosofii (USSR) 14(9):111-119, 1960)
(Office of Technical Services, Washingto, D.C.) 61-21125

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Ziegenruecker, G. H., & E. B. Magid 1959 SHORT TIME HUMAN TOLERANCE TO SINUSOIDAL VIBRATIONS. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 59-391; ASTIA AD-227 341; July 1959

ABSTRACT: Short time human tolerance criteria for sinusoidal vibration from 1 to 15 cps were determined using 10 healthy male subjects ranging in age from 23 to 34 years. At each frequency, the amplitude was increased at a constant rate from zero to the point where the subject stopped the run because he thought that further increase might cause actual bodily harm. The lower levels of tolerance were found to be between 1 and 2 g at 3 - 4 cps and at 7 - 8 cps. The highest tolerance level of 7 - 8 g was found at 15 cps. Subjective tolerance limits were found to be caused by one or more of seven specific sensations or symptoms. Physiological observations during vibration exposure were also made. (AUTHOR)

6,181

Ziegenrucker, G.H. & E.B. Magid 1960 SHORT TIME HUMAN TOLERANCE TO SINUSOIDAL VIBRATIONS. (Paper, 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960)

ABSTRACT: Short time human tolerance criteria for sinusoidal vibration from 1 to 15 cps were determined using ten healthy male subjects ranging in age from twenty-three to thirty-four years. At each frequency, the amplitude was increased at a constant rate from zero to the point where the subject stopped the run because he thought that further increase might cause actual bodily harm. The lower levels of tolerance were found to be between 1 and 2 G at 3-4 cps and at 7-8 cps. The highest tolerance level of 7-8 G was found at 15 cps. Subjective tolerance limits were found to be caused by one or more of seven specific sensations or symptoms. Physiological observations during vibration exposure were also made.

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Ziegler, R. B. and J. Lazo 1961 SUBJECT SELECTION: PERTINENT CRITERIA FOR SUBJECTS IN AEROSPACE HUMAN FACTORS RESEARCH.
Aerospace Medicine 32(3):253, March 1961.

ABSTRACT: Selection of subjects for aerospace human factors research becomes

increasingly critical when the results are to be applied to a single human being, such as the operator of an X-15 aircraft or Mercury capsule. Longitudinal analysis of data from subjects in several Air Crew Equipment Laboratory studies has indicated that one carefully chosen subject can often provide more pertinent information than can large groups of randomly selected men. There was a tendency for introversive types of men to deal with anxiety differently than extroversive types do, and to have different psychophysiological patterns. Examples are given of differences in perceptual thresholds, time estimation ability, performance, personality test results, and in physiological measures, found in experimental subjects and which appeared to be related to the manner in which they reacted to stress situations. These meaningful differences are frequently cancelled out by statistical averaging techniques. A thorough mission profile analysis can provide criteria for detemining which subjects are appropriate for studies of a particular aerospace problem.

6,183

Ziengenruecker, G.H. & E.B. Magid. 1960 SHORT TIME HUMAN TOLERANCE TO SINUSOIDAL VIBRATIONS. Aerospace Med. 31(4):325-326

ABSTRACT: Short time human tolerance criteria for sinusoidal vibration from 1-15 cps were determined using ten healthy male subjects ranging in age from 23 to 34 years. At each frequency the amplitude was increased at a constant rate from 0 to the point where the subject stopped the run because the thought that further increase might actual cause bodily harm. The lower levels of tolerance were found to the between 1 and 2 G at 3-4 cps and at 7-8 cps. The highest tolerance level of 7-8 was found at 15 cps. Subjective tolerance limits were found to be caused by one or more of 7 specific symptoms. Physiological observations during vibration exposure were also made.

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Zim, H. S. 1943 MAN IN THE AIR: The Effects of Flying on the Human Body. (New York: Harcourt Brace & Co., 1943)

ABSTRACT: "Man in the Air" considers flying from the point where it affects man's body and mind. The chapters include; man in the ocean of air; the air in which we life; our bodies; adjustment to temperature; respiration and breathing; oxygen and oxygen masks; present day oxygen masks; aeroembolism; pressure suits and pressure cabins; high up on the ground; changes in speed and direction; positive and negative acceleration; eyes to see; ears to hear; ears are for more than hearing; air sickness; flying fatigue; smart enough to fly; tests and more tests; safety in flight fatigue; smart enough to fly; tests and more tests; safety in flight and flying and public health.

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Zimkin, N. V. 1961 KONFERENTSIIA PO PROBLEME ADAPTATSII, TRENIROVKI I DRUGIM SPOSOBAM POVYSHENIIA USTOICHIVOSTI ORGANIZMA, 25-28 IANVARIA 1961 G. (CONFERENCE ON PROBLEMS OF ADAPTATION, TRAINING, AND OTHER METHODS OF INCREASING BODY RESISTANCE, 25-28 JANUARY 1961) Fiziologicheskii zhurnal SSSR (Moskva) 47(7):934-937, July 1961
English Translation: Sechenov Physiol. J. USSR (New York: Pergamon Press, 1962) 47(7):1020-1023, Jan. 1962

ABSTRACT: The majority of papers were concerned with the discovery of adaptation mechanisms and measures for enhancing the organism's resistance to unfavorable agents (physical training, drugs, etc.). Non-specific increase in resistance via non-specific adaptation mechanisms were obtained after administration of Dibazol, "Zhen'shen", Eleutherococcus, vitamin B_{12}, ascorbic acid, Proserine, eserine, or cortisone. Various experiments were reported where these agents alone or in combination raised the tolerance to hypoxia, hypothermia, hyperthermia, and acceleration in the animal organism. A number of reports dealt with increased resistance resulting from regular exposure to hypoxia. Preliminary adaptation of rats to hypoxia increased their resistance to hypothermia, burn sequelae, and hyperthermia. Hemispherectomy affected hypoxia tolerance differentially in rats and dogs. Other reports described research on the organism's adaptation to ambient heat or cold, the importance of muscular work in increasing non-specific resistance, research on fatigue, development of resistance to drugs by cancer cells, and neural adaptation. (Aerospace Medicine 33(11):1396, Nov. 1962)

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Zimkin, N. V. 1961 CONFERENCE ON THE PROBLEM OF ADAPTATION, TRAINING AND OTHER METHODS OF RAISING BODILY RESISTANCE, STALINO, JAN. 61. (Trans. of Fiziologicheskii Zhurnal (USSR) 47(7):934-937, 1961.) (Office of Technical Services, Washington, D.C.) 62-15380

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Zimmer, H. 1960 TECHNICAL REVIEW OF BIOSCIENCES RESEARCH (Georgetown U. Hospital, Washington, D.C.) Project 9778(805), Contract AF 49(638)-187; AFOSR, DLS

ABSTRACT: The purpose of this research is to assemble and administer review committees consisting of distinguished scientists in the biosciences area for the purpose of providing critical reviews and guidance for the biosciences research program. Special teams will be provided for the preparation of reports and materials on special subjects of importance to the biosciences research program specifically, and to the Air Force at large as required. A vehicle and personnel for the review of research proposals submitted to the biosciences program will be provided to insure the ablest evaluation of such proposals.

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Zimmerman, and Putnam 1947 RELATION BETWEEN ELECTROENCEPHALOGRAPHIC AND HISTOLOGIC CHANGES FOLLOWING APPLICATIONS OF GRADED FORCE TO CORTEX Arch. Neurol. Psychiat. 57:521-546

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Zimmerman, W. S., A. A. Canfield, & R. C. Wilson 1948 THE EFFECT OF INCREASED POSITIVE RADIAL ACCELERATION OR G, UPON HUMAN ABILITIES. PART I: SPATIAL ORIENTATION ABILITY. (University of Southern California, Los Angeles, Calif.) Contract N6ori77, Task Order III; ASTIA ATI-52525; 15 June 1948

ABSTRACT: The effects were investigated of various levels of radial acceleration or positive G on human spatial orientation ability. Subjects wearing anti-G suits were tested at G levels of one, two, three, four, and five G by means of the human centrifuge and analyses were made of the difficulty of the six possible response movements. No observable effect of increased G was found in the performance of the task, either on speed, accuracy, or total performance, and no individual variations were observed. It was concluded that a pilot, equipped with a type Z-2 G suit has no impairment of his spatial orientation ability when exposed to as much as 5 G for a period of 15 seconds. (CADO)

SUMMARY: 1) This study is devoted to appraisal of the effects of various levels of radial acceleration or positive G on spatial orientation ability. It is one of a series of psychological experiments designed to investigate the effects of variation of G upon independent measurable human abilities, called factors. 2) The factorial viewpoint was adopted, on the assumption that such an approach should yield the most economical and meaningful results. 3) The abilities under investigation are those which were found to be most valid for predicting success in pilot training during World War II. 4) A study of the effects of positive G on spatial orientation ability was undertaken first. The results of this investigation are presented in this report. 5) A test to measure this spatial orientation ability was devised and apparatus suitable for presenting the test on the human centrifuge was constructed. 6) The test was administered to subjects at one, two, three, four and five G. Subjects wore anti-G suits, type Z-2, during all the test periods. At 15 sec. run at each of the G levels was given at each day's testing session for each individual. This procedure was repeated on five different days with counterbalanced G order and rearrangement of test items. Twenty-one subjects completed the series of trials. 7) Analysis of the data obtained reveals no evidence that spatial orientation ability, as measured, was affected by increased G produced by radial acceleration on the human centrifuge. No significant differences were found between scores made at the five different G levels. 8) It is recommended that the outlined series of psychological studies be continued, to map as completely as possible the effects of increased G forces upon human abilities. (AUTHOR)

6,190

Zimmerman, R.H. & C.D. Jones 1962 FLIGHT ENVIRONMENT DESIGN PARAMETERS FOR MARS AND VENUS (Ohio State U. Research Foundation, Columbus, Ohio) Contract AF 33(616)5914: Proj. 6146; ASD TDR 62-805, ASTIA AD-288 538

ABSTRACT: The physical characteristics of the planets Mars and Venus are assessed and probable quantitative limits are defined as minimum, representative and maximum probable values for application to environmental studied and equipment design. These data are applied to Chapman s generalized analysis for bodies entering plaetary atmospheres to proflight environment design parameters. These planetary parameters are applied with body and trajectory parameters, using Chapman's analysis, to selected direct, multipass and graze entries. (AUTHOR)

6,191

Ziskind, M.M. & O. Creech Mar. 1961 STUDIES OF RESPIRATORY FUNCTION FOLLOWING THORACIC AND THORACO-ABDOMINAL INJURIES: 1) Pulmonary compliance, 2) Alveolar ventilation, 3) Inspired gas distribution. ASTIA AD 253 498. (Cont. no. DA-49-007-MD-796)

Summary(a): A large mobile equipment cart especially designed for bedside studies has been assembled. The cart carries a spirometer integrated with apparatus for the determination of residual volume, inspired air distribution, pulmonary compliance and airway resistance. The cart and the apparatus are described in detail in the report.

With the modified apparatus 29 subjects including normals, medical patients and traumatic chest and thoracic surgical patiants have been studied; the results are tabulated in the report. The value of the individual tests for the investigation of acute chest injuries has been considered. Minute ventilation, tidal volume, nitrogen washout (single breath) curves, airway resistance measurements, and arterial oxygen saturation and carbon dioxide tension determinations are the most reliable and instructive procedures for the patient who is acutely ill and whose cooperation is limited. The complicated methods which measure pulmonary diffusing capacity and compliance require a steady-state and full cooperation and are suitable only after the clinical situation has been stabilized. They are then valuable aids for studying recovery of function and response to treatment.

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Zjurin, I. 1940 AERIAL SICKNESS AND THE INSULIN TEST AFTER LONDON (Russisch) (Arch. biol. Nauk 60, Nr1, 41-45 u. engl. Zusammenfassung 45 Ref. Luftfahrtmed. 5, 301)

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(Arch. biol. Nauk 60: 37-40 Ref. Luftfahrtmed. 5, 205)

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Zuckerman, S. 1939 EFFECTS OF DIRECT CONCUSSION ON MONKEYS IN UNDERGROUND SHELTERS. (Research and Ex. Branch, Min. Home Security) RC 65, December 1939

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Zuckerman, S. 1940 EXPERIMENTAL STUDY OF BLAST INJURIES TO LUNGS.
Lancet 2:219, 238 Aug. 1940.

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Zuckerman, S. 1940 FIRST REPORT OF INVESTIGATION OF EFFECT OF BLAST ON ANIMALS. (Report, Research and Exp. Branch, Min. of Home Security) June 1940

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Zuckerman, S. and A.N. Black 1940 THE EFFECT OF IMPACTS ON THE HEAD AND BACK OF MONKEYS
(Ministry of Home Security, Research and Experiments Dept.) August 1940
R.C. 124

ABSTRACT: Signs of concussion do not develop in monkeys which are tied (either with their heads free or with their heads fixed) to a freely swinging plate that is set into motion with an initial velocity of up to 10 ft./ sec.

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Zuckerman, S. 1940 EXPERIMENTAL STUDY OF BLAST INJURIES TO LUNGS
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Zuckerman ,S. 1940 BRIEF REPORT BY PROFESSOR S. ZUCKERMAN OF EXPERIMENTAL WORK ON THE PHYSIOLOGICAL EFFECTS OF BLAST, CARRIED OUT BY THE RESEARCH AND EXPERIMENTS BRANCH, MINISTRY OF HOME SECURITY. (Ministry Home Security, Research & Exper. Dept.) RC 108, June 1940

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Zuckerman, S. 1941 THE PROBLEM OF BLAST INJURIES Proc. Roy. Soc. Med., XXXIV: 171-188.

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Zuckerman, S. 1941 OBSERVATIONS ON SO-CALLED BLAST CEREBRAL-CONCUSSION. (Report, Comm. Weapons) MPRC-BPC 147/WS 12, 20 Nov. 1941

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Zuidema, G.D., S.I. Cohen, A.J. Silverman & M.B. Riley 1956 HUMAN TOLERANCE TO PROLONGED ACCELERATION (Aero Med. Lab., WADC, Wright-Patterson AFBase, Ohio) Tech. Rept. No. WADC TR-56-406, Oct. 56
Also J. Aviat. Me. 27:469-481, Dec. 1956

ABSTRACT:Subjects whose blackout level had been determined while wearing the standard USAF anti-g suit were subjected to a series of nine runs distributed in random order, but consisting of three runs at 2.5 g for 115 secs.each, three 4 g. runs for 80 secs. each, and three runs at a g level 0.5 below individual blackout levels. Physiological and psychological determinations indicated: (1) dimming of vision occurred late in the higher g runs of all subjects despite the fact that they were protected by anti-g suits and running at 0.4 g below their pre-determined blackout level. (2) Blood pressures at the heart level showed graded increases both insystolic and diastolic components under increasing g; pulse pressure remained relatively constant,(3) Four of five subjects showed cardiac arrhythmias at high g levels.(4) High g loads produced excessive central nervous system excitability as reflected in skin resistance measures. And (5) the higher levels of sustained g in this experiment approach man's physiological and psychological limits of tolerance(AUTHOR).

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Zuidema, G. D., S. I. Cohen, A. J. Silverman and M. B. Riley 1956 HUMAN TOLERANCE TO PROLONGED ACCELERATION. J. Aviat. Med. 27:(6)469-481 Dec 1956
See also (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 56-406; ASTIA AD-97 156, Oct. 1956

ABSTRACT: Human tolerance to prolonged positive acceleration has been evaluated on the human centrifuge. Central nervous system and cardiovascular decompensation were found to occur almost simultaneously at high g levels. A high incidence of cardiac arrhythmias was seen, and this may well be the limiting factor of the future use of high g levels sustained for approximately 60 seconds.

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Zuidema, G. D., & R. Edelberg 1956 A DEVICE FOR THE INDIRECT RECORDING OF BLOOD PRESSURE. PART II. RESEARCH USES. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TN 55 427, Pt. 2; ASTIA AD-110 576; Dec.1956

ABSTRACT: Four modifications of a previously reported indirect blood pressure recorder are presented. These consist of four variations in the pulse-sensing unit and include: a strain gauge mounted over the brachial artery; a one-piece unit consisting of a fluid-filled rubber balloon and tubing connecting it to a pressure transducer; use of the Gauer miniature manometer; or application of a very simple carbon microphone. Their use in the high altitude-low pressure chambers, the human centrifuge, and psychophysiological test situations is described. (AML)

6,205

Zuidema, G. D., S. I. Cohen, & A. J. Silverman July 1958 CLINICAL EVALUATION OF LOW G TOLERANCE. WADC TN 57-268 ASTIA AD 130 918
NOTE: CARI P&S 2.14

ABSTRACT: Twelve student pilots were referred to this laboratory for evaluation of their g tolerance, following inflight blackout episodes. The patients were studied by a team using cardiovascular, neurohormonal, bioelectric, psychologic, and psychiatric techniques. Results showed that the patients could be divided into 4 groups: (1) 6 patients had no demonstrable physiological or psychological difficulties; (2) 2 subjects had been incorrectly performing protective maneuvers; (3) 2 patients had inadequate vasomotor reflexes; and (4) 2 subjects had psychologic characteristics thought to be important determinants of lowered acceleration tolerance. The relationship of cardiovascular and psychophysiological factors in tolerance to g forces is illustrated. (AUTHOR)

6,206

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Zuidema, G. D. 1961 CLINICAL EVALUATION OF LOW G TOLERANCE. (In Gauer, O.H. and G. D. Zuidema, Gravitational Stress in Aerospace Medicine) (Boston: Little, Brown, and Co., 1961). pp. 224-237.

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Zweifach, B. W., & L. Thomas 1957 THE RELATIONSHIP BETWEEN THE VASCULAR MANIFESTATIONS OF SHOCK PRODUCED BY ENDOTOXIN, TRAUMA, AND HEMORRHAGE. I. Certain Similarities between the Reactions in Normal and Endotoxin-Tolerant Rats. J. Exptl. Med. 106:385-402

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Zweifach, B. W. 1960 THE CONTRIBUTION OF THE RETICULO-ENDOTHELIAL SYSTEM TO THE DEVELOPMENT OF TOLERANCES TO EXPERIMENTAL SHOCK. Ann. N.Y. Acad. Sciences 88:203-212

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Zwerling, I., 1949. A NOTE ON WENDT'S VIEWS OF THE IMPORTANCE OF PSYCHOLOGICAL FACTORS IN MOTION SICKNESS. J. Aviat. Med. 20(1):68-72.

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Zybulski, N. 1878 UEBER DEN EINFLUSS DER KÖRPERSTELLUNG AUF DEN BLUTDRUCK UND DEN PULS (Concerning the Influence of the Posture Upon the Blood Pressure and the Pulse.)
Medizinische Wochenschrift (St. Petersburg) #11; 1878.

ACCELERATION

ANONYMOUS

6,213

Anon. n.d. ABSTRACTS OF PAPERS PRESENTED AT THE SYMPOSIUM ON THE UNEXPLAINED AIRCRAFT ACCIDENT (Tenth Meeting of the AGARD Aeromedical Panel, Paris,France)

6,214

Anon. n.d. ACCELERATION PROBLEMS IN SPACE FLIGHT. (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA 5909.

6,215

Anon. n.d. STATIC AND DYNAMIC TESTS OF A TYPICAL TRANSPORT PILOT'S SEAT INSTALLATION FOR A 40 G CONDITION. (Naval Air Material Center, Philadelphia, Pa.) Rept. No. ASL NAM 24102, Part II and Part I.

6,216

Anon. n.d. THEORETICAL COURSE FOR THE USE OF CANDIDATES FOR THE PRELIMINARY PROFICIENCY CERTIFICATE IN PARACHUTING (French Ministry of Public Works and Transport) R.A.E. Transl. No. 416

6,217

Anon. n.d. VTOROY SOVETSKIY KOSMICHESKIY KORABL' (The Second Soviet Cosmic Ship) Izvestiya, No. 212, 6 Sept. 1960.

6,218

Anon. 1910 AEROPLANE ACCIDENTS: Record Breaking and Its Consequences. Sci. Amer. Suppl. 70:355

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Anon. 1910 AEROPLANE ACCIDENTS: What they teach the designer Sci. Amer. Suppl. 70:212

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Anon. 1911 AIR SICKNESS AND AVIATION ACCIDENTS. Sci. Amer., 104:570-571

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Anon. 1911 RECENT FATAL ACCIDENTS WITH MONOPLANE. Sci. Amer. 104:108

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Anon. 1911 THE TRAGIC END OF MOISANT AND HOXSEY. Sci. Amer. 104:43

6,223

Anon. 1912 PARACHUTE JUMP FROM AEROPLANE IS SUCCESSFUL Aero. J. 3:453.

6,224

Anon. 1913 TURNING SOMERSAULTS WITH AN AEROPLANE: The Remarkable Exploit of Adolphe Pegoud. Sci Amer. 109:240

6,225

Anon. 1928 PHYSIOLOGY OF FLYING. Literary Dig., 99 (2):84-85

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Anon. 1929 THE PROBLEM OF AIR SICKNESS. Air Commerce Bull, 1(10):6

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Anon. 1930 THE PROBLEM OF AIR SICKNESS. Sci. Amer, 142:70

6,228

Anon. 1931 ACCELERATION OF THE HUMAN BODY. Astronautics (2):5 Mar. - Apr. 1931

6,229

Anon. 1934 A NOTE ON BLIND FLYING ISSUED BY THE AERONAUTICS BRANCH, DEPARTMENT OF COMMERCE. J. Aviation Med. 5(1):26-27

ABSTRACT: It has been determined that if a pilot sits in a normal manner with head erect and facing forward he is subject to slight, if any, false impressions of position or orientation. It has also been found that if his head is twisted or inclined sidewise he is immediately subjected to strong and entirely false impressions of position and orientation. This is commonly referred to as vertigo Vertigo is the sensation of movement after the body has stopped moving. It involves subjective sensations of disturbed relations with environment to some definite plane, vertical, horizontal or oblique . Vertigo occurs when the membranes in the semi-circular canal are strongly stimulated by rapid action of the fluid. (CARI)

6,230

Anon. 1937 BIBLIOGRAPHY OF AERONAUTICS, PART XI -MEDICINE (U.S. Works Progress Administration)

CONTENTS:

This bibliography was compiled from the index of aeronautics of the Institute of Aeronautical Sciences.

It is an extensive bibliography covering accidents, airsickness, airplane ambulances, carbon monoxide poisoning, cardiovascular system, ear, nose and throat, effects of altitude, effects of wind, cold and speed, eye fatigue and staleness, hygiene, nervous system, pathology, physical qualifications; psychological aspects, psycho-physiological aspects, sanitary aviation and general references.

6,231

anon. 1938 INFLUENCE OF FLYING ON THE CIRCULATION. J. Amer. Med. Ass. 110:2092-2093

ABSTRACT: Both the peripheral and the central circulation are greatly influenced by flying. The special demands made by flying are based on two factors, speed and altitude, which differ fundamentally in one respect: altitude influences the circulation directly through diminished oxygenation of the blood, whereas the effect of speed is vastly more indirect. The speed factor is based on centrifugal force, always present whenever the course of the aircraft is altered. The entire organism of the flier is exposed to the same centrifugal forces as the ship.

Since the blood volume is diminished, during exposure to centrifugal forces, blood in more or less considerable quantities is transported peripherad. Owing to the great capacity of the abdominal circulation and the centrifugal speed, which in flying usually exerts its influence distad, large quantities of blood will descend into the lower half of the body, with more or less complete emptying of the vessels of the upper half. Some vasomotor collapse will occur. It is generally assumed that the altitude influences the circulation indirectly through the lowering of the pressure of the oxygen in the atmosphere and by the inhibition of oxygenation in the pulmonary blood supply.

6,232

Anon. 1939 ANOTHER KIND OF BLACKOUT.
Lancet, 2:1125-1126

ABSTRACT: High speed flying often results in transient blindness (blacking out or amaurosis fugax), brought about by sudden change of direction or when power diving.

Forces meeting the pilot in a straight anteroposterior or lateral direction while in flight do not have the same results as when accelerating in a curved path. Here the body may be subjected to a centrifugal force with the head inward, or less frequently outward. A force of more than 5 g. causes diminution, or loss of vision, rapidly followed by loss of consciousness. The changes are due to centrifugal removal of the blood from the brain.

The ability to withstand such stress depends on the power of the cardiovascular system to adjust itself to the forces encountered.

Whether blindness is due to retinal ischemia or vascular alterations in the visual pathway has not yet been determined; however, Livingston brought forward evidence against the theory the ischemia results from occlusion of the retinal arteries by positive intra-ocular pressure, since this is unchanged by centrifugal action. He believed that alterations take place in the neighborhood of the external geniculate bodies and the area striata.

6,233

Anon. 1939 GERMAN NOMENCLATURE FOR AERODYNAMICS
(D.I.N.L. 100 German Standards, German Air Ministry, Sept., 1939)
R.A.E. Translation No. 116

6,234

Anon. 1940-42 PHYSIOLOGY OF FLIGHT - HUMAN FACTORS IN THE OPERATION OF MILITARY AIRCRAFT, A COMPENDIUM OF LECTURES AND DEMONSTRATIONS GIVEN TO ARMY AIR FORCE PERSONNEL, 1940-42. (Aero-Medical Research Laboratory, Experimental Engineering Section, Materiel Center, Wright Field, Ohio)

6,235

Anon: 1941 PHENOMENON OF "BLACK-OUT,"
Canad. M.A.J., 43:271-273

ABSTRACT: In amaurosis fugax (blackout) the defect of vision varies from slight transient haze to complete temporary blindness.

Gravity (G) is produced, the period during which it is operating to its full extent, and the degree of susceptibility of the flier enter into production of

"blackout," which is attributed to intra-ocular compression of the central retinal artery and its branches. The status of the eye is only one part of the factors affecting the lower visual centers and the corticovisual areas. The retinal vessels are believed to collapse because the systolic pressure in the ophthalmic artery is markedly reduced under centrifugal action and the intra-ocular pressure of 20 mm. offers a resistance which cannot be overcome.

6,236

Anon. 1941 SOLVING RIDDLES OF AVIATION MEDICINE.
Canad. Aviation 14(8):21-23; 28, 53

6,237

Anon. 1942 BLAST INJURIES
J. A. M. A. 118(11):898-899, March 14, 1942.

ABSTRACT: In 1918 and 1919 D. R. Hooker made a study of blast injuries at the Sandy Hook Proving Ground. These studies led him to emphasize four points: The fatal effects of primary blasts occur in animals only relatively near the explosion, a difference of 2 or 3 feet often determining the question of life or death; there is a syndrome of primary shock characterized by collapse of the blood pressure in animals affected but not killed; there is an absence of petechial hemorrhages or other intracranial lesions in the brains of animals exhibiting primary shock; hemorrhagic lesions of the lungs and occasionally of other visceral organs are prevalent in animals subject to blast. The extent of the lung lesion bore little if any relation to the gravity of the symptoms of concussion.
In his report on experimental investigation carried out for the Research and Experiments Department of the Ministry of Home Security, S. Zuckerman detailed his studies on mice, rats, guinea pigs, rabbits, cats, monkeys and pigeons. Zuckerman concluded from these experiments that it is the pressure component of the blast wave which bruises the lungs by its impact on the body wall.

6 238

Anon. 1942 BLAST INJURIES
J. American Med. Assn. 120: 1398-1399, Dec. 26, 1942.

ABSTRACT: Experiments conducted by E. R. P. Williams showed that the maximum blast pressure that can be withstood without loss of efficiency is 2 1/2 pounds per square inch. Effects on the body of explosions, both in air and in water, are primarily due to the externally applied pressure wave, but in air both the windage factor and the after-suction waves play their part. Internal blast injuries without external marks are rare in William's experience, since he has seen only 4 such cases among 1,500 casualties. Authors agree that most blast injuries are multiple. They include concussion of the brain and spinal cord, injury to the lungs or the abdominal contents, rupture of the ear membrane and injury to the eye. Williams believes that the most important single measure in the treatment of patients with blast injuries of the lungs is continuous administration of oxygen.

6,239

Anon. 1943 COOPERATION IN DESIGN.
Sc. News Letter 43:92-93

ABSTRACT: Engineer and biologist must work together if men are to be successful in handling the formidable airplanes now possible.

Professor Bronk cites the "blackout" experienced by dive bombers in pulling out of steep, fast dives. The centrifugal effect of such sudden upswerves drains the blood away from the brain. The basic reason for this momentary unconsciousness is oxygen starvation on the part of the brain cells which never have more than a few seconds supply on hand.

6,240

Anon. 1943 YOUR BODY IN FLIGHT, AN ILLUSTRATED "BOOK OF KNOWLEDGE" FOR THE FLYER. (Aero Medical Lab. Engineering Division, Materiel Command, Wright field, Ohio)

6,241

Anon. 1945 ANTI-G SUIT FOR FIGHTER PILOTS
Flight 47(1881):37. Jan. 1945.

ABSTRACT: To protect pilots against effects of excessive "positive g" during violent maneuvers. A short note about experiments and some particulars added.

6,242

Anon. 1945 ANTI-G SUIT FOR FIGHTER PILOTS.
Flight and Aircraft Engineer, 47(1881):37, Jan. 1945

ABSTRACT: As early as 1945, Americans at Wright Field de veloped the Berger G 2 suit, consisting of 5 air cushions for the stomach, thigh and calves.

6,243

Anon. 1945 EFFECTS OF ACCELERATION ON MAN.
(Conference on Human Factors in the Design and Operation of Aircraft, Aero Medical Laboratory, Engineering Division, ATSC, 19, 20 Jan. 1945)

ABSTRACT: The pilot, sitting in the conventional position in an aircraft, is

subjected to increased positive "g" in pull-outs and banking turns and to negative "g" in outside turns and push-downs. Forces developed in both types of maneuvers can produce important effects on the flyer. This article discusses the symptoms and results of increased positive "g" on the pilot. It also surveys the results obtained from experiments on the centrifuge at Wright-Patterson Field.

6,244

Anon. 1945 THE G-SUIT: NOTES FROM THE AIR SURGEONS OFFICE. J. Aviation Med. 16:45-46

ABSTRACT: The earliest workable G suits were developed by the Canadian and the Australian air forces, followed closely by the U.S. Navy. The AAF, experimenting with the Navy suit, modified and adapted it after extensive tests on the centrifuge at the Aero Medical Lab., Wright Field, and evolved the present suit now standard for the AAF.

The G-3 suit consists of a series of 5 air bladders positioned over the soft tissue areas of the calves, thighs, belly. When inflated, the air bladders tense the inelastic cloth of the suit, exerting pressure upon the body to keep the blood from flowing downward rapidly and to force it back toward the heart.

The suit makes use of the "exhaust" compressed air from the aircraft's vacuum instrument pump connecting to the pump through a light-weight value which also supplies air pressure to the jettisonable gas tanks. This valve automatically inflates the suit in two seconds when the G force exceeds 2 G and empties it when the G force returns below two, giving the suit a pressure of 1 pound per square inch per G above 2 G. The flier needs only to plug the suit into the air line when he gets into the cockpit. The rest is automatic.

Although theoretically, the suit offers an extra tolerance of 1.9 G, fighter pilots wearing the suit have never reported a complete blackout, regardless of the violence of any combat maneuver experienced.

6,245

Anon. 1945 "RADIAL ACCELERATIVE FORCES IN THE GAF" MEDICAL INTELLIGENCE. The Air Surgeon's Bulletin. 2(11):411

ABSTRACT: " In an interview with a German University professor it was learned that work involving radial accelerative forces had been carried on in Berlin. Experiments were performed, first with animals and then with humans, in which forces up to 18g were recorded, presumably with the subjects in the prone position. The German Air Force apparently had no satisfactory method of coping with the effects of great accelerative forces on flyers. An anti-g suit obtained from a captured P-51 pilot was said to have been considered "inferior", but in the absence of any German device it was copied and put into production! " (CARI)

6,246

Anon. 1946 DECELERATOR FORCES PRINTS-DRAWINGS. (Cornell Aeronautical Lab, Buffalo, N.Y.) DA-R-223-001, DA-R-223-008, DA-G-223-015, DA-R-223-009, DA-R-223-013.

6,247

Anon. 1946 DESIGN DATA FOR PILOT EJECTION SEAT AND CATAPULT- APPENDIX 3 (Wright-Patterson Air Force Base, Ohio) M.R. TSEAC11-4534-7-2, Add. 1. 1 May 1946. ASTIA ATI 12725

ABSTRACT: This publication lists the specifications that must be met by the designer of the pilot ejection seat and catapult.

6,248

Anon. 1946 FOREIGN AIR TECHNICAL DOCUMENTS
Mechanical Engineering 68(7):651-652, July 1946

6,249

Anon. 1946 PHYSIOLOGICAL EFFECTS OF INTERMITTENT BLASTS, PERIODIC BLASTS, AND SUPERSONIC VIBRATIONS OF GREAT ENERGY (War Dept. Air Forces. Interrogation Rept.) TSEAA-660-99, February 28, 1946

6,250

Anon. 1947 AEROMEDICAL RESEARCH
Abstract: Bulletin of U.S. Army Medical Dept. 7(3):256-257, Mar. 1957.
NOTE: Reel 7, Flash 7, Item 7

ABSTRACT: Reviews future projects for aeromedical research necessary to solve the physiological problems caused by acceleration, deceleration, high speed escape, and intense temperatures. (CARI)

6,251

Anon. 1947 AVIATION MEDICINE
Abstract; Bulletin of U.S. Army Medical Dept. 7(7):627, July 1947.
NOTE: Reel 7, Flash 7, Item 8

ABSTRACT: Throughout the war, the Air Force, with Army Air Forces funds, conducted an extensive program of research in the field of aviation medicine. In 1944, they developed an oxygen mask which fitted the flyer and eliminated the

danger of freezing up. In that same year, they developed an electrically heated suit to prevent frostbite. Soon afterwards, a pneumatic anti-g suit was developed to protect the crews of planes from accelerative forces in the air. To protect crew members from long-range flak and 20-mm. shell fragments, a flak suit made of overlapping plates of manganese steel secured in pockets and worn as an apron or vest was developed. In 1943 an improved type of helmet was developed for flying personnel. (CARI)

6,252

Anon. 1947 THE BELL XS-1
Abstract: Bulletin of U.S. Army Medical Dept. 7(1):41-42, Jan. 1947.
NOTE: Reel 7, Flash 7, Item 6

ABSTRACT: The Army Air Forces' first rocket-propelled airplane, the Bell XS-1 made its first powered flight at Muroc Flight Test Base, Calif., in Dec. Designed to fly at a top speed of 1,700 mph at an altitude of 80,000 ft., the XS-1 was never intended to be a military airplane. It is actually a piloted flying research laboratory, the sole function of which will be the recording of data on the effect of transonic and supersonic speeds on an aircraft. These data will be used in the development of faster and safer planes. The XS-1 has already flown--but not at supersonic speeds and not under its own power. It has been carried to altitude by a B-29 again as a towcraft. Released at altitude, the XS-1 will then be subjected to its rocket power. It has an extremely rugged airframe driven by a powerful rocket engine. Since it is not a combat plane, it has no armament or armor protection for the pilot. Power for the XS-1 is supplied by an engine which consists of 4 units, burning alcohol and liquid oxygen, each of which produces a static thrust of 1,500 lbs., or a total thrust output of 6,000 lbs. Power output is controlled by selection of the number of cylinders to be fired at one time. Thus, the pilot can use 1,500, 3,00, 4,500 or full 6,000 lbs. thrust at his choice. Its range will be extremely short, being little more than 100 miles. While the XS-1 has been designed and constructed as the most rugged airframe ever built it is believed to be thoroughly capable of withstanding the stresses and strains to be imposed. The manufacturer's contract calls for demonstration of the following minimum performance requirements: First, an 8 'g' pullout, at an indicated air speed not exceeding 500 mph; an 8 'g' pullout at minimum speed; a proof of the specified endurance at rated thrust, and take-off and climb to 35,000 ft. under its own power. Finally it must respond satisfactorily to controls at a speed of 0.8 the speed of sound. When transonic speeds are reached, the pilot will have more than the conventional controls to assist him in flight, inasmuch as he can change the horizontal stabilizer setting in flight by means of a powerful actuator. Since this might be hazardous at high speeds, because of the vibrations set up, flutter dampeners have been designed to minimize the danger from this source. Heat caused by friction, sufficient to melt glass, is expected if the Army Air Forces' Bell XS-1 supersonic plane flies at a speed near its designed ultimate of 1,700 mph. Before an attempt is made to push the plane thru and beyond the supersonic barrier, a new windshield will be installed. The present one will suffice in the initial powered experiments at Muroc, since plans for the first test series call for speeds only up to about 600 mph. Beyond that, the temperature, due to friction caused by the on-rush of air against the fuselage of the speeding plane, is expected to rise to such a degree that the present windshield will melt. A new one is being designed for replacement with glass having a much higher melting point.

6,253

Anon. 1948 CRASH DECELERATION, CRASH ENERGY, AND THEIR RELATIONSHIP TO CRASH INJURY.
(Crash Injury Research, Cornell University Medical College)

6,254

Anon. 1948 EXIT IN EXTREMIS
Flight 56:199-201, Aug. 1948.

6,255

Anon. 1948 LANDING IMPACT VIBRATION STUDIED
Aviation Week, 48:26-27

ABSTRACT: An extensive investigation of vibration of airplane structure as a result of landing impact is in progress at the National Bureau of Standards under the direction of Dr. Walter Ramberg. Craft of earlier and more rigid types were designed for landing condition by treating the airplane as a rigid body subjected to an impact force. Large transport planes designed on this assumption showed a tendency to develop failures in the wing or tail, which could be ascribed only to transient vibration of the structure excited by landing impact. A comparison showed that the values obtained from the theory were 15 to 140 per cent greater than the measured values. It was concluded from the tests that the theory would give a fair estimate for the transient vibration in an airplane subjected to symmetrical landing impact leading to flexural vibration of the wing. Measurements on actual landings of large transport airplanes have failed to substantiate this conclusion.

6,256

Anon. 1948 MAN GIRDS FOR SUPERSONIC ROLE
Aviation Week 49:21-4, Sept. 27, 1948.

6,257

Anon. 1948 MEASUREMENT OF THE LOADS REQUIRED TO BREAK COMMERCIAL AVIATION SAFETY BELTS AS AN INDICATION OF THE ABILITY OF THE HUMAN BODY TO WITHSTAND HIGH IMPACT FORCES. (Naval Medical Research Institute) Rept. No. 12.

6,258

Anon. 1948 PILOT SEAT AFFORDS QUICK 15G EJECTION
AVIATION WEEK, Oct. 18, 1948. P. 9

6,259

Anon. . . 1949 . . DESIGN CRASH PROTECTION INTO LIGHTPLANES
Aviation Week May 2, 1949

6,260

Anon. 1949 SYNOPSIS OF THE AERO MEDICAL ASPECTS OF JET PROPELLED AIRCRAFT (Aero Medical Lab., Air Materiel Command) January 1949. ASTIA ATI 56134

ABSTRACT: Brief reviews of recent developments and current practices are presented on the following subjects: requirements and equipment, decompression sickness, cabin pressurization, explosive decompression, long term positive and negative acceleration, pilot's pneumatic suit for positive acceleration, cockpit design and temperatures, flight instruments, psychological limitations, sound problems, the ejection seat, protective helmets, wind-blast protection, and vision. Future research will be concerned with protection under emergency conditions in a vacuum, etc.

6,261

Anon. 1950 TESTS SHOW BODY'S CRASH RESISTANCE
National Safety News 61(2):62-63.

ABSTRACT: Six Air Force volunteers riding in a rocket-propelled sled developed by the Air Force by Northrop Aircraft, Inc., are now duplicating airplane crashes in an effort to provide greater flying safety. The experiments are being conducted at Edwards Air Force Base, Muroc, Calif.

Tests were made in gradual increases up to 35 g, facing forward and backward on the sled. A 35-g deceleration is achieved by slowing the carriage and rider from 150 mph to 75 mph in 1/5 of a second.

Seated backward, with the seat back for support, the body can easily withstand 35 g. Seated forward, the volunteers must have a special seat harness consisting of web straps fastened across the lap, around each thigh, and over each sholder.

6,262

Anon. 1951 DRAWING - GERMAN DECELERATOR.
In Ruff, S., "Brief Acceleration: Less than 1 Second." In German Aviation Medicine WW II, I;584-597, April 1950. 11 August 1951.

6,263

Anon. 1951 ENFANTS TERRIBLES
Shell Aviation News 159:3, Sept. 1951

6,264

Anon. 1951 "8,000 LB. LOAD NO BOTHER TO HIM"
Aviation Week 55(22):41, 26 Nov. 1951.

(Ref. to Col. J.P. Stapp)

6,265

Anon. 1951 FITNESS FOR DUTY.
Flight, 59(2192):104-107 ; 25 Jan. 1951

ABSTRACT: Survey of the work of the R.A.F. Institute of Aviation Medicine at Farnborough from 1939 till now. On the improvements of ejector-seats, pressure cabins and air-conditioning, g-suits, pressure waistcoats, ventilated suits and other items of specialized clothing.

6,266

Anon. 1951 580 MPH IN AN OPEN COCKPIT
Am. Aviation 15(14):55, 1951.

ABSTRACT: At the Air Force Flight Test Center at Edwards, Calif., Northrop, Aircraft recently made test flights without a cockpit canopy on the F-89. The tests were made to determine: (1) Is there any effect on airplane handling characteristics? (2) Is the pilot subjected to enough discomfort to impair his control of the airplane? (3) Will the equipment in the cockpit withstand the limiting test speed? (4) What is the limiting speed at which the radar observer can eject himself? (5) How useful is the special Air Materiel Command Type P1-A helmet in extending the tolerable speed range?

The first test, 400 mph and under 6,000 feet, was made with a life-size dummy seated in the radar operator's seat. The only damage was tearing of the right shoulder of the dummy's flying suit.

Two flights were made by E.P. Hetzel, asst. chief of Northrop's experimental flight department. In the first he wore standard goggles and experienced bad visibility at 250 mph caused by air leakage around the goggles. Wearing the Type P1-A helmet with two-position visor for eye protection, he experienced no obstructions to vision at 335 mph at 6,000 feet.
The fourth flight was made with the dummy at 580 mph. The helmet, oxygen mask and the left shoulder of the flight suit were pulled off at 540 mph.

The fifth flight, at 520 mph, was made by Maj. John Stapp, wearing a P1-A helmet. He suffered no injury and could maintain all faculties during flight.

Northrop's report said the tests proved that crew members can operate ejection seat systems to escape in emergencies at speeds above 500 mph. The plane's handling characteristics were not markedly affected by absence of the canopy and the pilot was not subject to appreciable discomfort. Cockpit equipment was structurally sound to 575 mph. (J. Aviation Med. 23(1): 87-88, Feb. 1952)

6,267

Anon. 1951 46.6 G'S---FROM 120 MILES AN HOUR TO ZERO IN 19 FEET
Tech. Data Digest 16:2-3, Oct. 1951

6,268

Anon. 1951 IMPROVED PILOT SHOULDER HARNESSES WITHSTAND 38, 6 G CRASHES.
Techn. Data Digest, 16:8 Jan. 1951

ABSTRACT: Designed to provide better protection in case of a crash, the new Air Force shoulder harness features increased strength of webbing and better distribution of forces to the strongest parts of the human body. The latter is accomplished by an inverted "V" crossing the pilot's thighs, which thus absorbs some of the pressure across the upper abdomen encountered with the old harness.

6,269

Anon. 1951 MEDICAL OFFICER SUBJECTS SELF TO EXTREME GRAVITY PULL
Martin Star 10:7, Nov. 1951

6,270

Anon. 1951 PROBLEMS OF PILOT EJECTION
The Aeroplane, 80(2071):378-379. March 30, 1951.

ABSTRACT: Summary of lecture before Roy. Aero. Soc. on physiological aspects, trajectory and control problems of ejection-seats, which requirements are to be fulfilled.

6,271

Anon. 1951 PRONE PILOT LAB.
Aviation Week 55(23):9, 3 Dec. 1951.

ABSTRACT: Picture of the Reid and Sigrist R. S. 4 being used by the Royal Aircraft Establishment, Farnborough, for testing prone pilot cockpit layouts. For safety, another pilot is carried in the normal cockpit.

6,272

Anon. 1951 RECENT STUDIES ON THE TREATMENT OF MOTION SICKNESS. Ann. Int. Med. 35:1383-1389, Dec. 1951.

ABSTRACT: This editorial describes the satisfactory results obtained by the drug Dramamine in the treatment of motion sickness. Dramamine is a combination of two well known compounds, Benadryl and a simple derivative of theophylline. In one experiment, it was found that the best combination of drugs in the prevention of motion sickness was Benadryl and hyoscine. The use of Dramamine is not limited to the control and prevention of motion sickness alone. A number of reports give promise that Dramamine may prove a merciful salvation in many conditions characterized by nausea and vomiting. The drug has also been claimed to relieve the distressful syndrome of radiation sickness, to reduce the incidence of vomiting following the fenestration operation, and following anesthesia for other surgical purposes. It has been demonstrated that Dramamine raises the threshold of effective vestibular stimulation to the microcaloric test and to the galvanic stimulation.

6,273

Anon. 1951 REPORT AND SERVICING MEMORANDUM FOR SAAB EJECTION SEAT (Svenska Aeroplan Aktiebolaget, Linkoping) Reference UM-29-9.04: R1. (1951) R.A.E. Translation No. 370 ASTIA AD 26 614

6,274

Anon. 1951 TESTS SHOW AIRSICKNESS CAN BE STOPPED American Aviation 15:26, 6 Aug. 1951

6,275

Anon. 1951 TESTS SHOW BAILOUTS FEASIBLE AT HIGH SPEEDS Tech. Data Digest 16:3, Oct. 1951

6,276

Anon. 1952 AIRCRAFT TYPE 29. EJECTIONS BY CATAPULT SEAT. (Air Technical Intelligence Center, Wright-Patterson AFB, Ohio) ATIC-235370. Translation no. F-TS-8748/III. ASTIA AD 153 353

ABSTRACT: The author describes the circumstances leading up to an ejection and the procedures used during several ejections. He also describes the injuries to personnel as a result of ejection.

6,277

Anon. 1952 THE G VERSUS YOU AND YOUR AIRPLANE
Flying Safety 8(3):18-20

ABSTRACT: The physiological and psychological effects of ultrasonic speeds and high g forces on the pilot are briefly reviewed. The study is primarily concerned with structural and resistance factors of the airplane.

6,278

Anon. 1952 THE HUMAN CENTRIFUGE
Mil. Surgeon 110:375, May 1952.

ABSTRACT: The Human Centrifuge at the Acceleration Laboratory, Naval School of Aviation Medicine, Pensacola, Florida recently completed its 10,000 th run since records were begun in August 1948.

The ten thousand runs have involved studies on and training of 613 men and 4 women, ranging in age from 2 to 56 years. The highest "G" level obtained has been 13.0, that is, thirteen times the force of gravity, and the longest run, ten minutes. The greatest number of runs by any one person has been 386, this extremely high number being accumulated by one of the research workers.

6,279

Anon. 1952 INVESTIGATION OF ACCIDENTS
Interavia, Geneva, 7:197-200, April 1952

6,280

Anon. 1952 MOTION SICKNESS PREVENTION
J. A. M. A. 148:1524, April 26, 1952

ABSTRACT: Further data suggesting that scopolamine (hyoscine) hydrobromide is the most effective motion-sickness remedy are presented by Glaser and Hervey (Lancet, 1:490 [March 8] 1952). The experiments were carried out in a large swimming bath with artificial waves; the subjects were 150 soldiers. The preparations used were: 1-scopolamine hydrobromide, 1 mg.; promethazine (N-[2-dimethylamino-n-propyl] phenthiazine hydrochloride) hydrochloride, 35 mg.; scopolamine hydrobromide, 1 mg., with promethazine hydrochloride, 25 mg.; scopolamine hydrobromide 0.65 mg., with promethazine hydrochloride, 15 mg., and mannitol hexanitrate, 50 mg.; and lactose (control). All the preparations containing scopolamine were more effective than promethazine, 35 mg., and 35 mg. of promethazine was no more effective than 25 mg., which was the dose that

had been used in a previous experiment. The straight comparison between scopolamine hydrobromide, 1 mg. and promethazine, 35 mg., showed that the former protected 92% of 98 men against vomiting and 81% against vomiting and nausea, compared with 64% and 53%, respectively, of 99 men given promethazine. The authors conclude "Except for pethidine, all the likely remedies have been investigated during the last eight years in this country and in North America. No further improvements can be expected except by accident or by a systematic study of basic principles."

6,281

Anon. 1952 NEW CAPSULE FOR HIGHSPEED BAILOUT
Aviation Week 57(4):36. July 28, 1952.

ABSTRACT: A new escape capsule developed by Douglas Aircraft Co. is discussed The capsule is expelled clear of the speeding plane by a rocket charge and is stabilized in flight by three rear fins. Forward speed is first slowed by a small auxiliary chute decelerating from 1,100 to 300 feet per second in about 5 seconds, then, at a safe speed, the main chute opens. The capsule is sealed and pressurized for use in atmospheric conditions above 50,000 ft. Fresh air is fed in "by wave motion". Survival gear similar to that carried in Navy life rafts is supplied. A test run under simulated conditions was tolerated well and without discomfort by the test subject.

6,282

Anon. 1952 ROCKET SENDS MAMMALS UP 200,000 FEET
J. Amer. Med. Assoc. 150(9):948, Nov. 1, 1952

ABSTRACT: Monkeys and mice fired in a rocket to an altitude of about 200,000 feet returned unharmed to the ground. They withstood an initial acceleration of about 15 g lasting less than one second and a subsequent acceleration of 3-4 g, lasting 45 seconds. One mouse, placed in an empty container, appeared to have lost its sense of direction and orientation while floating in a gravity-free state. Another mouse, however, whose drum was provided with a shelf, was able to cling to it and command its body at will. The application to man of the findings from these animal experiments should be made with caution. Reports on pilot performance under subgravity conditions have indicated no adverse effects on the subjects' sense of orientation. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space Medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903; ASTIA AD-227 817; Feb. 1959)

6,283

Anon. 1952 A SELF-RELEASING SEAT-BELT. Flight, London 61:767, June 27, 1952

ABSTRACT: A coupling device for seat belts so designed as to open up automatically under excess g-loads (under crash conditions) is described. The inventor, Mr. J.R. Stuge Whiting of Great Britain, has applied for patent protection.

6,284

Anon. 1952 THEY'RE OFF. - THE MONKEYS AND THE MICE: PHYSIOLOGICAL RESEARCH ON ANIMALS LEADING TO HUMAN SPACE FLIGHT. Western Aviation 32(11):12

ABSTRACT: Two monkeys and two mice have survived a ride to an altitude of 200,000 feet in Aerobee and V-2 type rockets fired from Holloman Air Force Base at Alamagordo, New Mexico. The experiment was carried out by the U. S. Air Force Air Research and Development Command. The monkeys had been anesthetized to prevent them from interfering with the recording instruments. The mice were placed in two separate drums, one smooth on the inside, the other provided with a small shelf. An initial acceleration of 15 g for less than one second was followed by 3 to 4 g for about 45 seconds At the peak of the trajectory the animals were weightless. Films taken during the flight showed the 'floating' mouse in a state of complete disorientation and unable to coordinate its movements. The mouse in the drum provided with a shelf was able to hold on to it and command its body at will. A statement by Major Charles Yaeger on his reactions during near-zero-conditions (while following a ballistic trajectory) confirmed the fact that proper performance of the pilot is not impaired under such conditions. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space Medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903; ASTIA AD-227 817; Feb. 1959)

6,285

Anon. 1952 WORLD'S LARGEST CENTRIFUGE TESTS MEN AND EQUIPMENT Tele-Tech, 11 July, 1952 p. 42-43

ABSTRACT: The Naval Air Development Center at Johnsville, Pa., constructed the largest centrifuge for the purpose of testing how humans and communications and electronic equipment react to accelerations encountered in supersonic flight. The test subject is enclosed in a gimbal-mounted gondola and may be accelerated to 40 g (to speed of 180 m.p.h. at 48.6 r.p.m.) in 6.8 seconds. A television camera, equipment for taking X-ray motion pictures, and for registering respiration, heart rate, blood pressure, and heart and brain waves are incorporated in the gondola.

6,286

Anon. 1953 ANTI-G SUITS.
In Physiology of Flight (Department of the Air Force, Washington, D.C.) AF Manual 160-30, 1953.

6,287

Anon. 1953 COMPARISON OF ACCIDENTS IN U.S. SCHEDULED AIR CARRIER PASSENGER OPERATIONS, CALENDAR YEARS 1952-1951. (Civil Aeronautics Board, August 1953)

6,288

Anon. 1953 COMPARISON OF ACCIDENTS IN U.S. SCHEDULED AIR CARRIER PASSENGER OPERATIONS, 1st 3 Quarters 1952-1951. (Civil Aeronautics Board, June 1953)

6,289

Anon. 1953 COMPARISON OF ACCIDENTS IN U.S. SCHEDULED AIR CARRIER PASSENGER OPERATIONS, 1st 6 Months 1953-1952. (Civil Aeronautics Board, November 1953)

6,290

Anon. 1953 DONT BE A SORE-HEAD
Naval Aviation News, p. 1-5, April 1953.

ABSTRACT: Several aircraft accidents are described in which the helmet worn by the pilot saved him from death. The development of the helmet, worn by the U.S. marine pilots since 1948, is traced. Types of shocks the helmet must withstand are described, and the technique of lessening the destructive force of impact by allowing damage to the helmet is explained.

6,291

Anon. 1953 EJECTION SEAT DEVELOPMENT IN SWEDEN.
The Aeroplane, 85(2209):692-694 , Nov. 20, 1953

ABSTRACT: Some information is given about the ejector seats developed by S.A.A.B. in Sweden.
The first dummy ejection was made by S.A.A.B. as early as January 1942 to test their model I ejection seat. A description of this seat is given in the article

The Mark II is a special light weight seat (installed weight 70 LB) which is intended for installation in the Folland Gnat.
The ejection velocities are considerably lower than the British equivalents.
A drawing with installation dimensions is given.

6,292

Anon. 1953 N.A.C.A. REPORT OF CRASH DATA TO INDUSTRY.
Aviation Week 59(21):26-28, 30, 23 Nov. 1953.

6,293

Anon. 1953 RIDING THE RAILS
Flying Safety 9(7):8-9

ABSTRACT: A brief illustrated description is presented of an ejection seat designed for training purposes and tested at Frankfort Arsenal. The portable testing unit was developed to acquaint air personnel with the knowledge of the procedures required to free onself from the cockpit and to simulate the sensations experienced during ejection from an operational aircraft at high altitudes and speeds.

6,294

Anon. 1953 ROCKET FLIGHTS OF MAMMALS TO 200,000 FT.
J. British Interplanet. Soc. 12:6-9
NOTE: Reel 7, Flash 7, Item 1

ABSTRACT: An account of the V-2 and Aerobee missile flights from White Sands Proving Grounds under the senior project officer, Dr. J. P. Henry.

6,295

Anon. 1953 SAVE PILOTS IN CRASHES.
Sci. News Letter, 63(13):206

ABSTRACT: A description of a shoulder harness, seat belt, and gravity reel combination for low-level crashes is given. The safety device was developed by F.E. Weick, director of the Personal Aircraft Research Center at Texas A. and M. College, College Station, Texas.

6,296

Anon. 1953 TUMBLING TOO FAST DANGEROUS IN PLANE ESCAPE
Science News Letter 63(21):328

6,297

Anon. 1954 AVIATION MEDICAL LABORATORY OPENS
Canad. Aviation Toronto) 7 (3): 32, 34. March 1954.

ABSTRACT: The new Defense Research Medical Laboratories, which opened recently, has developed from a merger of the Medical Research Laboratories with the Royal Canadian Air Force Institute of Aviation Medicine. Its current location is at Downsview. Included are: the Personnel Research Section, the Aerophysiology team, the Applied Physiology Section, the Physiology-of-Cold Section, the Motion Sickness and Disorientation team, the Sonics Section, the Toxicology Section, and the Biostatics Section. Acceleration studies are particularly concerned with cardiovascular research on human and animal subjects. Gravity tolerance studies are being conducted with and without various types of g-suits. An electronic human centrifuge capable of producing forces up to 20 g is used. Recording equipment is incorporated in the machine for continuous recording. Clarification of decompression sickness symptoms is attempted with the aid of a Bell-type decompression chamber, simulating atmospheric conditions up to altitudes of 80,000 ft. The role of ascorbic acid in increasing cold tolerance is investigated. The Motion Sickness and Disorientation team has discovered a relation between the degree of head motion and individual susceptibility to nausea and is investigating further the precise direction and speed of head movements. The staff is assisted by a selected group of consultants in diverse fields.

6,298

Anon. 1954 FILM OF MONKEY AND MICE IN FREE FALL.
J. Brit. Interpl. Soc. 13:223-224

6,299

Anon. 1954 INJURIES IN AIR CARRIER ACCIDENTS IN TURBULENT AIR
Air Carrier Safety Bulletin, No. 39, 16 March 1954

6,300

Anon. (USAF) 1954
OPERATIONAL EXPERIENCE WITH EJECTION ESCAPE SYSTEMS FROM 1 JANUARY 1949 THROUGH 31 DECEMBER, 1954
(Directorate of Flight Safety Research, Norton Air Force Base, Calif.)
ASTIA AD 72 809

ABSTRACT: Current ejection escape systems provided a means for successful

escape from aircraft in a wide range and combination of airspeeds (up to 560 knots), altitudes sign and maintenance and greater familiarity with the operation of ejection escape equipment reduced fatalities from 27% in 1951 to 21% in 1954. Further reduction was believed obtainable by (1) better training of aircrew, maintenance, and inspection personnel; (2) better design, maintenance, and inspection of ejection escape systems; (3) providing all personnel using ejection seats with both automatic opening lap belts and automatic opening parachutes; and (4) expeditious retrofit of in-service aircraft with improvements which have been approved for ejection escape systems. (ASTIA)

6,301

Anon. 1954 SAFE TEST EJECTIONS MADE FROM 50 FEET.
Aviation Week 61(20):64.

6,302

Anon. 1954 SPACE FLIGHT PROBLEMS. IVth International Astronautical Congress, Zurich, 1953 (Biel-Bienne: Laubscher and Co., 1954)

6,303

Anon. 1955 AIR FORCE FLIGHT SURGEON ATTAINS SPEED OF 632 M.P.H. IN DECELERATION TESTS.
U. S. Armed Forces Medical J. 6(1):292.

ABSTRACT: Lieutenant Colonel John P. Stapp, USAF (MC), Chief of the Aeromedical Field Laboratory, Holloman Air Force Base, N. Mex., on 10 December reached a speed of 632 miles per hour while riding a rocket-propelled sled to reproduce exposure to windblast and slowdown effects experienced by air crewmen when escaping from aircraft at supersonic speeds. In previous experiments he had attained a speed of 421 miles per hour in the "abrupt deceleration vehicle," the technical designation of the sled.

Exerting a total force of 40,000 pounds thrust, the nine rockets propelled the sled to its top speed in five seconds. After the rockets burned out, it coasted for less than half a second before the brakes were applied and it was abruptly halted. During the test, Colonel Stapp withstood a deceleration force of 35 g and a wind pressure of more than two tons. With the exception of a plastic helmet and visor, he wore no special clothing during the test.

6,304

Anon. 1955 AIRCRAFT CRASH ACCELEROMETER
Engineer (London)200:305, 26 Aug. 1955

ABSTRACT: A description is given of an instrument designed by the N. P. L. for recording impact decelerations.

6,305

Anon. 1955 ANNUAL REPORT 4/1/54-3/31/55. (Automotive Crash Injury Research) Ann. Rept. 32.

6,306

Anon 1955 BRITON EJECTED Time 19 Sept. 1955

ABSTRACT: This article describes the first live test of the Martin-Boker Aircraft Company's low altitude ejection seat by test pilot, John Stuart Fifield on a little used air strip at Chalgrove, Oxfordshire. Fifield rode in the rear seat of a Meteor Jet with another pilot at the controls. At 157 mph, just before the wheels left the ground, Fifield ejected. "Fifty feet up, he separated from the seat and kept rising, when he reached 80 ft., two small parachuts pulled a big parachute out of its pack. The whole sequence, from ejection to landing, took six seconds." (CARI)
Includes photo of ejection (See also Time, 21 March 1955)

6,307

Anon 1955 COLONEL STAPP HITS 632 M.P.H IN DECELERATION EXPERIMENTS. J. Aviation. Med. 26(1):17.

ABSTRACT: Lieutenant Colonel John P. Stapp, USAF (MC), chief of the Aeromedical Field Laboratory, Holloman Air Force Base, New Mexico, established a new speed record of 632 miles per hour on December 10, 1954, in a rocket-propelled test sled in which he has been conducting experiments as his own subject for several years. A fellow of the Aero Medical Association, he received the 1952 John Jeffries Award of the Institute of the Aeronautical Sciences and numerous other citations for his contributions to increased safety in flight.

The test vehicle was a 2,000 pound sled mounted on rails and pushed by nine rockets which exerted a total force of 40,000 pounds thrust. The enormous force generated by the rockets accelerated the sled from a standing start to its top speed of 632 miles per hour in five seconds time and 2,800 feet distance. After

the rockets burned out the sled coasted for less than a half second and the actual braking to a stop took a fraction more than a second. During the test Colonel Stapp withstood a deceleration of 35 times gravity and a wind pressure of more than two tons. With the exception of a plastic helmet and a clear plastic visor to protect his face no special clothing was worn for the test.

In June, 1954, the Air Force announced that Colonel Stapp had attained a speed of 421 miles per hour during an earlier test run which was a part of a series of tests that led to his latest speed record.

6,308

Anon. 1955 DOUGLAS DESIGNS COMPACT LIGHTWEIGHT EJECTION SEAT. Avaition Age, 23(3):50-53 March 1955.

ABSTRACT: A new ejection seat has been designed for the A4D-1, which possesses a carrying skin. During ejection, the chair is automatically loosened from the pilot. He possesses no adjustable head or foot rest. The chair and the equipment of the pilot weighs over 50 lbs less than the comparable installation of the Douglas A2D-1 and F4D1 manufactured for 25 g force and a 40 G crash force. It withstood a delay of 60 g.

6,309

Anon. 1955 GEORGE SMITH'S PHENOMENAL ESCAPE.
See also: Coughlin, W.J. 1955

A manuscript, author unknown

6,310

Anon. 1955 MILITARY SPECIFICATION, SEAT EJECTION, AIRPLANE, DESIGN AND INSTALLATION OF. MIL-S-18471 (Aer), Feb. 1955.

6,311

Anon. 1955 NORTHROP DEMONSTRATION DECELERATOR. (Northrop Aircraft Inc.) Rept. No. NAI 55-831.

6,312

Anon. 1955 PROCEEDINGS OF THE VTH INTERNATIONAL ASTRONAUTICAL CONGRESS, INNSBRUCK, 1954 (Wien: Springer-Verlag, 1955)

6,313

Anon. 1955 PROJECT DETAILS OF TED ADC AE-1407, HUMAN PERFORMANCE LIMITATIONS IN AIRCRAFT CATAPULTING AND ARRESTING. (Bureau of Aeronautics letter, AE-14/36 of 17 Oct. 1955)

6,314

Anon. 1955 RESEARCH PROGRESS REPORT (Aviation Medical Acceleration L..., Naval Air Development Center, Johnsville, Pa.) 31 Dec. 1955, ASTIA AD-83 499

6,315

Anon. 1955 ROCKING, NOT TUMBLING, IS BAILOUT HAZARD. Av. Week 63(26):21-23 26 Dec. 1955

ABSTRACT: Dummy tests on sled mockup of Convair's F-102A give researchers new design data for advanced supersonic ejection system.

6,316

Anon. 1955 A STUDY OF CRASH INJURY PATTERNS AS RELATED TO TWO PERIODS OF VEHICULAR DESIGN. (Automotive Crash Injury Research)

6,317

Anon. 1956 ACCOMPLISHMENT SUMMARY OF AVIATION MEDICAL ACCELERATION LABORATORY. (Naval Air Development Ctr., Johnsville, Pa.) ASTIA AD-52476

6,318

Anon. 1956 AEROMEDICAL ASPECTS OF HIGH ALTITUDE HIGH SPEED FLIGHT Information Bulletin (Office of the Surgeon, Headquarters AMC) 1 Feb. 1956.

ABSTRACT: Aviation has made tremendous advances during the past few years. What the future holds in store remains to be seen but it does not seem too speculative to assume that within the next decade we can expect to witness military operations to altitudes of 100,000 feet, cabin altitude 37,000 feet, at speeds to 2000 miles per hour. It is upon such a premise that this paper which proposes to present a condensation of the available material relating to the aeromedical aspects of such flights is being prepared.

6,319

Anon. 1956 AIRCRAFT PASSENGER SEATS: SAFETY WITH ACCELERATION OF 9 G. Engineering (London) 181(4693):19- , Jan. 6, 1956

ABSTRACT: A new type of aircraft passenger seat is described designed to withstand an acceleration of 9 g, facing forward or aft. When forward facing, in an emergency landing, the back of seat, which is padded, will fold forward when struck behind.

6,320

Anon. 1956 ANNUAL REPORT (1955-56). (Automotive Crash Injury Research) Annual Rept. 20.

6,321

Anon. 1956 ARDC SLED TESTS EJECTION IMPACT FORCE. Aviation Week 65(24):81, 83.

6,322

Anon. 1956 EARTH SATELLITES AS RESEARCH VEHICLES (Proceedings of symposium at Franklin Institute, Philadelphia, 18 April 1956) J. of Franklin Inst. No. 2, June 1956

6,323

A non. 1956 EJECTION SEAT DEVELOPED FOR MACH 3 AFTER ARDC DECIDES ON CAPSULES. Aviation Week, 65 (15):72 , Oct. 1956

ABSTRACT: A supersonic escape ejection seat has been developed which is designed to permit safe escape limits exceeding 800 kts. at sea level and Mach 3 at altitude. The development comes in the face of a decision by Air Research and Development Command to require escape capsules incorporating protective and survival devices for all new aircraft with performance exceeding 600 knots IAS and 50,000 altitude.

6,324

Anon. 1956 EJECTION SEAT STUDY, 1949 - 1956. (Naval Aviation Safety Center, Norfolk, Va.) ASTIA AD 125 052

ABSTRACT: The increasing ejection rate per unit hours flown and an increasing number of these units flown indicated a steady mounting of the frequency of

ejections. There is a pronounced relationship between successful ejections and altitude. The relationship between altitude and successful ejection becomes apparent at 5000 feet and ejections become increasingly hazardous as the altitude decreases below this height. The mean altitude at which ejection occurs did not increase during the period. M + 0.70 is the beginning of the critically dangerous zone for ejections. In terms of indicated airspeed only, 400 kn is the beginning of the critically dangerous zone for ejections. Ejecting from the F9F, F7U and TV model aircraft is significantly more dangerous than ejecting from the F2H and FJ models. Ejections from the swept-wing F9F are no more dangerous than those from the straight wing F9F. Ejections are more dangerous than bailouts with present equipment. No relationship existed between altitude and injury in bailouts (as long as irreducible minimum is observed.) Successful bailouts may be made at lower altitudes than ejections with present equipment. No relationship existed between speed and injuries resulting from bailouts within the speed range in which bailouts are made. The mean speed in which bailouts are made is substantially slower than the mean speed at which ejections are made. Bailing out from the F4U model aircraft is significantly more dangerous than bailing out of AD and SNJ models. (ASTIA)

6,325

Anon. 1956 MEN IN SPACE.
Ryan Reporter 17:18-21, 32-34

ABSTRACT: A discussion of the problems to be solved if man is to survive in space flight.

6,326

Anon. 1956 PROCEEDINGS OF THE VII INTERNATIONAL ASTRONAUTICAL CONGRESS, ROME, 1956

6,327

Anon. 1956 PRONE-COCKPIT LAY OUT PROMOTES FATIGUE.
Aviation Week, 64(14):47-49

ABSTRACT: This article discusses a prone-cockpit layout developed by the Institute of Aviation, RAE, Farnborough, England which was recently used in a Gloster Meteor 8 test vehicle. Information is presented on load factor tolerance of the prone pilot, effectiveness of control, pilot fatigue, visibility, and pilot escape. Detailed descriptions of the pilot bed and escape mechanisms are also given.

6,328

Anon. 1956 SIMULTANEOUS MONORAIL AND PERSONNEL DELIVERY FROM C-119 AIRCRAFT (Continental Army Command Board No. 5, Fort Bragg, N.C.) 29 Aug. 1956 Proj. No. AB 355, ASTIA AD 108-128

ABSTRACT: Tests were conducted to determine the maximum speed at which standard type aerial delivery containers rigged with G-13 cargo parachutes on the monorail and personnel wearing T-10 parachutes may be safely delivered simultaneously from the C-119 airplane. Twenty-three drops were conducted with dummies delivered simultaneously with standard cargo containers of varying weights and dimensions at indicated air speeds (IAS) from 115 to 130 kn. Motion pictures and rapid sequence still photographs were taken and studied. As a result of these studies, simultaneous delivery of personnel and cargo was considered safe at IAS up to 130 kn provided the containers weighed 375 lb. or greater and the dimensions were 40 by 25 in. or smaller. Sixteen drops from the paratroop doors of combat-equipped personnel wearing T-10 parachute assemblies were conducted simultaneously with monorail delivery of standard type aerial delivery containers rigged with G-13 parachutes. This procedure was considered safe from C-119 airplanes flying at IAS up to 130 kn only when: the G-13 cargo parachute is utilized, container dimensions are 40 to 25 by 25 in. or smaller, container weights are 375 lb or greater, and containers are not dropped over personnel in the air or on the ground.

6,329

Anon. 1956 A STUDY OF THE CRASHES DURING LANDING OF TWO INSTRUMENTED F6F DRONE AIRCRAFT. (Human Factors Research, Inc., Los Angeles, Calif.) Technical Rept. No. 2 on "Measurement of Forces Affecting Human Bodies in Aircraft Accidents", Feb. 1956. ASTIA AD 93-352.

ABSTRACT: Research was undertaken for developing a method of recording deceleration forces in airplane crashes. Self-actuating accelerometers were mounted in the seats of two F6F drone aircraft prior to take off. Upon stimulation with a force of 8 g or more, the accelerometer starts and records the force patterns for 8 sec. Two airplanes which were crashed during landing struck the runway nose down at approximately the same angle. Results indicated that the method was feasible. Records showed that the application of g force varied with respect to time; successive peak g's occurred at a frequency of 35 to 45 c. Although both crashes were survivable crashes (cockpit area remained intact), the g forces were of such magnitude that a pilot would have been injured. The g forces which were recorded in the vertical and horizontal body axes were approximately equal (55.5 and 52g and 32.1 and 48 g, respectively). Seats and protective devices should be designed for absorbing repeated shocks and for withstanding high, short duration peak loads rather than only static loads.

6,330

Anon. 1956 A STUDY OF THE CRASHES OF FOUR INSTRUMENTED F6F DRONE AIRCRAFT (Human Factors Research, Inc., Los Angeles, Calif.) Technical Rept No. 3 on "Measurement of Forces Affecting Human Bodies in Aircraft Accidents," April 1956, ASTIA AD 93 351.

ABSTRACT: Accelerometer recordings were analyzed for 4 crashes. In 2 cases, the aircraft ran out of fuel and were crash landed on the desert, one with wheels up (no. 3) and the other with wheels down (no. 4). Of the other 2 crashes, one nonsurvivable crash into a mountain ridge (no. 5) occurred when aircraft control was lost, and one (no 6) occurred on takeoff. Results of crashes 3,4 and 6 showed that the forces in the vertical body axes exceeded those in the longitudinal axes; in crash 6, these forces approached human tolerance limits. The records of crash 3 indicated some evidence of an oscillatory application of crash forces. The records of crashes 3 and 4 showed that both the g forces which were developed and the damage to the aircraft were greater in the wheels-down crash.

6,331

Anon. 1956 TEXT-BOOK DITCHING.
Flight 69(2454):142-143. Feb. 1956.

ABSTRACT: The story of a night ditching in the Atlantic Ocean by an American Military Air Transport Service C-54 with two of four engines inoperative, a 42 kt cross-wind and a 12-15 ft swell.

6,332

Anon. 1957 ABSTRACTS OF SCIENTIFIC PAPERS TO BE PRESENTED AT THE SECOND EUROPEAN CONGRESS OF AVIATION MEDICINE IN STOCKHOLM.
Meddelanden fran flyg-och navalmedicinska namnden (Stockholm)
Congress Number 5-19

ABSTRACT: Abstracts are presented of reports dealing with acceleration, decompression, recompression, psycho-physiology, psychology, medical examination, and pilot selection contributed by a group of authors.

6,333

Anon. 1957 AIRCRAFT ACCIDENTS AS RELATED TO AIR FORCE HIAD REQUIREMENTS.
(Eng. Branch, Directorate of Flight Safety Research. Norton AFB.)
AFR 190-16

6,334

Anon. 1957 ANNUAL REPORT 4/1/56-3/31/57. (Automotive Crash Injury Research) Annual Rept. 31.

6,335

AFOSR and Convair 1957 ASTRONAUTICS SYMPOSIUM (San Diego: AFOSR and Convair, 1957)

ABSTRACT: The tape transcription of the summary session of 19 Feb 1957 in the astronautics symposium held at San Diego, 18-20 Feb 1957, under the joint sponsorship of AFOSR and the Convair Division of the General Dynamics Corp. Panel subjects and leaders were: "Re-entry," W.H. Dorrance; "Tracking and Communications," C.A. Potter; "Environment and Measurements," F.L. Whipple; "Propulsion," W. Bollay; "Orbits," P. Herget; "Human Factors," H. Strughold. The 43 papers read at this symposium were published under the title Vistas in Astronautics; First Annual Air Force Office of Scientific Research Astronautics Symposium, M. Alperin, M. Stern, and H. Wooster (eds), (London: Pergamon, 1958)

6,336

Anon. 1957 "Crash Safety" (Reprinted from Canadian Flight). MATS Flyer 4: 24-25.

6,337

Anon. 1957 EINE SCHLEUDER FUR BESCHLEUNIGUNGSUNTERSUCHUNGEN (A Centrifuge For Acceleration Investigation) Luftfahrttech. (Germany) pp. 38-39, Feb. 1957.

ABSTRACT: Centrifuges for high g experiments which have been built and put into operation in the D.V.L. Aviation Medicine Institute, Bonn. are discussed and described.

Translated in ONR Tech Memo 2-58, ASTIA AD 206 888L.

6,338

Anon. 1957 THE EJECTABLE SEAT OF THE MARTIN-BAKER MK4. Aviation Magazine, (238):24,25, 1 Nov. 1957.

ABSTRACT: A detailed description of the ejection seat of the Martin-Baker MK4 type is given in this article. The discharge mechanism and the ignition is described. Furthermore, the parachute and the opening of the head parachute are discussed. Several ties are fastened to the chair to prevent the legs from moving around during firing. The ignition is 83 ft/sec,the maximum acceleration 20 g. The chair is 40 kilo.

6,339

Anon. (U. S.Army) 1957-1959
FATAL ARMY HELICOPTER ACCIDENTS
(Army Board for Aviation Accident Research, Fort Rucker, Ala.)
Rept. no. HF 3-60 July, 1957- December,1959
ASTIA AD 246 719

ABSTRACT: Twenty-seven Army helicopter accidents involving fatalities were studied. Forty-four deaths occurred in these accidents during the period of July 1957-December 1959. The findings further indicate: (a) more than one-third of the fatalities occurred in survivable-type accidents; (b) head injuries and burns accounted for most of the deaths in survivable accidents; (c) approximately three-fourths (77%) of survivable accidents involved reconnaissance helicopters; and (d) more than one-half (59%) of reconnaissance helicopter accidents were survivable. These accounted for 75% of the fatalities in survivable accidents. It was concluded that: (a) utilization of protective helmet, safety belt, and shoulder harness will provide increased protection in survivable helicopter accidents once the crash-fire problem is overcome; and (b) helicopter accident fatalities can be reduced by insuring maximum indoctrination of personnel in the value of injury-preventing equipment, that all Army aircraft are equipped with proper restraint devices, and appropriate regulations governing use of injury-preventing equipment. (AUTHOR)

6,340

Anon. 1957 HEEDLESS HORSEPOWER.
In The Traveler's 1957 Book of Street and Highway Accident Data.

6,341

Anon. 1957 HOLLOMAN TRACK (Air Force Missile Development Center, Holloman Air Force Base, N. Mex.) Rept. no. AFMDC TR-57-1, Sep 1957, ASTIA AD-150 248

6,342

Anon. 1957 HUMAN TOLERANCE TO LINEAR DECELERATIONS. (La tolerance humaine aux decelerations lineaires) Force Aerienne, Service de Sante, Bulletin technique d' information (Bruxelles) 1957 Dec. :1

ABSTRACT: Four subjects attached by different types of harnesses to an ejectible sled fixed to a vehicle on a rail propelled by rockets were subjected to deceleration tests of 0.2-0.4 seconds. Using a conventional harness with two outer straps, V-inverted, and attached to the center of the abdomen and base of the foot, the body was able to tolerate 17 g. By adding an apparatus for stablizing the legs to the harness, 20 g was tolerated. If, instead of the conventional harness, a special retention vest with an apparatus for holding the legs, arms, and head was used, 25 g was tolerated.

6,343

Anon. 1957 MAN IN SPACE.
Brit. Med. J. (London), 2(5052):1041-1042, 2 Nov 1957.

ABSTRACT: The possibility of human space travel is discussed in general. The hazards and problems of space travel (confinement, acceleration, barometric pressure, radiations, meteorites, food, re-entry problems) and possible means of overcoming them are briefly considered.

6,344

Anon. 1957 PRELIMINARY REPORT ON NUMBER OF PERSONS INJURED, U.S., JULY-DECEMBER 1957 (Health Statistics, U.S. National Health Survey) Series B-3.

ABSTRACT: About 25 million persons (24,953,000) were injured during the last 6 months of 1957, according to data obtained by the U. S. National Health Survey in household interviews. This includes only persons who sustained injuries that caused them to restrict their usual activities for at least a day or injuries that were medically attended. Males accounted for 14.1 million of those injured and females for 10.8 million. Among those persons 60 percent had injuries that involved activity restriction, 80 percent had injuries that received medical attention, and 40 percent had injuries that involved both activity restriction and medical attendance.

6,345

Anon. 1957 PROCEEDINGS OF THE VITH INTERNATIONAL ASTRONAUTICAL CONGRESS, COPENHAGEN, 1955 (Copenhagen: Danish Astronautical Society, 1957)

6,346

Anon 1957 QUARTERLY SUMMARY OF AIRCRAFT ACCIDENTS, OCTOBER-DECEMBER 1957. Royal Canadian Air Force (Toronto), 15 Feb. 1958. ASTIA AD 304 014

6,347

Anon. 1957 TWO GROUND EJECTION SEATS TESTED IN LIVE AND DUMMY RUNS. Aviation Week, 67(11):88,89 16 Sept. 1957.

ABSTRACT: A series of 6 pictures illustrating the use of the Martin Baker Mark V ground level ejection seat, demonstrated by a pilot of the R.A.F. who ejected himself out of a Grumman F9F-8T with a speed of 120 kt on the runway.

6,348

Anon. 1957 VERTEBRAL INJURIES FROM EJECTION FORCES, (North American Aviation) Engineering Rept., Dec. 1957

6,349

Anon. 1958 AIR FORCE PLANS MANNED ORBIT FOR 1959. Aviation Week 68:26-27, April 7, 1958.

ABSTRACT: Gen. LeMay seeks funds to support ARDC program that would put primary emphasis on human factors.

6,350

Anon. 1958 AIRCRAFT DAMAGE STUDIES (New Mexico Inst. of Mining and Tech., Socorro.) 10 Dec 1958. AD 304 - 074.

6,351

Anon. 1958 ARMY AVIATION. (Army Aviation School, Fort Rucker, Ala.) 6 June 1958. AD-144 962

6,352

Anon. 1958 BANG! YOU'RE ALIVE! Air Clues, 13(3):66-73 Dec. 1958

ABSTRACT: This article traces the development of ejection seats. The name of the British firm of Martin-Baker is synonymous with ejection seat history and much help has been received from them in writing the article. The many changes in the design of the seats are not detailed and an outline only of the main events is given. The article contains many new facts, and a number of the photographs have not previously been published.

6,353

Anon. 1958 CHIMPANZEES PASS SPACE SPEED TEST. New York Times, 31 Jan. 1958.

6,354

Anon. 1958 MILITARY AIRCRAFT ACCIDENTS. U.S. News and World Report 45:28

6,355

Anon. 1958 MOUSE IN LIQUID SUIT SHOWS HOW MAN MAY SURVIVE STRESS OF GRAVITY IN SPACE TRIPS
Wall Street J. 8 Feb. 1958

6,356

Anon. 1958 NEKTERE SOUCASNE PROBLEMY LETECKEHO LEKARSTVI (SOME CONTEMPORARY PROBLEMS OF AVIATION MEDICINE)
(Praha: MNO, 1958). 40pp.

6,357

Anon. 1958 OUTWARD BOUND
Time 71(21):68-78, 26 May 1958.

ABSTRACT: A brief pictorial review of the psychophysiological factors that man must face during space flight.

6,358

Anon. 1958 PILOT PERFORMANCE AND TOLERANCE STUDIES OF ORBITAL RE-ENTRY ACCELERATION.
(U.S. Naval Air Develop. Ctr., Johnsville, Pa.) NADC AE-1412, Sept. 1958.

ABSTRACT: This report concerns a preliminary study of human tolerances to the reentry accelerations expected in most lift vehicles. The study was undertaken to ascertain whether a human subject could tolerate orbital reentry acceleration patterns associated with the National Advisory Committee for Aeronautics (NACA) manned Space capsule. The first phase of this study involved the expected reentry G time histories which NACA supplied to the Aviation Medical Acceleration Laboratory (AMAL). These were carried up to 12 G peak. The second phase of the study probed the area up to 20 G.

6,359

Anon. 1958
The New York Times, Feb. 10, p. 14

ABSTRACT: Description of a manned sphere, 10 ft. in diameter, which could be lifted to 100,000 feet altitude by balloon, then released, whereupon a rocket motor would boost it to 3400 mph, raising the sphere to 600,000 feet altitude. It would then begin a free-fall that would produce 2.5 minutes of weightlessness. It is primarily designed to give training in weightlessness but could give some experience in acceleration, deceleration and isolation as in space flight. (CARI)

6,360

Anon. 1958 PROCEEDINGS OF THE VIIIth INTERNATIONAL ASTRONAUTICAL CONGRESS, BARCELONA, 1957 (Wien: Springer-Verlag, 1958)

6,361

Anon. 1959 REENTRY FORCES G-FORCE 150 to 170 G'S IN TACTICAL MISSILES.
Aviation Week, p.63 20 July 1959

6,362

Anon. 1959 ROCKET TECHNOLOGY AND SPACE RESEARCH
Raketentech. u. Raumfahrtforsch. 3(2): , Apr.-June 1959
(Picatinny Arsenal, Feltman Research & Engineering Labs., Dover, N. J.)
Translation No. PA-61, ASTIA AD-228 967, Nov. 1959

6,363

Anon. 1958 SATELLITES PAVE WAY FOR SPACE TRAVEL.
FBIS, USSR/East Europe No. 186, Sept. 24, 1958

ABSTRACT: The problems during the third stage of rocket investigations included the checking of all the results obtained during the flight of animals up to a height of 212 kilometers. During the so-called "active" stage of the flight, with the intense noise and G-force, the rate of pulse and breathing and the blood pressure of nonanesthetized animals increased as a rule. When the state of weightlessness set in, these physiological indices remained at a high level for the first two to three minutes, but by the fifth or sixth minute they returned to the initial level. Animals which were anesthetized showed no changes in the rate of pulse and breathing and in blood pressure during the state of weightlessness. Telemetric data obtained during the ascent of the rocket showed that the heartbeat was almost trebled. But subsequently, while acceleration rose, the rate of the heartbeat fell. The rate of breathing also rose three to four times under the influence of maximal acceleration; this is apparently due to the considerable increase in the weight of the dog. (CARI)

6,364

Anon. 1958 SOVIETS RECOVER RESEARCH ROCKET DOGS
Aviation Week 69:61-63, Nov. 3, 1958

ABSTRACT: Izvestia reports two dogs, Belyanka and Pestraya, were recovered from 280 miles altitude in a single-stage research rocket launched from the "the middle latitudes of Soviet European territory" on Aug. 27, 1958, with a 3,726-lb. payload This is reported as being the second launching of such a rocket. The felt-lined cabin, which landed "in a selected area," contained "a generation system, a self-contained system for recording the biological functions of the animals, and a special motion picture camera." The rocket was stabilized "during the entire flight, including the inertial part of its flight," to ensure the necessary conditions for the experiment. The rocket also carried instruments for measuring concentration of free electrons, ion composition of the atmosphere, concentration of positive ions, electron temperature, air pressure, micrometeorite impingement, ultraviolet region of the solar spectrum, infrared radiation of the earth, and the earth's atmosphere.

6,365

Anon. 1958 "SPACE FLIGHT" Aviation Age 29:14-101

ABSTRACT: Among the articles and sections in this special report are the following: "Develop. nt of Manned Space Flight," "Who'll Run Our Space Program, "What Does It Take to Get into the Space Flight Business," "Blueprint for Space Research," "Getting Man into Space," "Balloon-launched Vehicle May Be First on the Moon," "Propulsion" "Thermodynamics,""Structures and Materials," "Guidance and Control,""Orbits," "Human Factors," "Accessories," and "Ground Support."

6,366

Anon. 1958 SPUTNIK II THROUGH RUSSIAN EYES.
Astronautics 3:48-49, 62

ABSTRACT: Although silent on launching vehicle and means of propulsion, these translations from the Soviet press offer hitherto unreleased data on structure of the satellite and the biological experiments performed.

6,367

Anon. 1958 SPUTNIKS AND SPACE SHIPS BREAKING THROUGH THE BIOLOGICAL CARRIER (USSR no. 4:17-19, 1958)

ABSTRACT: A general article which covers the physiology of cosmic flight; overcoming hazards of space; how much speed can the body endure; weightlessness and acceleration; altitude and survival; and the space age.

6,368

Anon. 1958 TEN STEPS INTO SPACE.
J. of the Franklin Inst. (6): Dec. 1958

6,369

Anon. 1959 ACCIDENT SUMMARY.
Aviation Week, August 31, 1959, p. 25.

ABSTRACT: Civil Aeronautics Board last week, in its annual resume of aircraft accidents, reported a total of 90 air carrier accidents occurred during 1958, 15 of them fatal. Fatal accidents involving domestic airlines during the year totaled eight, with 20 crew fatalities and 119 passenger fatalities. Foreign and overseas operators were involved in two fatal accidents, with no crew and 10 passenger fatalities. Non-certified carriers were involved in one fatal accident which resulted in the loss of two crew members. There were no passengers lost in the latter accident. General aviation accidents involving helicopters and fixed wing aircraft in excess of 12,500 lb. gross weight totaled 122 during the year, 21 of them fatal.

6,370

Anon. 1959 AEROMED FACILITY STUDIES SHOCK ABSORBER SEATS FOR JET PASSENGERS
Aviation Week 70(21):136- , May 1959

ABSTRACT: This brief article describes a hydraulic shock absorber system whereby passengers in jet transports would be able to survive fairly high impact accelerations. The data from which the proposed system was designed were obtained by Cornell Automotive Crash Injury Research. Two methods of applying the shock absorbers for deceleration are described and seat fitting are indicated.

6,371

Anon. 1959 ANNOTATED BIBLIOGRAPHY OF SOVIET AIR AND SPACE PROJECTS (AEROMEDICAL ASPECTS) Trans. from Soviet open sources, 1951-1959. LC or SLA 59-16479 (SLA Translation Center, Chicago, Ill.)

6,372

Anon. 1959 DRAG PARACHUTE RETRACTING SYSTEM (Van Zelm Associates, Inc., Baltimore, Md.) Rept. nos. 151 and 156; WADC Technical rept. no. 57-57, Contract AF 33(600)30389), Jan 1959, ASTIA AD-155 709

ABSTRACT: The general problem of a retractable deceleration parachute system has been examined and possible solutions have been studied. These solutions

have been evaluated, and the final system configuration has been selected and designed. The design incorporates a basic concept of winding a parachute around a revolving drum after retraction through a duct which collapses the parachute and compresses it to a size which the drum can accommodate. The rewind motor is hydraulically or pneumatically actuated and the control system is largely mechanical with some components being hydraulic or pneumatic. A prototype unit was manufactured for test which weighed 94 pounds, and was installed on a truck. The vehicle was used to conduct a comprehensive testing program, to study the action of the parachute during deployment and retraction, and to evaluate the retraction system. Tests of the retraction system demonstrated that the design meets the requirements of such a device. (Author)

6,373

Anon. 1959 MARTIN-BAKER EJECTION SYSTEM HIGH SPEED-HIGH ALTITUDE TEST AND EVALUATION (Joint Parachute Test Facility, El Centro, Calif.) Technical rept. no. 2-59, Proj. TED no. ELC AE-5242.2; ASTIA AD-244 200

ABSTRACT: Of the total of twelve test flights conducted, ejection was successful and satisfactory in all firings. Seat-dummy separation was accomplished ten times the two malfunctions resulting from interference between seat system components and auxiliary test equipment items. The dummy was recovered on nine (of the ten) tests, a hardware malfunction causing the one failure. As a result of the test program, ejection seat function was adjudged satisfactory. As stated by Appendix A, evaluation of the general parachute performance was to be made on the basis of data gathered on the free bailout facility, the maximum performance capability required, and the effect of drogue or other component failure. In addition, the possible use of a 28-foot parachute and/or the integrated torso harness was to be investigated. In this connection, a Bureau of Aeronautics instruction of 9 December 1958 required the employment of the integrated harness on all tests made subsequent to that date. The twelve tests were conducted in three basic phases such that six were made with the standard Martin-Baker 24-foot parachute and harness system, two with the MBA parachute and Naval Parachute Unit integrated harness, and four with Pioneer-NPU integrated harness. Minor malfunctions were frequently encountered, but generally satisfactory results were obtained with all three parachute-harness assemblies. The over-all results of the test program conducted demonstrate the serviceability of the subject ejection system. (Author)

6,374

Anon. 1959 PHOTO, BOEING, FULL-BODY RESTRAINT
Astronautics P. 34, Nov. 1959.

CONTENTS: Photo of Boeing full-body restraint for spacecraft.

6,375

Anon. 1959 PILOTS BEYOND THE STRATOSPHERE.
Interavia. 14: 390-392, April 1959

6,376

Anon. 1959 PROCEEDINGS OF THE IXth INTERNATIONAL ASTRONAUTICAL CONGRESS, AMSTERDAM, 1958, VOL. I (Wien: Springer-Verlag, 1959)

6,377

Anon. 1959 PROCEEDINGS OF THE IXth INTERNATIONAL ASTRONAUTICAL CONGRESS, AMSTERDAM, 1958, VOL. 2 (Wien: Springer-Verlag, 1959)

6,378

Anon. 1959 PUTESHESTVENNIKI V KOSMOS (Space Travelers)
(Trans. from Gudok (USSR), p. 4, Sept. 38, 1958)
(SLA Translations Center, Chicago, Ill.) 59-16430

6,379

Anon. 1959 RABBIT AND TWO DOGS RECOVERED FROM SPACE.
Science 130:258.

ABSTRACT: From Soviet announcements, two dogs and a rabbit on a 4000-lb payload were launched into space on July 2, 1959, and successfully recovered. According to the Soviet press, instruments aboard the missile sent back information on the animal's reaction to weightlessness, and information on the ultraviolet part of the solar spectrum, the structure of the ionosphere, and the direction and speed of air streams at various altitudes. Among commentator's reporst: "This has proved we can bring animals back alive," and "It means much in the preparation for space flights by human beings."

6,380

Anon. 1959 RAZVEDCHIKI BOL'SHIKH VYSOT (AND) ISSLEDOVANIYA PERVOSTEPENNOGO ZNACHENIYA (High Altitude Scouts (and) Research of Paramount Importance)
(Trans. from Pravda Moscow, (189):6, 1959: a partial trans. from no. 189, p. 1 and a summary trans. of 3 articles on the same subject from Izvestiya (USSR) (160):3, 1959)
(SLA Translations Center, Chicago, Ill.) 59-19716

6,380

Anon. 1959 ROCKET TECHNOLOGY AND SPACE RESEARCH
(Picatinny Arsenal, Feltman Research and Engineering Labs., Dover, N.J.)
Translation no. PA-61, Nov. 1959, ASTIA AD 228 967
Also in: Raketentech. u. Raumfahrtforsch., v. 3, no. 2, Apr.-June 1959

ABSTRACT: Included in this report are observations on the physiology of the senses during the transition from acceleration to weightlessness.

6,381

Anon. 1959 SMART DRIVERS USE SEAT BELTS.
Rocky Mountain Medical Journal 56(7):44-46.

ABSTRACT: Seat belts help decrease the severity of accidental injury or prevent injury when accidents occur. When a car crashes, the motorist without a seat belt to stop him flies forward at unreduced speed—for a split second still uninjured—until he hits something solid. This is the impact that kills and maims. It is the violence of the reduction in speed, not the speed itself, which kills. Thus, even low speed collisions can produce high deceleration rates. Careful analysis of auto accidents by crash injury research experts shows that in a traffic accident: (1) a belt helps prevent being thrown forward; (2) you are much safer inside the car; and (3) everyone is safer when the driver is kept behind the wheel.

6,382

Anon. 1959 SPACE MEDICINE.
Scot. Med. J., 4:462-465, Sept. 1959.

ABSTRACT: Medical problems of spaceflight are in general, extensions of those faced by the aviation medicine specialist in the last decade. They can be usefully considered under the general classification of mechanical stresses and environmental factors.

6,383

Anon. 1959 STUDIES ON DYNAMICS AND INSTRUMENTATION OF THE HOLLOMAN TRACK
(Air Force Missile Development Center, Holloman Air Force Base, N. Mex)
Rept. No. AFMDC TR 59-8; Arpil 1959. ASTIA AD 236 096.

ABSTRACT: This technical report is a consolidation of twenty-three papers prepared at AFMDC over a period of about two years, 1956 through 1958. Track structure, vibration, instrumentation, friction and slipper wear, and aerodynamics and propulsion are treated. (Author)

6,384

Anon. 1959 TYPICAL ACCELERATION LOADS IMPOSED ON PILOTS DURING CATAPULTING AND ARRESTING (N.A. Test Center, Patuent River, Maryland) Proj. TED No. PIR SI-43108, 3 April 1959.

6,385

Anon. 1959 USAF PLANE CRASHES DECLINE SINCE 1955. Av. Wk. 29 June 1959, p.83.

ABSTRACT: Los Angeles, USAF aircraft accident rate has declined steadily since 1955, despite the increasing number of hours flown in high performance aircraft.
Maj. General Joseph D. Caldera, departing here for a new assignment as USAF deputy inspector general for Safety (AW June 15, p. 23), said the number of fatalities totaled 389 in 1955, but was down to 302 in 1958. If the trend continues as indicated in the first quarter 1959, the number of fatalities could decrease to less than 200, he added.
The accident rate per 100,000 flying hours is similarly reduced drom 4.0 to 2.8 in the first quarter of this year.
Most significant cause in the reduction in the rate is pilot education; although the number of ejections in first quarter 1959 is 65% greater than in 1958, pilot fatalities have dropped, he said. Each year sees a greater number of flying hours in Century-series fighters with newly graduated pilots manning the aircraft, making the record more remarkable, Caldara added.
Fuel contamination is still a major headache in flying safety, he continued, and the Air Force suspects fuel contamination could be a cause factor in some of the undetermined crash causes which make up 18% of Air Force flying accidents. One manner in which the contamination problem is being tackled is through continued emphasis to fuel handlers of the importance of their jobs. Gen. Caldara said a large procurement of fuel filtration equipment is in the offing pending the outcome of service tests on such equipment now. Major emphasis will be removing water in solution from JP-4 and JP-5.
Brig. Gen. Walter E. Arnold will assume Caldara's former post as director of flight safety research, Norton AFB, Calif.

6,386

Anon. 1960 ANNUAL REPORT, 1 APRIL 1959 to 31 MARCH 1960. (Automotive Crash Injury Research).

6,387

Anon. 1960 ASCENT INTO THE HIGHEST STRATA OF THE ATMOSPHERE Deutsche Flugtechnik 1960(3):76-77

ABSTRACT: This is the narrative account of the unknown author's visit to an unidentified laboratory for high-altitude flying, obviously in the USSR. The

guide was the Candidate of Medicine, Modest Vakar. In the pressure chamber a test was made with a dog. The author could see on the X-ray screen the dog's skin lift several centimeters under the effect of the reduced barometric pressure. Upon completion of the test the visitor was shown the unharmed dog. The next test in the pressure chamber was carried out with Aleksey Grachev. A decompression was simulated with Aleksey Belokonev in the decompression pressure chamber. This chamber was a model of a cockpit built of armor-glass. The next stop of the visitor was at the acceleration lab. A test was made with Ivan Kachur. The author noticed on Kachur's pressure suit the special rubber pockets over the abdomen, on the thighs and the lower legs, filled with pressurized air to protect the vital organs, to facilitate the blood circulation and the heart functions on the centrifuge, simulating the acceleration. The guide told the author about K. Ye. Tsiolkovskiy's idea of placing the pilot into a liquid as a protective means against the acceleration forces. Test animals did thus stand a thousandfold pressure over short periods. (CARI)

6,388

Anon. 1960 BIBLIOGRAPHY OF RESEARCH REPORTS AND PUBLICATIONS ISSUED BY THE BIO-ACOUSTICS BRANCH.
(Aerospace Medical Lab., Wright Air Development Div., Wright-Patterson Air Force Base, Ohio) Dec. 1960.

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Noise control structures
Hearing and physiology of the ear
Speech
Biological and psychological effects of noise
Ear protection
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Effects of vibrations and shocks
General noise guides and criteria
Bionics

6,389

Anon. 1960 CRASH INJURY; CRASH WORTHINESS. (Flight Safety Foundation, Inc.) Army Aviation Safety Final Report TREC TR-60-77, Av-CIR-70-0-128.

6,390

Anon. 1960 DESCRIPTION OF THE EXPERIMENTS PERFORMED DURING THE FLIGHT OF THE SECOND RUSSIAN SPACE-SHIP SATELLITE.
Pravda, 4-6 Sept. 1960.
R.A.E. Translation No. 921

6,391

Anon. 1960 DETERMINATION OF TEST INSTRUMENTATION REQUIREMENTS FOR BIOLOGICAL AIRBORNE AND ASTRONAUTICAL TESTS: REQUEST FOR (Air Crew Equipment Lab., Naval Air Material Center, Philadelphia, Pa.) Proj. TED no. NAM AE-1403.1 rept. no. 2137, 28 March 1960, ASTIA AD-234 091

ABSTRACT: A description of electrodes suitable for obtaining ECG records when worn under protective clothing during prolonged exposures in adverse environmental conditions has been given. The manner in which these electrodes were applied to the surface of the body was also indicated. The electrodes were found to give clinically acceptable ECG recordings during tests lasting over 12 hr. During this time, subjects dressed as shown in enclosure (5) were exposed to very warm and humid environmental conditions. After wearing these electrodes for 46 hr, a subject having fair, thin skin showed no skin changes other than a moderate reddening at the areas of contact. After removing the electrodes, these reddened areas disappeared within 6 hr. In no case, when these electrodes were used, did any of the subjects report discomfort arising from the electrodes or the lead wires. (Author)

6,392

Anon. 1960 DOGS ADJUST QUICKLY TO FLIGHT.
TASS, Radioteletype in Russian to Europe (Moscow), 22 Aug. 1960. 0110 GMT. (translation. Excerpts)

ABSTRACT: P. Fedorov reports that television observations were conducted from the moment the spaceship was launched and practically to the beginning of its descent. The dogs were reported to have pricked up their ears and looked with perplexity into the inside of the cabin. During the first seconds the dogs felt uneasy and agitated. As the speed of the ship increased they were gradually pressed to the floor by the increasing force of gravity. Strelka pressed down with her paws, tried to resist, and looked from side to side with alarm. Then the animal stood stock still. The ship was in orbit. After great changes in the load the condition of weightlessness was reached. The dogs "hung" in the cabin. Their paws and heads hung down weakly and at first sight the animals appeared lifeless. Having accustomed themselves to weightlessness, the animals began to eat. During the day they got worried from time to time, but they gradually settled down.

6,393

Anon. 1960 IN THE EARTH'S ATMOSPHERE
Vozdushnogo flota 11: 95

6,394

Anon. 1960 EJECTION SEAT STUDY.
(Naval Aviation Safety Center, Norfolk, Va.)
June 1960. ASTIA AD-238 492

ABSTRACT: A statistical analysis is presented showing the degree of personnel injuries sustained during ejection from disabled aircraft. Factors analyzed include altitude, speed, seat systems, attitude, and types of emergency. Ejection frequency and fatality rates per 10,000 hours flying time are also presented. A comparison is made between injuries resulting from ejections and bailouts.

6,395

Anon. 1960 FLIGHT CONTROL STUDY OF A MANNED RE-ENTRY VEHICLE (General Electric Co., Philadelphia, Pa.) WADD TR 60-695, Contract AF 33(616) 6204, Proj. 8225, July 1960. ASTIA AD 249 400.

ABSTRACT: Appendix V shows how a variable drag device can be used to limit the maximum deceleration. The results presented herein should be helpful in evaluating the utility of variable drag devices in terms of human tolerance to deceleration and the thermodynamic and mechanical feasibilities of specific types of devices. (Author)

6,396

Anon. 1960 INDEX ON ENVIRONMENTAL TEST EQUIPMENT IN GOVERNMENT ESTABLISHMENTS (Director of Defense Research and Engineering, Washington, D.C.) Dec. 1960. ASTIA AD 252 715.

ABSTRACT: The index, compiled by the centralizing activity for shocks, vibration and associated environments, includes a list of the test facilities and equipment available at Army, Navy, Air Force, and non-military establishments. It is intended to acquaint scientists and engineers with the existence of these facilities and prevent unnecessary expenditures for environmental test equipment. Part I lists the items of test equipment at the several establishments and some information on performance capabilities. Part II lists the performance details of certain commercial ranges of test equipment.

6,397

Anon. 1960 PROBLEMS OF SPACE FLIGHT.
Komsomol'skaya pravda, 2 Dec. 1960, p. 2, cols. 1-4.

ABSTRACT: Experiments with dogs have proved that the future space pilot must be placed in a position where the force of overload will be felt in th direction of chest to back ... The cabin, acting like a gyroscope in space, will maintain the same position for the pilot... The problem of overload has also been studied by

observing other animals such as the giraffe, in which special heart muscles pumping blood to the animal's head were found to overcome the "natural overload" created by the distance between the heart and the brain. Bears and pigs were also tested since their bone structure in terms of "biological resistance" resembles that of man... Tests have also been conducted with plants and organisms which immersed in a fluid were found to survive the effects of acceleration ... Weightlessness does not present a serious danger to life. Having experienced a state of weightlessness, man will, however, be faced with serious problems of readjustment after return to earth. Thus the necessity for creating artificial gravity in the space cabin by centrifugal force... A number of tests have been made in space with mice, hamsters, fruit flies, pieces of skin, and grains, to determine the effect of radiation. Chemist are working on a protective agent containing sulfur, albumens, vitamins, and hormones which, introduced into the organism, will increase resistance against radiation in space ....

6,398

Anon. 1960 PROSPECTORS OF GREAT HEIGHTS.
Pravda,(Moscow) 189(14948):6 LC or SLA Trans. 60-19078

6,399

Anon. 1960 SATELLITE RETURNS SAFELY
FBIS, USSR & East Europe, Nr. 163, August 22, 1960.

6,400

Anon. 1960 SECOND SOVIET SPACESHIP (Official Report)
Pravda 4: 3-4; Sept. 1960

6,401

Anon. 1960 SERVICE TEST OF PARACHUTE JUMPING FROM ARMY AIRCRAFT (H-37). (Arctic Test Board, Fort Greely, Alaska) Proj. No. ATB 3-430, 20 May 1960. ASTIA AD 237 940.

ABSTRACT: The H-37 helicopter, when modified by the installation of the anchor cable assembly described in Sikorsky Drawing S1507-5120-C less the starboard cable, will be suitable for parachute delivery of a maximum of 16 combat equipped parachutists under artic winter conditions. When so modified, the H-37 helicopter will be suitable for consecutive delivery of standard type aerial delivery containers from the door or from the external cargo hook followed by parachutists from the door under arctic winter conditions. No requirement exists for the starboard anchor cable under arctic winter conditions. The requirement for use of the static line protective shield will be limited and infrequent and therefore the shield should be locally fabricated by using units as required. (Author)

6,402

Anon. 1960 SOVIET SPACE SCIENCE
Trans of mono. Stantsii v Kosmos: Sbornik Statei (Stations in Space; Collected Articles) Moscow, 1960, p. 214-229.
(Joint Publications Research Service, San Francisco, Calif.)
Nov. 16, 1961 JPRS: 11154

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Life in a Sputnik, by P. Isakov
Man Prior to Starting into Space, by E. Yugov and A. Serov

6,403

Anon. 1960 SPACE COCOONS FOR ORBITING ASTRONAUTS
I/EC 52(11):36A-39A, Nov. 1960

ABSTRACT: A plastic foam cocoon designed to protect an astronaut during re-entry, should it become necessary to abandon a disabled satellite vehicle, is contemplated by research engineers at General Electric.

6,404

Anon. 1960 VTOROY SOVETSKIY KOSMICHESKIY KORABL' (The Second Soviet Cosmic Ship)
Izvestiya no. 212, p. 3, 6 Sep. 1960

6,405

Anon. 1961 AT SUPERSONIC VELOCITY
Sovetskaya Litva, July 28, 1961, p. 3. Prepared by: Translation Services Branch, Foreign Technology Division, WP-AFB, Ohio. FTD-TT-61-203/1
ASTIA AD 268 072

ABSTRACT: This is an article from the Russian Newspaper Sovetskaya Litva. It discusses the characteristics of ejection seats and how they operate.

6,406

Anon. 1961 AUTOMOTIVE CRASH INJURY RESEARCH SUMMARY REPORT. Annual Report 21.

6,407

Anon. 1961 AVIATION CRASH INJURY SYMPOSIUM, U.S. ARMY CHIEF OF TRANSP. (Cornell-Guggenheim Aviation Safety Center)

6,408

Anon. 1961 BIOLOGY AND THE COSMOS
Trans. of Nauka i Zhizn' (USSR) 28(6):6-9, 1961.
(Joint Publications Research Service, New YOrk, N. Y.)
Oct. 17, 1961 JPRS: 10553; OTS 61-28924.

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Microorganisms in the Cosmos, by N. I. Rybakov.

6,409

Anon. 1961 BIOMEDICAL ASPECTS OF SOVIET SPACE RESEARCH
Trans. from Ekonomicheskaya Gazeta (USSR) 1961, no. 167, p. 3; Sovetskaya Rossiya (USSR) 1961, 19 Sept. p. 4; Izvestiya (USSR) 1961, no. 184(13730)p. 6; Pravda, Moscow (USSR) 1961, no. 222(15712) p. 6; Pravda Vostoka (USSR) 1961, 13 Aug.
(Joint Publications Research Service, New York, N. Y.)
March 27, 1962 JPRS: 13244

6,410

Anon. 1961 COMPENDIUM OF ABSTRACTS OF PAPERS PRESENTED AT THE SYMPOSIUM ON BIOMECHANICS OF BODY RESTRAINT AND HEAD PROTECTION.
(U.S. Naval Air Materiel Center, Philadelphia, Pa.)

6,411

Anon. 1961 DECELERATION OF SPACE VEHICLES.
In Tekhnika-Molodezhi (Meteor-Rocket)
(Science and Tech. Section, Air Information Division, Washington, D.C.)
AID Rept. 61-51; 18 Apr. 1961. ASTIA AD 255 793

ABSTRACT: The electric charge on the nose of a rapidly flying body changes the intensity of the body's deceleration. The use of this effect in the development of a deceleration engine for space vehicles is discussed. In explaining the possibility of using the kinetic energy of a space body for deceleration, the reentry processes for both electrically conductive meteors and dielectric meteors are described.

6,412

Anon. 1961 DETAILS OF THE LEGENDARY FLIGHT
(Komsomol'skaya Pravda, v. 91 (11031), April 16, 1961, pp. 1-3)
(Aerospace Technical Intelligence Center, Wright-Patterson AFB, Ohio)
Trans. No. MCL-1035, July 27, 1961, ASTIA AD 261 805

6,413

Anon. 1961 DYNA-SOAR EJECTION SEAT AND SURVIVAL SYSTEM
(Boeing Co., Seattle, Washington) Rept. No. 10-81000, Rev. B to Rept. No 10-81000, 15 Sept. 1961. ASTIA AD 269 506L

ABSTRACT: The design, fabrication, performance, and testing requirements for a type of equipment designated Ejection Seat and Survival System is reported. It is designed for pilot escape and survival from the Dyna-Soar glider in instances when a satisfactory landing site cannot be reached or when other conditions make an attempted glider landing impractical. (Author)

6,414

Anon. 1961 EL HOMBRE EN EL ESPACIO EXTERIOR (MAN IN OUTER SPACE)
Revista de Aeronautica (Spain) 21(245):275-282, April 1961

ABSTRACT: A resume of the man-in-space projects being conducted by the U. S. and USSR is presented. (JPL)

6,415

Anon. 1961 EVALUATION OF HUMAN SUBJECT REACTION IN THE FORWARD AND AFT FACING SEATED POSITIONS.
(Naval Air Materiel Center, Philadelphia, Pa.) NAMC-ACEL-424

6,416

Anon. 1961 THE FIRST FLIGHT OF MAN IN COSMIC SPACE
Trans. from Izvestiya (USSR) 1961, 25 April.
(Joint Publications Research Service, New York, N. Y.)
May 8, 1961 JPRS: 8238

ABSTRACT: Newspaper account of Gagarin's flight of 12 April 1961 containing general nontechnical discussions on the design of the spaceship, medico-biological problems of spaceflight, and on the training of Soviet cosmonauts.

6,417

Anon. 1961 FIRST MAN IN SPACE
Tudomany es technika (Hungarian Popular Science J.) (9)
See also, Anon. "Manned Space Capsule," ibid.

ABSTRACT: This article concerns Major Gagarin's space flight on April 12, 1961. It describes the equipment in the cabin, food supplies and water, instruments and rockets and brakes for descent.

6,418

Anon. 1961 FLIGHT OF THE SECOND COSMIC SHIP
Vestnik Akademii Nauk SSSR, 10:10-17

ABSTRACT: A report of a press conference by the Presidium of the USSR Academy of Sciences on Aug 24, 1960, two days after the flight of the second Soviet cosmic ship. A.V. Topchiyev related how the planned program on the ship was carried out, described the passengers, and cited preliminary results. N.M. Sisayakan described the biological program and V.V. Parin discussed the medico-biological part of the program. O.G. Gazenko exhibited rats, mice, and the dogs Belka and Strelka. S.N. Vernov and L.V. Kurnosova discussed radiation experiments on the flight. (CARI)

6,419

Anon. 1961 FROM SPUTNIK TO ASTRONAUT
Wojskowy przeglad lotniczy 1961(5):1-8

ABSTRACT: This feature article commemorates Major Y. Gagarin's successful orbital flight of April 12, 1961 and briefly describes all Soviet space vehicles launched during the last 3½ years preceding the manned orbital flight. Gagarin's flight was preceded by two Vostok-type space ships launched for a test of the capsule's landing equipment. Gagarin's task during the flight was to observe the earth, the sky, and the lower layers of the atmosphere, as well as his own physical reactions to acceleration, weightlessness, etc. Sensors attached to his body recorded cardiac currents, respiration and pulse rate. The data showed that acceleration and deceleration caused little changes in his pulse rate and respiration. During weightlessness, his pulse and respiration rates returned to nearly normal. It can be assumed that manned space flights to the moon and other planets will come true in the near future. (CARI)

6,420

Anon. 1961 A GREAT EVENT IN THE SCIENCE AND HISTORY OF MANKIND -- THE FIRST FLIGHT OF MAN INTO THE COSMOS (CERTAIN CLINICO-PHYSIOLOGICAL PROBLEMS CONCERNING COSMIC FLIGHT OF MAN) Klinicheskaya Meditsina (Moscow) 39(7):3-5 July 1961

ABSTRACT: This article discusses Major Yuriy Alekseyevich Gagarin's flight into space, an event which the combined efforts of scientists, engineers, designers, medical men, biologists, psychologists, and other workers in the Soviet Union made possible. It also includes some comments made by Gagarin after his flight. The human descent, re-entry, and safe landing of Gagarin prove that a human is able to tolerate this complex stage of flight. This article is concluded with an appeal to all therapeutists, neuropathologists, surgeons, and specialists in other fields to cooperate actively with physiologists in their attempt to solve the problems of aerospace medicine. (CARI)

6,421

Anon. 1961 GRISSOM REPORTS ON SECOND MR FLIGHT
Aviation Week and Space Technology 75(6):60-64, Aug. 7, 1961

ABSTRACT: Excerpts from the official NASA transcript of Captain V. I. Grissom's report of his flight and reactions are contained in this article. (JPL)

6,422

Anon. 1961 INSTRUMENTATION BIBLIOGRAPHY
(Ministry of Aviation, Gt. Brit.) Rept. No. TIL/BIB/50; Jan. 1961.
ASTIA AD 253 346

ABSTRACT: This bibliography contains material on the following subjects: general instrumentation; calibration; combustion; electrical and electronic devices; test facilities; accelerometers; computers; displacement measurements; flow measurement and control; pressure and thrust measurement; recording; shock and vibration; strain gauge measurements; temperature measurement; and time measurement.

6,423

Anon. 1961 LA PREMIERE EXPERIENCE BIOLOGIQUE SPATIALE FRANCAISE (THE FIRST FRENCH BIOLOGICAL SPACE EXPERIENCE) Homme et l'espace (Lausanne) No. 8-9-53-55. Nov.-Dec. 1961

ABSTRACT: A rat (Hector) hermetically sealed into a compartment of the Veronique rocket was launched to an altitude of 110 kilometers. Throughout the flight, the physiological parameters (brain, heart, and muscular activities) of the animal subjected to accelerations were telemetered and registered on the ground. Physiological surveillance of the rat permits the study of the eventual repercussion of the [illegible] on the animal body. (J. Aerospace Medicine 33(11):1391, Nov. 1962)

6,424

Anon. 1961 LA RELAZIONE UFFICIALE SUL VOLO SPAZIALE DI TITOV (Official Account of Titov's Space Flight)
Oltre il cielo (Rome), 5(90):292-296, 1-15 Oct. 1961, (in Italian)

ABSTRACT: The successful launching into space of the spaceship-sputnik "Vostok 2" on August 6, 1961, was manned by the Soviet astronaut, Gherman Stefanovic Titov. The flight lasted 25 hours and 18 minutes. Discussion is presented on the spaceship's structure and equipment; means of radio- and telecommunication; direct television and motion picture recording of the astronaut's

behavior during the flight, monitored simultaneously with registrations of physiological functions back to earth; environmental conditions on board (temperature, barometric pressure, etc.); the weightlessness encountered during the flight and its effects on blood circulation, respiration, work capacity, and vestibular apparatus; radiation protection; and the astronaut's impressions of the flight.

6,425

Anon. 1961 LIFE SUPPORT SYSTEMS: SOVIET LITERATURE
(Monthly rept. no. 7 for Oct/Nov 61 on AID Work Assignment no. 22 Dec. 1961) AID rept. 61-168; ASTIA AD 271 514
(Office of Technical Services, Washington, D.C.) 62-19110

6,426

Anon. 1960 LUNAR JOURNEY
Lancet (London) 1(7134): 1117-1118. 21 May 1960.

ABSTRACT: The physiological problems of orbital and space flight are briefly reviewed, including: (1) the typical aviation stresses of acceleration, low barometric pressure, and temperature and humidity extremes, for which adequate measure of protection are available; (2) prolonged weightlessness, the "breakoff phenomenon," and primary cosmic radiation, about which little is known; and (3) problems of lunar flight which will require further development of existing techniques, such as increased acceleration stress, the mental strain of extended flight, the additional radiation hazard of the Van Allen belts, and the necessity of the provision of large quantities of food and oxygen

6,427

Anon. 1961 MANNED SPACE CAPSULES (USSR, HUNGARY)
Tudomany es technika (Hungarian Popular Science J.) (9), 8 May 1961

ABSTRACT: This article contains two sketches of Gagarin and his space capsule. The parts of the space capsule and interior of the cabin are pointed out in the picture and described in the article. (CARI)

6,428

Anon. 1961 MEDICINE AND SPACE FLIGHTS
Trans. of Vsesoyuznoe Obshchestvo po Rasprostraneniyu Politicheskikh i Nauchnykh Znanii Seriya 8: Biologiya i Meditsina (USSR) (9):3-32, 196?
(Joint Publications Research Service, New York, N.Y.)
Aug. 14, 1961 JPRS: 9939

CONTENTS:
In Place of a Foreword, by N. N. Blokhin
The Role of Space Medicine in Providing for the Flight of the First Cosmonaut, By V. V. Parin,
Fundamental Medical-Biological Problems of Space Flights, by O. G. Gazenko'
Radiation in Cosmic Space, by S. N. Vernov.

6,429

Anon. 1961 MICE-BEARING ROCKET LAUNCHED IN KRAKOW.
Warsaw Polish Home Service. 11:05 GMT. 11 April 1961. (translation).

ABSTRACT: (Text) Two successive rockets of the meteorological type were launched in the Biedowska Desert near Olkusz. One of them carried two white mice in a special container. The first rocket, weigning 10 kilograms and measuring one and a half meters in length, reached the planned altitude of 1,700 meters. The rocket traveled at a speed of 55[illegible] kilometers and hour. At a certain time the first stage with the container separated from the rocket and landed with its passengers by a special parachute. The animals felt well after the experiment. The next experiments are to take place in May. The experiments, organized by the experimental aviation and rocket technology circle of the Krakow Aero Club, take place under the auspices of the Polish Astronautical Society and Krakow scientists.

6,430

Anon. 1961 MISSILE "DRAG" BALLOON
Spaceflight 3(3):112, May 1961

ABSTRACT: Coated fabric balloons which inflate in one-tenth of a second have been developed for a high-altitude recovery system designed to control deceleration of re-entry vehicles. (JPL)

6,431

Anon. 1961 NEW INDICATIONS IN SOVIET SPACE TECHNOLOGY (Science and Tech. Section, Air Information Div., Washington, D.C.) AID rept. 61-40; 28 March 1961; ASTIA AD-254 409

Anon. 1961 OT MECHTY K DRISTVITEL 'NOSTI (MEDIKO-BIOLOGICHESKIE PROBLEMY KOSMICHESKOGO POLETA) (From Thought to Reality (Bio-Medical Problems of Cosmic Flight) Voyenno-Med. Zhur. (Moscow), 1961, no. 5 pp. 3-12 Also in U.S. Joint Publication Research Service, Washington, D.C. Trans. No. 10052 (1374-N/42), Aug., 1961.

ABSTRACT: This is a scientific review of preparations for the man-in-orbit satellite flight on April 12, 1961. Rocket and satellite flights carrying biological materials were used to solve problems concerning flight dynamics, physical characteristics of outer space, meteors, temperature changes, lack of atmosphere; and internal cabin environment. After being subject to cosmic radiation during the flight, accelerated growth and gemination were shown for onion and Nigella seeds after flight. Also, there was an increase in the frequency of chromosomal aberations in root cells, bone marrow cells of mice, and growth points of plants. Furthermore, the frequency of dominant and recessive lethal factors in Drosophila was increased after a 24-hour satellite flight. A complete ecological cycle is discussed for space flight with a larger crew.

6,433

Anon. 1961. PARIN ON COSMONAUTS, SPACE DOGS
(FBIS, USSR & East Europe, Nr. 81, April 27, 1961)

ABSTRACT: Moscow -- The dogs which have taken part in space flights are still in excellent health and their journey into space has had no harmful aftereffects on them, said Soviet medical scientist Vasil Parin today, appearing on Moscow television program devoted to the conquest of space. Parin stressed that Soviet technology had created vehicles capable of placing living creatures into orbital flight and that both the stages of acceleration and deceleration had caused no harmful aftereffects. Academician Parin said that apparently for some time to come cosmonauts would be selected from among pilots. Outlining the requirements to be met by a cosmonaut, the scientists said that he must possess the same qualities as those possessed by Yuriy Gagarin. Speaking about Yuriy Gagarin's preparation for the flight, Academician Parin said that it had been carried out according to a big program, and all the tests were carried out with "large endurance margins" exceeding in severity those conditions which Gagarin was likely to encounter during the flight. Parin said that Gagarin's spice suit incorporated special transmitters with the help of which all the data on the condition of his body during the flight were transmitted to earth. Academician Parin said that in future flights into unexplored cosmic regions the first explorers would apparently again be man's four-legged friends - dogs.

6,434

Anon. 1961 PERIODICAL REPORT ON AEROMEDICINE IN THE USSR: 61-24
(1126th USAF FAG, Arlington Hall Station, Arlington 12, Va.) Rept. 1452577

ABSTRACT: This is a report dealing with: a) Contents of a book on the psychology of the flying profession, b) Comparative physiological study of tolerance to radial acceleration, 3) The Sixth Congress of the Ukr. Society of Physiologists, and d) Astronaut training and manned space flights. (CARI)

6,435

Anon. 1961 QUARTERLY REVIEW OF APL ACTIVITIES JULY-SEPTEMBER 1961. II. SPACE EXPLORATION AND RESEARCH AND DEVELOPMENT (Applied Physics Labs., Johns Hopkins U., Silver Spring, Md.)Contract NOrd-7386, ASTIA AD-327 457

6,436

Anon. 1961 RAT FLIGHT PROVIDES DATA ENCOURAGING FOR MAN
Missile & Rockets 8(21):42-43, 22 May 1961

6,437

Anonymous (U. S. Army) 1961
RELATIONSHIP BETWEEN IMPACT VARIABLES AND INJURIES SUSTAINED IN LIGHTPLANE ACCIDENTS.
(Cornell-Guggenheim Aviation Safety Center, New York)
AvCIR 61-5 August ASTIA AD 263 676L

ABSTRACT: Impact conditions are related to injuries sustained by 248 occupants involved in lightplane crashes. Seat tie-down and belt restraint were considered effective and structural collapse was generally not extensive, yet one of every four occupants was killed. Injury severity fatality rate, and incidence of injury to all areas of the body-except the lower torso and thoracic-lumbar spine-were directly related to impact velocity and to angle of impact but inversely related to stopping distance. Lumbar and thoracic spine injuries occurred more frequently in low-angle long deceleration crashes. It was concluded that crucial injuries largely stem from flailing of the body against injury-producing structures within the occupant's environment. Belt restraint is thus seen to play only a moderate role in reducing injury severity. The need for additional safety measures is emphasized. (AUTHOR)

6,438

Anon. 1961 REVIEW OF AERONAUTICAL AND SPACE MEDICINE (SELECTED ARTICLES)
Riv. Med. Aeronaut. (Rome) 23:347-436, Sept. 1960
(Aerospace Technical Intelligence Ctr., Wright-Patterson AFB, Ohio, Trans. No. MCL-787; ASTIA AD-259 594; April 25, 1961)

CONTENTS:

Vacca, C. & L. Vacca, "Modification of the Electrocardiogram of Albino Rats Subjected to Tangential (Transversal) Acceleration Before and After Splenectomy."

6,439

Anon. 1961 SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS (Science and Tech. Branch, Aerospace Information Div., Washington, D.C.) AID rept. 61-156, 30 Nov. 61, ASTIA AD-269 794

6,440

Anon. 1961 SOVIET SPACE SCIENCE
Trans. of Priroda (USSR) 50(9):9-10, 54-60, and 75-77, 1961.
(Joint Publications Research Service, San Francisco, Calif.)
Dec. 21, 1961 JPRS: 11706.

CONTENTS:
Another Victory of Soviet Science and Technology Laboratory Animals, by A. I. Metelkin
In the Name of Science, the Homeland, and the Progress of Mankind (Press Conference).

6,441

Anon. 1961 SOVIETS INDICATE BIG PROBLEMS IN SPACEMAN'S WAY.
Columbus Dispatch, March 10, 1961

ABSTRACT: Two Russian scientists indicated that despite Soviet recovery of another space ship with a dog inside, major problems remain to be solved before a Soviet man is shot into space. Ivan Maisky, director for the Experimental Biology Institute, and Vasil Parin of the Soviet Academy of Medical Sciences agreed that weightlessness is a major problem of manned space flight. Parin said Russian scientists have been getting "interesting data" on how living organisms are affected by such unusual irritants as vibration, stress, and the extreme noise of rocket engines. (CARI)

6,442

Anon. 1961 SPACE MEDICAL SYMPOSIUM HELD IN CONJUNCTION WITH THE XIth INTERNATIONAL ASTRONAUTICAL CONGRESS, STOCKHOLM, SWEDEN, AUGUST 15-20, 1960
Astronautik (Stockholm) 2(4):213-324

ABSTRACT: This issue of the journal contains 13 papers or abstracts on aerospace medicine. Some of the entries are abstracted separately. (J. Aerospace Medicine 33(8):1030, Aug. 1962)

6,443

Anon. 1961 SPACESHIP CAPSULE
Vestnik Vozdushnogo Flota, no. 1, 1961, 95. TL504.V45

ABSTRACT: The best solution for protecting man from the effect of over-loading and appreciable angular acceleration is an anti-g force detachable capsule. The capsule should be provided with a special device for automatic regulation of the position of the astronaut so that the accelerations originating during the flight will always be in a direction perpendicular to the axis of the human body.

6,444

Anon. 1961 SURVIVAL IN SPACE
Interavia (Geneva), 16 (12): 1651-1653. Dec. 1961

ABSTRACT: In a space vehicle, the following problems are met with which do not arise with either a jet aircraft or a submarine: (1) the absence of any medium which can be used for propulsion or in the life support system cycle; (2) new environmental influences, e.g., cosmic radiation, reduced magnetic fields, meteoritic storms; (3) re-entry into the Earth's atmosphere; and (4) weightlessness. Despite extreme stresses, such as high accelerations, noise, vibration, heat, reduced external pressures, and emotional stress, astronauts can undertake an impressive work program of making decisions, carrying out observations, and executing repairs. Included are a tabulation of the present state of knowledge in the life sciences, a picture of the Mercury capsule, and a record of astronaut Shepard's pulse and respiration rate during Mercury flight.

6,445

Anon. 1961 A TABLE OF EQUIVALENTS OF ACCELERATION TERMINOLOGIES (Acceleration Committee, Aerospace Medical Panel, AGARD, 1961)

6,446

Anon. 1961 A TABLE OF EQUIVALENTS OF ACCELERATION TERMINOLOGIES.
Rivista di medicina aeronautica e spaziale (Roma) 24(4):644-651, Oct.-Dec. 1961

ABSTRACT: A Table of Equivalents of Acceleration Terminologies is presented which has been prepared by the Committee on Acceleration of the Advisory Group for Aeronautical Research and Development, Aero Space Medical Panel. In this table the terms are grouped as to the type of acceleration, the body axis concerned, and the physiological consequences of acceleration. The Committee recommends the following: (1) that writers and researchers in the field of acceleration related to mammalian subjects restrict their descriptive terminologies and symbols

to those contained in the table; (2) that the table be used as a ready reference for equivalent translation of acceleration terminologies; (3) that large G be used as the unit of physiological acceleration at all times; and (4) that the metric system be used in applying these acceleration terminologies and symbols. (Aerospace Medicine 33(8):1036, Aug. 1962)

6,447

Anon. 1961 TIMETABLE FOR ASTRONAUTS IN 1961
Tudomany es technika 1961(1):16

ABSTRACT: The article deals with astronautical events to be expected in 1961. The author predicts the possible achievements of space navigation. The most eagerly expected event is the first manned space flight. Further experiments will be conducted on the psychological aspects of manned space flight to determine to what extent the spaceman can maintain his composure and deliberation, and what can be done to influence his state by drugs. The author discusses research on nutrition, sleep during weightlessness. He also discusses the problems involved in landing on the Moon or Venus or Mars. (CARI)

6,448

Anon. 1961 VOSTOK DETAILS
Flight 79(2721): 586, 4 May 1961

ABSTRACT: The Soviet satellite Vostok and Major Gagarin's flight of April 12, 1961, are described. (JPL)

6,449

Anon. 1961 VOSTOK II STEERING EXPLAINED
FBIS USSR & East Europe, Nr. 155, August 11, 1961

ABSTRACT: Berlin--The Society for the Dissemination of Scientific Knowledge and the GDR Astronautical Society this afternoon arranged a discussion with journalists about Major Titov's space flight. The scientists and technologists made clear that the reports concerning steering of the spaceship by the pilot have been misunderstood. In the view of the German experts, these steering operations could hardly have been concerned with changing the orbit. For various reasons it would be inexpedient to change the direction of the flight of a spaceship which has been on a precalculated orbit. On the other hand, there was a need for later corrections in the position of the spaceship axis in the light of changes brought about by physical conditions in space. This can be done automatically, as with all the unmanned artificial earth satellites which have been brought back, or by hand

steering. The pilot takes his orientation from an instrument which, irrespective of the position of the spaceship at the time, indicates an "artificial horizon." These corrections of the position in space are, however, without influence on the course along which the spaceship moves. The scientists expressed the view that Titov was exposed to a maximum pressure of 5 G's at the short end of 10 G's maximum at the landing.

6,450

Anon. 1961 UNITED STATES ARMY AVIATION CRASH INJURY RESEARCH
(Aviation Crash Injury Research, Phoenix, Ariz.)
AvCIR 61-20, 44-177-tc-707, Sept. 1961. ASTIA AD 275 184-L

ABSTRACT: During this year of the program of Army Aviation Flight Safety, added emphasis was given to fullscale dynamic crash testing of aircraft and intensive activities were carried on in statistical analysis, while at the same time continuing the work in the training of crash injury investigators and field investigation of Army aircraft accidents. (Author)

6,451

Anon. 1961 UNPRECEDENTED CONQUEST OF THE FORCES OF NATURE (SELECTED ARTICLES).
Trans. of 5 selected articles from Priroda (USSR) 50(5), 1961.
(Joint Publications Research Service, New York, N. Y.)
Sept. 14, 1961 JPRS: 10166

6,452

Anon. 1962 BIOLOGISCHE GEFAHREN DER RAUMFAHRT (BIOLOGICAL DANGERS OF SPACE FLIGHT) Weltraumfahrt (Frankfurt) 13(2):50, March 1962

ABSTRACT: A brief editorial describes the dangers that may arise for life on earth upon return of a space ship contaminated with extraterrestrial organisms. Effective decontamination procedures should be developed before space travel and carried out before launching the space vehicle to prevent passage of terrestrial organisms into space and before reentry. A model of such a sterilization plant has been built and tested, employing as the chemical agent a mixture of ethylene oxide and freon-12 gases. Other methods include ultrasound, irradiation, dry heat, chemical disinfection, extreme cold, dehydration, and mechanical abrasives. (Aerospace Medicine 33(11):1391, Nov. 1962)

6,453

Anon. 1962 EARTH-SPACE-EARTH (SELECTED ARTICLES)
(Foreign Technology Division, Wright-Patterson AFB, Ohio) FTD-TT-62-1416/1+2
11 Oct. 1962 ASTIA AD 292 224
Trans. from: Zemlya-Kosmos-Zemlya, (Sbornik Materialov, Opublukovannykh V Gazete "Pravda" Izdatel'stvo "Pravda", Moskva, Issue Nr. 24, 16 Aug. 1962, 96 pages), pp. 10, 13-14, 27, 30-31, 45-46, 47, 51-52, 56-57 and 51.

ABSTRACT: This publication contains detailed accounts of the launch and flight of Vostok-3 and Vostok-4. Telemetric data of the health of the astronauts are included along with reports on the effects of weightlessness and activity and eating reports.

6,454

Anon. 1962 ENVIRONMENTAL EFFECTS ON MATERIALS AND EQUIPMENT. ABSTRACTS. SECTION B. VOLUME 2B, NUMBER 1.
(Prevention of Deterioration Center, National Research Council, Washington, D.C.) Jan. 1962. ASTIA AD 283 811.

ABSTRACT: Section A: Reports information on environmental factors, their effects on materials and equipment, materials resistance, corrective or preventive measures, and test methods. Section A is the successor to the Prevention of Deterioration Abstracts, a service covering the identical area of interest since 1946. Section B similar in treatment to Section A but presents information dealing predominately with physical and engineering considerations--mechanical shock and vibration, thermal extremes, vacuum, magnetic and gravitational fields, natural radiations found in space, dissociated and ionized gases, meteoroids and meteoric dust. Section B is a continuation of Environmental Effects on Materials and Equipment, Volume I which commenced in January 1961. (Author).

6,455

Anon. 1962 FROM GROUP SPACE FLIGHT TO A MOON-FLIGHT
Repules, No. 10, pp. 8-9, 1962

ABSTRACT: The significance of Vostock 3 and 4 spacecraft is discussed. Two main lessons were learned: (1) The human body can function satisfactorily under conditions of weightlessness for several days; (2) It is possible to put two spacecraft into almost identical orbits. The specially prepared food, liquid containers, oxygen supply, the removal of carbon dioxide and water vapor from the air, the possibility of high-energy radiations and the need for television transmitters in spacecraft are considered. In connection with future space flights the following points are briefly mentioned: (1) In flights of several months duration, the regeneration of water must be considered. (2) The food

supply problem can be mitigated by cultivating chlorella algae aboard the spacecraft. (3) The problems arising in connection with earth-moon-earth spacecraft. (4) Assembly of stations in space and the possibility of constructing these stations from the Vostock rockets themselves. The latter solution would greatly reduce the problems of payload.

6,456

Anon. 1962 LECTURES IN AEROSPACE MEDICINE 8-12 JANUARY 1962. (School of Aerospace Medicine, Brooks AFB, Texas) ASTIA AD 281 775

CONTENTS:

History and background of astronautics
Occupational medicine at the launch site
Selection and stress testing of astronauts
Biologic effects of high energy practices in space
Physiologic necessities in simulated lunar flights
Biomedical monitoring in-flight
Weightlessness: a physiological problem in space
Newer aspects of subcellular photosynthesis
Bio-instrumentation for space flight
What can man contribute to operations in space
X-15 operations in pre-lunar studies
Response of mammalian systems to non-uniform space radiation dose
Bio-astronautic support of the X-15 and Dyna-Soar
Interplanetary environment
Extraterrestrial life
Propulsion systems for lunar operation
Ocular effects of particulate space radiation
Monitoring of moon base atmospheres by gas chromatography
The ecologic profile of the moon
Soil-less gardening on the moon
The lunar crust for life support
Who owns the moon
The logistic of re-launch from the moon

6,457

Anon. 1962 MEDICAL AND BIOLOGICAL ASPECTS OF USSR SPACE FLIGHTS
Trans. of Meditsinskii Rabotnik (USSR) 25(72):3, Aug. 17, 1962.
(Joint Publications Research Service, Washington, D.C.)
Nov. 16, 1962 JPRS. 16227

CONTENTS:

Progress in space medicine, By I. Akulinichev
Radio and Space Medicine, by G. Novikov
Cyberentics in Space, by A. Prokhorov and I. Zakharov
The Atmosphere in a Space Ship, by Yu. Ivanov
Biological Problems in Astronautics, by A. Makarchenko.

6,458

Anon. 1962 (MEDICAL WORKER) 1962 (VOL. 25) 6 FEB: SELECTED ARTICLES. Trans. from Meditsinskii Rabotnik (USSR) 25:2-3, 1962, Feb 6. (Joint Publications Research Service, New York, N. Y.) July 13, 1962 JPRS: 14450

6,459

Anon. 1962 NEWS OF THE ACADEMY OF SCIENCES USSR, BIOLOGY SERIES, 1962, NO. 1: SELECTED ARTICLES Trans. of Akademiya Nauk SSR Izvestiya, Seriya Biologicheskaya, 27(1): 84-95, 102-105, 122-130 and 144-150, 1962. (Joint Publications Research Service, New York, N. Y.) April 24, 1962 JPRS: 13562

6,460

Anon. 1962 95 CHASOV V KOSMOSE. (Ninety-five Hours in the Cosmos) Priroda (Moskva), (9):5-7. Sept. 1962. In Russian.

ABSTRACT: This is a brief account of the orbital flights of A.G. Nikolaev and P.R. Popovich in Vostok-3 and Vostok-4 on August 11-15, 1962. The purpose of the flights was to test the effects of space flight on the human organism, the effects of weightlessness on his performance, and to carry out observations which might lead to improvements in space vehicle design, communication systems, and guidance and re-entry systems. Part of the time the cosmonauts took over manual control, part of the time they slept. Data are given on the average pulse rate (78-92, less during sleep) and respiration rate (12-20). The cosmonauts returned to Earth in good physical condition. (Aerospace Medicine 34(8):769, Aug. 1963)

6,461

Anon. 1962 QUARTERLY INDEX AND ABSTRACTS OF TECHNICAL DOCUMENTARY REPORTS (Air Force Systems Command, Washington, D.C.) ASTIA AD-275 745

6,462

Anon. 1962 SOVIETS INDICATE TITOV'S SICKNESS IN ORBIT MAY HAVE BEEN EXTENSIVE Aviation Week and Space Technology, May 7, 1962, p. 35

ABSTRACT: Soviet Maj. Gherman Titov last week minimized the sickness he experienced during his orbital flight, but other Soviet spokesmen strongly indicated that the

effects may have been more serious than has been reported previously. The first signs of sea-sickness were there...they manufactured themselves when I made an abrupt movement of my head," he said. "But my spirits were high, and my capacity for work was not affected. The best proof of this is that I completed my program." In his autobiography, Titov says flatly that the condition was serious enough to cause him to faint. This was contradicted as an error in translation by Myron Sharpe, the American publisher of the autobiography, who said the word "zamer" should have been translated as "remained still" rather than "fainted." (CARI)

6,463

Anon. 1962 SPACE FLIGHT
Trans. of Nauka i Zhizn' (USSR) [illegible] 1962.
(Joint Publications Research Service, New York, N. Y.)
6 Aug. 1962 JPRS: 14737.

CONTENTS:
The Biosphere in the Cabin of a Space Ship, by V. Borisov and A. Sergeev
Manned Interplanetary Flights of Long Duration, by K. E. Tsiolkovskii
Lost and Restored Weight, by B. Viktorov

6,464

Anon. 1962 SPACE PROGRAMS SUMMARY NO. 37-15, VOLUME II, 1 MARCH - MAY 1962. THE PLANETARY--INTERPLANETARY PROGRAM (Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena) Contract NAS 7-100

ABSTRACT: Research and development activities are reported for the following projects and components: Mariner R. Project, Mariner B Project, and Voyager Project.

6,465

Anon. 1962 SPACE SIMULATION FACILITIES
J. Environmental Science 5(2):23-24, April 1962

ABSTRACT: The world's largest combined environmental test facility being built at Edwards Air Force Base, California, features a 30 g centrifuge with a load capacity of 30,000 pounds. The environmental complex is designed to assume any combination of acceleration, vibration, temperature, humidity, and altitude. It integrates in one test system a large centrifuge acceleration test machine, vibration exciter, and temperature and vacuum chamber. Vibration stresses and g forces encountered by missiles and spacecraft during take-off and flight will be simulated by a shaker integrally mounted to the test chamber. A tabulated comparison of thermal vacuum test facilities and the space environment simulator is presented. (Aerospace Medicine 33(10):1280, Oct. 1962)

6,466

Anon. 1962 SURVEY OF FACILITIES FOR SPACE ENVIRONMENT SIMULATION (Aerospace Research and Testing Committee, Washington, D.C.) ARTC Project no. 6-60 ATC Report no. ARTC-30 April 1962.

ABSTRACT: The main body of the report is separated into 11 sections including acoustic test facilities, vibration test facilities, human factors facilities, and general environmental test facilities. These sections explain the function of specific equipment for space environmental simulation. When practical a summary table has been added to the section giving general characteristics of the equipment.

6,467

Anon. 1962 UNPRECEDENTED TANDEM FLIGHT IN SPACE (PRINCIPAL RESULTS). Trans. from Pravda, Moscow (USSR) no. 295(16151) p. 1-3, Oct. 22, 1962. (Joint Publications Research Service, Washington, D.C.) Nov. 6, 1962 JPRS: 16064

6,468

Anon. (U. S. Army) 1961
U. S. ARMY G-91 RECONNAISSANCE JET FIGHTER ACCIDENT. FORT RUCKER, ALA. 1 FEBRUARY 1961
(Cornell-Guggenheim Aviation Safety Center, New York)

ASTIA AD 263 675L

ABSTRACT: Report is made of crash injury investigation involving a U. S. Army G-91 aircraft to determine cause of fatality. Wreckage was examined at crash site, photographs obtained, and reconstruction of the approximate kinematics of the crash sequence made. It was concluded that the fatal injury was caused by a blow to the head and recommended that the ejection seat, since it is designed to provide safe escape at all altitudes and speeds, be utilized as an escape device in lieu of riding the aircraft in a crash landing, with the exception, possibly, of crash landing on a well prepared surface or runway. (AUTHOR)

6,469

Anon. (U. S. Army) 1960
U. S. ARMY NATIONAL GUARD H-23C HELICOPTER ACCIDENT, PHOENIX, ARIZONA 8 DECEMBER 1960
(Cornell-Guggenheim Aviation Safety Center, New York)
Rept. no. AvCIR 61-3 July ASTIA AD 263 674L

ABSTRACT: A U.S. Army National Guard H-23C helicopter, Serial No. 56-2273, crashed on 8 December 1960 in a flat, unpopulated area north of Phoenix, Arizona, while on a night proficiency flight.

At the time of the crash, only the pilot was aboard the aircraft.

The helicopter was extensively damaged and the pilot was thrown clear of the wreckage without sustaining injuries. A crash injury investigation of the accident was conducted on 8-9 December 1960 Aviation Crash Injury Research (AvCIR) under the provisions of a U. S. Army Transportation Research Command contract. The investigation revealed that the latch on the pilot's safety belt had not been securely fastened. As the pilot flexed forward at impact, the belt opened and he was thrown back-first, feet-up, through the upper portion of the canopy. It was noted during the investigation that there was no shoulder harness installed in the aircraft. (AUTHOR)

6,470

Anon 1963 AN IMPROVED PRESSURE SUIT FOR X-20 PILOTS
Astronautics and Aerospace Eng. 1(10):155

ABSTRACT: "--One that can be worn up to 36 hr without discomfort and which will provide 25% more mobility than earlier models--has been announced by the Air Force. The suit features an immobile helmet like that used in the suits of the Soviet cosmonauts; the pilot's head can turn inside the helmet, which will have a wider visual area than earlier models. Joints are eliminated by designing a "distorted angle" inner fabric which will permit knee bends and other movements of the arms and legs. The suit itself is designed for a mixed gas mixture (60% nitrogen, 40% oxygen) during orbital flight, but the pilot may switch to 100% emergency oxygen should cabin pressure drop, and the suit will incorporate an emergency supply of pure oxygen sufficient for 11 min, or equivalent to a free fall of 100,000 ft."

VIBRATION

A

1

Ackerman, E. 1952 CELLULAR FRAGILITIES AND RESONANCES OBSERVED BY MEANS OF SONIC VIBRATIONS.
Journal of Cellular and Comparative Physiology, 39(2):167-190, April 1952,

ABSTRACT: Vibrating plate transducers have been developed which have sufficient sonic output to produce cellular destruction from 200 cps to 20,000 cps. These are convenient to use because their frequency can be varied and their sonic output measured.

Using this equipment we find that cellular destruction obeys the equation:
$\log N/N_0 = KVt$
Where:
N_0 = the original cell concentration;
N = the cell concentration after exposure to the sonic field;
V = a number proportional to the space average of the peak velocity of the diaphragm;
t = the time of exposure; and
K = the breakdown constant.

It is found for all cells that K is independent of frequency throughout most of the audible range. Although the absolute value of the breakdown constant, K, has no significance, the relative value for various cells is interpreted as a measure of mechanical fragility. Values of K, based on K = 1 for human r.b.c., range from 0.01 to 16. The values do not depend on the size along; they are a quantitative measure of the mechanical fragility.

Paramecium species and Blepharisma have characteristic frequency ranges in which they are much more sensitive to the effects of the sonic field. Differential counts on mixtures of two species show that these are true cellular resonances and not due to errors in measurement of the sonic ouput. Experiments on a Blepharisma species with and without its pellicle show that the pellicle is not the seat of the resonance. They also show that the pellicle reduces the mechanical fragility by a factor of two.

The cellular resonances can be interpreted in terms of two cell models. One model considers the cell to lack rigidity, but to be surrounded by a membrane with an interfacial tension. This leads to values of 3 to 10 dynes/cm for the interfacial tension. The second model, that of a cell surrounded by a rigid shell, leads to a coefficient of rigidity of about 10^4 dynes $/cm^2$. Since both the values are plausible the evaluations of these constants are not inclusive. Moreover, overtones predicted by the theories are not yet found.

2

Ackerman, E., J.J. Reid, H. Kinsloe & H.W. Frings 1953 BIOLOGICAL EFFECTS OF HIGH-INTENSITY SOUND WAVES. (Wright Air Development Ctr., Air Research and Development Command, Wright-Patterson AFB, Ohio) WADC TR 53-82, Jan. 1953. ASTIA AD 26848

ABSTRACT: Studies on the effects of high frequency and high intensity sounds on bacteria and living animals and cells carried out by the departments of Physics, Bacteriology, and Zoology and Entomology are described and critically discussed.

3

Ackerman, E., A. Anthony, R. L. Berger, A. J. Campanella, P. A. Danner, R. W. Farwell, H. W. Frings, F. Oda, L. Tu 1957 SOUND ABSORPTION AT THE SURFACES OF SMALL LABORATORY ANIMALS. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 57-461; ASTIA AD-130 946.

ABSTRACT: This report describes the theory, equipment and experimental results of the measurement of the acoustic absorption coefficients for the surfaces of rats, guinea pigs, and haired and hairless mice. These coefficients were measured at The Pennsylvania State University by various methods in the frequency band from one to twenty kilocycles per second. All experiments showed that the absorption coefficients rise between six and twenty kc. Those for the haired animals approached 100%. Hairless mice, on the other hand, had lower absorption coefficients. These were still appreciably higher than corresponding absorption coefficients for humans. The data for haired rats are consistently higher but in reasonable agreement with those obtained by others. The acoustic absorption coefficients for both haired and hairless animals in a randomly oriented sound field appear to be due at least in part to the excitation of surface waves.

4

Ackerman, E. & Fujio Oda 1962 ACOUSTIC ABSORPTION COEFFICIENTS OF HUMAN BODY SURFACES (Pennsylvania State U., University Park) Contract AF33(616)-27770, MRL-TDR-62-36 April 1962 ASTIA AD 283 387.

ABSTRACT: Reverberation chamber decay times were measured with and without human body surfaces exposed to the sound field. From these measurements acoustic absorption coefficients were computed for human body surfaces. These were all small compared to similar coefficients for laboratory animals. Typica values for the absorption coefficients measured for human body surfaces were in the range of 1 to 2 percent. Little variation was found from 1 to 20 kc. Measurements were not made outside of these limits. The results are discussed and compared with other values obtained by different methods. (Author)

5

Ades, H.W., H.Davis, D.H. Eldredge, H.E. von Gierke, et al. 1953
BENOX REPORT: AN EXPLORATORY STUDY OF THE BIOLOGICAL EFFECTS OF NOISE.
(The University of Chicago) 1 December 1953. ASTIA AD 24685

ABSTRACT: The BENOX group was organized to make a survey of existing information, to conduct preliminary experiments, and to make recommendations as to the course of action to be followed in order that men can continue to perform effectively in situations where intensity levels of noise are very high. Noise levels to which men are now routinely exposed are great enough to produce temporary hearing losses and, if exposures are repeated frequently over a period of weeks or months, to produce permanent damage to the inner ear. Evidence of physiological effects other than loss of auditory acuity has not been clearly demonstrated although excessive fatigue occasional nausea, and loss of libido are common complaints of men working in noise. The use of ear defenders to prevent excessive stimulation of the central nervous system by way of the auditory and, perhaps, vestibular end-organs should provide partial protection, at least, from these more general stress reactions which appear to be taking place.

6

Ades, H.W., A. Graybiel, S.N. Morrill, G.C. Tolhurst and J.I. Niven
NYSTAGMUS ELICITED BY HIGH INTENSITY SOUND.
(U.S. Naval School of Aviation Medicine, Pensacola, Fla.)
Proj. No. NM 13 01 99, Report No. 6, 15 Feb. 1957. ASTIA AD 138 472.

ABSTRACT: In order to study some of the extra-auditory effects of loud noise, deaf subjects were stimulated by high intensity sound, both pure tone of several frequencies and wide band noise. In those showing positive response to vestibular stimulation in one or more standard tests, nystagmus was regular consequence when the noise was of a sufficiently high intensity. Curves are shown, comprising the thresholds at six frequencies of pure tone and for the noise of a jet engine. Dizziness and apparent movement in the visual field were in some cases regular concomitants of nystagmus, in others, less consistent.

7

Ades, H. W. et al 1958 NON-AUDITORY EFFECTS OF HIGH INTENSITY SOUND STIMULATION ON DEAF HUMAN SUBJECTS
J. of Aviation Medicine 29(6):454-467, June 1958

ABSTRACT: Deaf human subjects were exposed to pure tone and wide-band noise at sound pressure levels up to 170 db. Subjective responses reported include vibration, tickle, warmth, pain, and dizziness with some descriptive variants of each. Thresholds for each type of sensation have been determined for several subjects at each test frequency. The most sensitive frequency range for all the aforementioned sensations is that of from 200 to 1000 cps.

Noise of sufficiently high intensity is found to induce nystagmus in subjects having appreciable residual labyrinthine function. Thresholds of nystagmus in serveral subjects have been determined at each test frequency, and frequency-intensity curves for this phenomenon are shown; lowest thresholds (120 to 130 db.) are found in the frequency range of from 200 to 500 cps. Subjective reports related to the nystagmus include feelings of dizziness and observation of apparent movement when instructed to fixate on a luminous vertical line. Hemorrhage of the tympanic membrane is a further consequence of high level noise exposure; the susceptibility to this damage varies individ-

8

Ades, H.W., A Graybiel, et al. 1958 NON-AUDITORY EFFECTS OF HIGH INTENSITY SOUND STIMULATION ON DEAF HUMAN SUBJECTS
(Naval School of Aviation Medicine, Pensacola, Florida) Project No. NM 13 01 99, Rept. No. 5; ASTIA AD-208 011.

ABSTRACT: Noise of sufficiently high intensity (such as that produced by jet engines) is known to affect sensory systems other than the auditory. It is suspected that in some instances this may have adverse effects on various aspects of neural and neuromuscular function. It is necessary that these non-auditory effects of noise be studied systematically. Since it is not feasible to expose normal subjects to high intensity noise to the extent required by such a study, because of the danger of hearing loss, deaf subjects were employed as they have nothing to lose, acoustically speaking.

Several types of subjective responses were reported by deaf subjects exposed to pure tone and wide-band noise at SPL's up to 170 db. These include vibration, tickle, warmth and pain, with some descriptive variants of each. Thresholds for each type of sensation have been determined for several subjects, at each of the test frequencies. In general, when these thresholds are plotted as frequency-intensity curves, it is noted the most sensitive frequency range is from 200-1000 cps, the threshold rising rapidly at successively higher frequencies above 1000 cps, and, in some cases, rising slightly below 200 cps.

Objectively, noise of sufficiently high intensity is found to induce nystagmus in subjects having appreciable residual labyrinthine function. Thresholds of nystagmus have been determined for several subjects at each test frequency, and frequency intensity curves for this phenomenon are shown. The lowest thresholds (120-130 db) are found in the frequency range 200-500 cps, rising rapidly above 500 cps. Subjective reports related to the nystagmus include feelings of dizziness and observation of apparent movement when instructed to fixate on a luminous vertical line.

Incomplete data indicate that damage to the tympanic membrane is a further consequence of high levels of noise exposure, and the degree of this damage varies from one individual to another.

9

Adey, W.R., J.D. French, R.T. Kado, D.F. Lindsley, D.O. Walter et al. 1961 EEG RECORDS FROM CORTICAL AND DEEP BRAIN STRUCTURES DURING CENTRIFUGAL AND VIBRATIONAL ACCELERATIONS IN CATS AND MONKEYS.
IRE Transactions on Bio-Medical Electronics 8:182-188, July 1961

ABSTRACT: Electroencephalographic records have been taken from deep regions of the brains of cats and monkeys with chronically implanted electrodes during centrifugal and shaking accelerations comparable to booster forces. Histological and X-ray controls have indicated that displacement of the electrodes does not occur, and that damage to brain tissue is comparable with nonaccelerated animals. A transistorized EEG amplifier suitable for recording in satellite biopack environments has been developed.

In centrifuge tests, transverse accelerations up to 8 G were associated with rhythmic "arousal" patterns of slow waves in hippocampal regions of the temporal lobe during increasing or decreasing acceleration. Longitudinal accelerations between 5 and 6 G produced blackouts after 30 to 40 seconds, with flattening of EEG records, and frequently with induction of epileptic seizure activity in temporal-lobe leads. Shaking tests suggested that vibrational acceleration may be associated with the intermittent "driving" of the cerebral rhythms, in a fashion resembling photic driving, at shaking rates from 11 to 15 cps, and from 22 to 30 cps.

10

Adey, W. R., W. D. Winters, R. T. Kado and M. R. Delucchi 1963 EEG IN SIMULATED STRESSES OF SPACE FLIGHT WITH SPECIAL REFERENCE TO PROBLEMS OF VIBRATION
Electroenceph. Clin. Neurophysiol. 15:305-320, 1963

ABSTRACT: The effects of shaking on the electrical brain activity as recorded in cortical and subcortical structures of four pig-tailed macaques (Macaca nemestrina) are described.

Shaking was performed over a continuous spectrum from 5-40 c/sec, at a peak acceleration of 2 G over the greater part of the spectrum. Driving of brain rhythms at the shaking frequency was noted in the midbrain reticular formation, the nucleus centrum medianum, the visual cortex and the hippocampal system. An essentially different distribution of driving was produced by photic stimulation.

Control procedures indicated that this rhythmic driving was abolished or greatly reduced by pentobarbital anesthesia in both cortical and subcortical structures. It did not arise through sway artifacts in recording leads nor was it due to magnetic flux leakage in the vicinity of the shaking transducer.

The driving was maximal in the frequency range from 9-15 c/sec. At frequencies from 15-20 c/sec, evidence was found of driving at half the shaking frequency. The driving was frequently dissociated in simultaneous records from adjacent brain structures, and from leads in symmetric bilateral placements.

11

Adrian, E. D. 1943 DISCHARGES FROM VESTIBULAR RECEPTORS IN THE CAT. J. Physiol. (London) 101:389-407.

SUMMARY: 1. The impulses from vestibular receptors can be studied in the cat by a fine wire electrode thrust into the brain stem in the region of the vestibular nucleus. The results are in general agreement with those from cold-blooded vertebrates.

2. Discharges in single units belong to one of two main types, gravity-controlled and rotation-controlled. The former depend on the position of the head in space, the latter only on angular accelerations or decelerations. Discharges controlled by horizontal rotation and by the tilt of the head in the median plane are found near the oral border of the striae acusticae, those controlled by lateral tilt and by rotation in the transverse plane are nearer the aboral border. Responses to vibration have not been found.

12

Aerospace Industries Association & Office of Naval Research 1961 SYMPOSIUM PROCEEDINGS: STRUCTURAL DYNAMICS OF HIGH SPEED FLIGHT, LOS ANGELES, CALIFORNIA APRIL 24-26, 1961 (U.S. Office of Naval Research, Washington, D.C.) ONR ACR-62 Volume I. ASTIA AD 264 140.

ABSTRACT: These proceedings are issued in two volumes. Volume I contains the twenty-five unclassified papers. Volume II contains the five classified talks. Subjects covered are flutter and vibration, missile system dynamics, dynamic loads, high-temperature effects, and environmental vibration.

13

Aerospace Industries Association of America, Inc. 1962 SURVEY OF FACILITIES FOR SPACE ENVIRONMENT SIMULATION.
(Aerospace Industries Association of America, Inc., Aerospace Research and Testing Committee, National Standards Association, Inc., Washington, D.C.) ARTC Project No. 6-60; ATC Rept. No. ARTC-30; April 1962.

ABSTRACT: The main body of the report is separated into 11 secions including acoustic test facilities, vibration test facilities, human factors facilities, and general environmental test facilities. These sections explain the function of specific equipment for space environmental simulation. When practical a summary is given of the characteristics of the equipment. (Author)

14

Agashin, Yr. A., & V. G. Artamanova 1962 [SCIENTIFIC SESSION ON HYGIENIC SIGNIFICANCE OF VIBRATION AND CLINICAL ASPECTS OF VIBRATION SICKNESS.] Gig sanit (Moskva) 27(5):104-106, May 1962 (Russian)

ABSTRACT: A scientific session on the hygienic significance of vibration

and the clinical aspects of vibration sickness, organized by the Leningrad Sanitation Hygiene Medical Institute and the Ministry of Health RSFSR, was held from December 12 to 15, 1962, in Leningrad. More than 200 Soviet scientists, engineers, and industrial-hygiene physicians participated, and more than 50 reports were presented.

15

Aiken, E.G. 1956 COMBINED ENVIRONMENTAL STRESSES AND MANUAL DEXTERITY. (Army Med. Res. Lab., Fort Knox, Ky.) AMRL Rept. No. 225, 7 Dec. 1956. ASTIA AD 89327.

ABSTRACT: Environmental extremes of noise, illumination and temperature were found to depress significantly the motor skills involved in a simulated line maintenance task. Individual prediction for speed and accuracy of performance under stress is poor.

16

Aleksandrov, N. 1960 RETURN FROM SPACE
Sovetskaya aviatsiya P. 3; 30 August 1960

17

Andreyeve-Galanina, Y.T. 1962 THE QUESTION OF PHYSICAL-HYGIENIC EVALUATION OF PULSE OSCILLATIONS. Gigiyeniya i sanit. (Moscow) 67-71 (Joint Publications Research Service, Washington, D.C.) JPRS-14974, 27 Aug. 1962.

ABSTRACT: The study of physical-hygienic evaluation of pulse oscillations in the human organism is discussed. The most important factors in such studies is the establishment of indices which do not cause pathologic changes in the organism and their quantitative expression. For the accomplishment of this tasks, it is necessary on the widest scale to set up experimental models, primarily using sinusoidal oscillations. It is also necessary to carry out clinical studies using physiological and biochemical methods for the establishment of the early changes which cannot be detected by ordinary clinical methods The hardness, the duration, the number of shocks per second, and the amplitude of the pulse oscillations should be obtained. It is especially necessary to determine the changes of acceleration with respect to time, since this is a combined index of hardness and is the most stable index.

18

Annenskiy, F.D. 1961 [SPACE PSYCHOLOGY]
Nauka i zhizn' (2): 33-39

ABSTRACT: The article investigates the various psychological problems and stresses which future astronauts will probably have to face. Experiments with animals in the second and third Soviet space ships indicate that the body can withstand the physical stresses of space flight and weightlessness. Man may find it more difficult to orientate himself in space and time during space flight because of the lack of succession of day and night and because of the absence of an "up" or a "down" in a state of weightlessness. At first the astronaut will have difficulty in judging the duration of an occurrence. The experience of the space dogs, however, indicated that they preserved some sense of time and rapidly adjust themselves to the situation. An aiding factor here would be the "time metronome" in the brain, i.e., the regular rhythm of 12 oscillations a second in the bioelectric activity of the brain. The astronaut will not be conscious of motion, noise or (except during the active phase of the flight) vibration. Prolonged isolation of this sort can cause various psychic disturbances and halucinations. The author feels, however, that an astronaut will be assisted by the routine instrument readings and observations he will have to make. Drugs may also be used to combat tiredness or insomnia. The general conclusion is that man is sufficiently adaptable to overcome any

19

Anthony, A. & E. Ackerman 1955 EFFECTS OF NOISE ON THE BLOOD EOSINOPHIL LEVELS AND ADRENALS OF MICE.
Journal of the Acoustical Society of America, 27:1144-1149

ABSTRACT: Physiological changes are described following exposure of mice to single and intermittent noise stimulation (110 db re 0.0002 dyne/ cm^2 cm^2, 10-20 kc) for varying lengths of time. Attention is focused on the degree of adreno-cortical activation as measured by cytological changes in the adrenal gland and fall in the number of circulating eosinophils. Since the observed changes were transient, of short duration and no evidence of systemic pathology could be detected, the noise was described as not harmful. The tendency of certain investigators to regard noise as an injurious, nonspecific stress stimulus without specifying the exact nature of the noise situation does not seem justified.

20

Anthony, A., 1955 EFFECTS OF NOISE ON EOSINOPHIL LEVELS OF AUDIOGENIC-SEIZURE SUSCEPTIBLE AND SEIZURE-RESISTENT MICE.
Journal of the Acoustical Society of America, 27:1150-1153

SUMMARY: The occurrence of a diurnal rhythm in circulating eosinophil levels is described in two strains of albino mice selected on the basis of audiogenic seizure susceptibility. Daily exposure of seizure-susceptible and

seizure-resistant mice to a single short noise burst from 15-50 days of age did not abolish or alter this rhythm, provided a recovery period was allowed between the last stimulation and time of testing. A single noise stimulus was followed by a moderate eosinopenia in nonseizure-susceptible mice and a marked eosinopenia in seizure-susceptible mice in about 3 hours; with complete recovery in both cases within 24 hours. A more prolonged eosinopenia occurs with several successive noise bursts- a moderately low level (ca 250 eosinophils/ cu mm of blood) in seizure-resistant mice and to very low levels (ca 100 eosinophils/ cu mm of blood) in mice which went into 2-4 convulsions during treatment.

21

Anthony, A. 1956 USE OF LABORATORY ANIMALS IN NOISE STUDIES
Noise Control 2(2): 83,94. March 1956

ABSTRACT: It is evident that one has to consider two separate aspects when dealing with studies of noise and its effects on humans: one involves the direct effects of sound vibrations on the ear membrane or the inner-ear apparatus; the other involves the analysis of secondary changes in organs other than the ear that may result from the activation of certain endocrine glands by acoustic stimulation or trauma. The reason for choosing laboratory animals rather than humans for noise studies resolves itself simply to the need for doing controlled experiments. Interpretations of how noise affects animals gain validity to the extent that one has information on the following: (a) previous noise history of the animal, (b) description of the noise stimulus, (c) time interval between exposure and autopsy, (d) analysis of tissue changes in various organs, and (e) possible role of extraneous factors in causing these changes. These conditions are usually met by obtainong or rearing animals of known genetic background and studying noise-exposed and unexposed control animals simultaneously under controlled laboratory conditions. Since humans are ill suited as experimental subjects for basic studies of this sort, the laboratory animal will continue to be indispensible in providing us with sound approaches to the solution of many human problems

22

Anthony, A. 1956 CHANGES IN ADRENALS AND OTHER ORGANS FOLLOWING EXPOSURE OF HAIRLESS MICE TO INTENSE SOUND. J. Acoust. Soc. Amer. 28(2):270-274, Mar. 1956

ABSTRACT: The systemic effects of local abdominal and scrotal skin exposure to moderately high (150 db., 18 kc., without skin heating) and high (160-168 db., 20 kc., with skin heating) levels of air-borne sound were studied in hairless mice. Areas of the body not under study were protected from noise exposure by shielding. Examination of control mice revealed that 10 minute daily immobilization for one to three months was sufficiently stressful to cause hypertrophy of the adrenal cortex and involution of the thymus. The adrenal response was increased in immobilized mice exposed to moderately high levels of sound. The absence of gonadal damage and the occurrence of only slight changes in the hemopoietic system in both groups indicated that the animals were exposed to only mild stress stimuli. The local and systemic response to more intense sound was similar to that observed after ordinary skin burns, and was attributed to the stress of heating rather than sound. (AUTHOR)

23

Anthony, A., & E. Ackerman 1957 BIOLOGICAL EFFECTS OF NOISE IN VERTEBRATE ANIMALS (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 57-647; ASTIA AD-142 078.

ABSTRACT: This report deals with the stress effects of noise on bodily functions other than hearing. It includes physiological, biochemical and behavioral effects of intense acoustic noise at low and high frequencies. Specific approaches employed are as follows: (1) flame spectrophotometric analyses of serum electrolytes, (2) serum ascorbic acid and blood sugar changes, (3) changes in adrenal and plasma cholesterol, (4) behavioral changes in noise exposed rats, mice and guinea pigs, (5) relationship of seizure-susceptibility to noise stimulation and (6) design and construction of a corona speaker for use in bioacoustic studies. It was demonstrated that short daily exposures to intense noise of about 132-140 db pressure levels can act as a physiological stress to which rats, mice and guinea pigs can satisfactorily adapt. These studies have also helped clarify the nature of the normal physiological defense mechanisms to excessive noise stimulation. By investigating the factors determining the severity of noise as a stress stimulus and using objective measures of the limits of endurance of animals to different types of intense noise situations, one can more intelligently cope with the problem of preventing noise from becoming a serious health menace to man.

24

Anthony, A., & E. Ackerman 1959 STRESS EFFECTS OF NOISE IN VERTEBRATE ANIMALS (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 58-022, September 1959 ASTIA AD 230 976

ABSTRACT: Rats, mice and guinea pigs were exposed to noise in two frequency ranges (150-4800 cps and 2-40 kc) at a sound pressure level of 135-140 db. Exposure time was 20-40 hours per week for 2 to 9 weeks. Stress response of the animals was measured by changes in the adrenal glands and other organs. It was most severe in animals exposed for the longest time to high frequency noise.

25

Arduini, A., G. Moruzzi, & C. Terzuolo 1950 ON THE MECHANISM OF THE ELECTRICAL SILENCE FOLLOWING CEREBELLAR STIMULATION. (Paper, The American Physiological Society, Fall Meeting, Columbus, Ohio, Sept. 13-16, 1950.)

ABSTRACT: Using cats decerebrated at the intercollicular level, the anterior lobe of the cerebellum or the bulbar inhibitory reticular formation were stimulated electrically for 30 sec. using one msec. rectangular pulses at a frequency of 280/sec. Stimuli reaching complete inhibition of decerebrate rigidity and myotatic reflexes were never followed by cessation of electrical activity in the stimulated area of the cerebellum or neighboring regions of the anterior lobe. A short lasting localized electrical silence was obtained only after cerebellar stimuli which were definitely supramaximal for the inhibition of myotatic reflexes and tonus. This effect of supramaximal stimulation was not prevented by mid-pontine transection. The hypothesis (Gualtierotti et al., J. Neurophysiol. 12:363, 1949) that cerebellar extinction following local stimulation is due to reverberating cerebello-ponto-cerebellar circuits, i.e. brain stem inhibition, is thus disproved by these experiments. (American J. Physiology 163:696, Dec. 1950)

26

Aring, C. D., & W. O. Frohring 1942 APPARATUS AND TECHNIQUE FOR MEASUREMENT OF VIBRATORY THRESHOLD AND OF VIBRATORY "ADAPTATION" CURVE. J. Lab. & Clin. Medicine 28:204-207, Nov. 1942.

ABSTRACT: An instrument for the quantitative measurement of the threshold of vibratory appreciation is described.

27

Arkad'evskii, A. A. 1962 [ON THE COMBINED EFFECT OF VIBRATION AND NOISE ON THE HUMAN BODY.]
Gig Sanit. 27:25-29, Oct. 1962 (Russian) (United States Air Force, Foreign Tech. Division, Wright Patterson, Ohio) FTD-TT-63-292.

28

Armstrong, J.J.P. 1931 MECHANICAL VIBRATION.
Phys. Therapeutics, 49:311-314

ABSTRACT: This paper is a report of the Committee on Mechanical Vibration Therapy and Apparatus read at the fortieth annual meeting of the American Physical Therapy Association, Chicago, October, 1931. Questionnaires were sent to 380 members and over two hundred replied. From the replies, these conclusions were drawn: (1) 116 members use vibrators and 103 do not use vibrators. (2) The vibrator is useful in examination, diagnosis, and for general tonic treatment. (3) Mechanical vibration fills an important place in the aftertreatment of fractures, in the treatment of cardiovascular diseases, and in splanchnic relaxation. It is also valuable in the treatment of conditions amendable to massage.

29

Arnould, P., & R. Blanchet 1956 L'ACTION DU BRUIT SUR LA FORMULE LEUCOCYTAIRE CHEZ LE COBAYE. (THE EFFECT OF NOISE ON THE LEUCOCYTE PICTURE IN THE GUINEA PIG). Comptes rendus de la Société de biologie (Paris) 150(11):1972-1974

ABSTRACT: Guinea pigs exposed 6 hours daily for 1 or 5 days to pure tones of 2400 or 520 c.p.s. at 100 db. showed an increase in neutrophils and eosinophils, and a decrease in lymphocytes immediately after exposure. The effect was apparently greater in animals exposed to the higher frequency.

30

Arsen'eva, M.A., V.V. Antipov et al 1961 IZMENENIIA V KROVETVORNYKH ORGANAKH MYSHEI POD VLIIANIEM POLETA NA KORABLE-SPUTNIKE (CHANGES IN THE HEMATOPOIETIC ORGANS OF MICE UNDER THE INFLUENCE OF FLIGHT IN A SPACESHIP) Iskusstvennye sputniki zemli (Moskva) 10: 82-92, 1961

ABSTRACT: The effect of space flight conditions was studied on the hematopoietic organs of 40 black S-57 strain mice and white mice sent up in the 2nd sputnik. An attempt was made to differentiate between the action of vibration, acceleration, and radiation. All animals were returned to earth in good condition. Chromosome disintegration during mitosis in the bone marrow cells was significantly increased in the experimental animals as compared to controls. The findings differed from the results of x-ray studies in that the frequency of chromosome destruction did not decrease prior to the end of the experiment and mosaicism in chromosomal changes was almost completely absent. Thirty days after the return to earth myelopoiesis increased sharply, manifested in an increased number of nyeloblasts, promyelocytes, and myelocytes. Three days after the return the number of megacaryocytes in the spleen decreased. Certain other changes noted in the hematopoietic organs are presumed to be caused by vibration and other adverse factors in flight. (Aerospace Medicine 33(11): 1395-1396, Nov. 1962)

31

Ashe, W.F. 1960 PH"SIOLOGICAL AND PATHOLOGICAL EFFECTS OF MECHANICAL VIBRATION ON ANIMALS AND MAN (National Institutes of Health, Washington, D.C.) RF Project 862, Progress Report No. 3, September 1960.

32

Ashe, W.F., E.T. Carter, G.N. Hoover, L.B. Roberts, E. Johanson, F. Brown and E.J. Largent. 1961 SOME RESPONSES OF RATS TO WHOLE BODY MECHANICAL VIBRATION: PART I. Archives of Environmental Health. 2: 369-377

ABSTRACT: Whole body vibration of unrestrained rats at comparable frequencies and amplitudes shows that the horizontal plane is less stressful than the vertical plane. In any given plane the observed and measured differences to changes in frequency and amplitude indicate that both factors play a role. Calculations indicate that the common denominator is not simply acceleration. No definite evidence of acclimatization to mechanical vibration was demonstratable in these studies.

33

Ashe, W. F. 1961 PHYSIOLOGICAL AND PATHOLOGICAL EFFECTS OF MECHANICAL VIBRATION ON ANIMALS AND MAN. (Ohio State University Research Foundation, Columbus) Progress Rept. No. 862-4; pt. 1, 1 July 60 - 31 Aug. 61. ASTIA AD-265 931

ABSTRACT: Rat Studies: Metabolic and growth responses of unrestrained rats to repeated exposures of vibration and effects of vibration on pregnant rats. Dog Studies: General responses of dogs to whole-body vibration; blood pressure responses to whole-body vibration in anesthetized dogs; and blood flow in arteries of vibrated animals. Human Studies: Human psychomotor performance during prolonged vertical vibration; oxygen consumption during human vibration exposures; respiratory frequency, tidal volume, and respiratory minute volume in human subjects exposed to vertical whole-body vibration; skin resistance (psycho-galvanic response) during whole-body vibration; body surface responses of standing male subjects subjected to vertical vibrations; occupational Raynaud's phenomena due to vibrating tools; and detection, recognition and identification of visual forms as a function of target size and whole-body vibration (ASTIA)

34

Askania-Werke AG (Berlin-Friedenau, Germany) 1956 VERTICAL FLAT SPRINGS SUSPEND OSCILLATING MASS. Design News 11:50, 1 Mar. 1956.

ABSTRACT: Four vertical flat springs and a single helical spring suspend the oscillating mass in a test instrument designed to measure and record deceleration rates of moving vehicles. Attached to the stationary base plate, the spring permits the mass to oscillate in the direction of motion. Natural frequency is approximately 5 cps. The semi-aperiodic damping unit consists of a rubber bellows which expels the air through a rubber hose and a replaceable carburetor jet.

35

Atchison, S.C. 1960 SHOCK DATA HANDLING SYSTEMS AT DAVID TAYLOR MODEL BASIN (Paper, 28th Symposium on Shock, Vibration and Associated Environments, The Departmental and Commerce Auditoriums, Washington, D.C., February 9-11, 1960) In ASTIA AD 244 857

ABSTRACT: The David Taylor Model Basin has recently revamped its methods of handling large quantities of shock data. New methods incorporate high-speed digital computer techniques and types of components which may be useful to others involved in correcting, reducing, and interpreting large quantities of transient data. Computer programs for computing the response of mechanical systems to transient inputs, e.g., shock spectra, are also available.

36

Awaji, Eniro 1944 EFFECT OF VIBRATION ON HUMAN BODY (Tokyo Imperial University JAP-TIU-ARI-RE292, May 1944

VIBRATION

B

37

Balakhovskii, I.S. & V.B. Malkin 1957 BIOLOGICAL PROBLEMS OF INTERPLANETARY FLIGHTS
(USAF Proj. Rand, Santa Monica, Calif.) Res. Memo. RM-1922, 21 June 1957. Pp. 81-86.
Original Source: Priroda 45: 15-21, Aug. 1956.
German Translation in Naturwissenschaft Rundschau 10: 173-177, 1957.

38

Barykin, K. 1960 BEFORE THE LEAP INTO SPACE
Sovetskaya Rossiya P. 4; 17 May 1960.

39

Beaupeurt, J.E., 1960 HUMAN VIBRATION PROBLEMS ASSOCIATED WITH LOW ALTITUDE FLIGHT. (Paper, presented at Armed Forces-National Research Council, Committee on Hearing and Bio-Acoustics Annual Meeting, Washington, D.C., November 16, 1960)

40

Beckhardt, A.R., J.A. Harper & W.L. Alford 1950 A PRELIMINARY FLIGHT INVESTIGATION OF THE EFFECT OF SNAKING OSCILLATIONS ON THE PILOTS' OPINION OF THE FLYING QUALITIES OF A FIGHTER AIRPLANE.
(NACA, Langley Aeronautical Lab., Langley AFB, Va.) NACA RM-L50E17a, 26 Sept. 1950. ASTIA AD 88079

ABSTRACT: A preliminary flight investigation of the effect of small-constant-amplitude snaking oscillations on the pilots' opinions of the general flying qualities of a fighter airplane was made. The test airplane, which was equipped with a device for varying the damping in yaw, was a typical high-speed low-wing fighter.

The results showed that, in general, the pilots' perception of the snaking oscillation was mainly dependent on the transverse acceleration which the oscillation produced. As soon as the transverse acceleration during the snaking oscillation reached a value that the pilots could perceive, the oscillation became objectionable from the standpoint of pilot comfort. In this airplane an amplitude of $\pm$.0.02 g was not always perceptible to the pilot, but on occasion was noticed. An amplitude of $\pm$0.08g was considered very unsatisfactory for any mission that this aircraft might perform.

The effect of the snaking oscillation on the efficiency of the airplane as a gun platform and the results of a check on the present service requirements for dynamic lateral directional stability are also discussed A brief discussion of the design characteristics of the test apparatus used to vary the damping in yaw is also presented.

41

Beckman, Merl R. 1960 A CRITIQUE OF THE TECHNIQUES USED IN THE MEASUREMENT, ANALYSIS, AND SIMULATION OF MISSILE VIBRATION ENVIRONMENT (Paper, 28th Symposium on Shock, Vibration and Asscciated Environments, The Departmental and Commerce Auditoriums, Washington D.C., February 9-11, 1960) Published in ASTIA AD 244 857.

ABSTRACT: The vibration qualification tests performed on missile equipment in the laboratory typically are very different from actual flight environments. Some causes may be found in the confusion that exists within the fields of vibration measurement, data analysis, and laboratory simulation. Even more important is the lack of coordination that exists between these specialties.

This paper deals primarily with the shock and vibration problem in missiles, but it would not be out of context to apply many of its conclusions to other electromechanical devices.

42

Beech Aircraft Corp. 1952 BIG PLANE TURBULENCE CAN CAUSE A FLIGHT HAZARD. (Beech Aircraft Corp.) Safety Suggestions No. 8

43

Beilin, E. A., & G. Yu. Dzhanelidze 1961 SURVEY OF WORK ON THE DYNAMIC STABILITY OF ELASTIC SYSTEMS. Prikl. Mat. Mekh. 16:635-648, 1952 (Translated by Trirogoff, K. N., & R. M. Cooper, Aerospace Corporation, El Segundo, California) Contract No. AF 04(647)-930; Report No. TDR-930 (2119)TN-2; 15 Nov. 1961

ABSTRACT: This report presents a survey of work published in the USSR on the problem of dynamic stability of elastic systems during the period 1924-1951. The paper is divided into three sections: 1) an analysis of early investigations, 2) an account of certain general theorems, and 3) a discussion of recent work (up to 1951). The problem of dynamic stability is directed to studies of the motions of elastic systems subjected to time-dependent external loads. The generalization of the Euler problem to the case of time-dependent forces is the classical prototype of these problems. The time-dependent external forces are applied in such a way that the corresponding time-independent loads, equivalent in direction and point of application, are able to induce loss of stability. (AUTHOR)

44

Bekesy, G. von. 1939 SENSATIONS OF VIBRATION. (Uber die Vibrationsemfindung) Akustich Zeit. 4: 316-334

ABSTRACT: The diffusion of mechanical vibration and the isolation of resonance in the human body are investigated. From the sensation of pressure and vibration it becomes evident that they occur through two different nerve types which have separated themselves spatially in the vicinity of the fibrous root. The frequency dependence of the vibration threshold is continously measured and it appears, through impedance measurements of the surface of the skin, that the sensation of vibration is not determined by the alternating pressure, but by the magnitude of deformation. Finally, an arrangement for the subjective measuring of vibration force is given.

frequency even smaller masses of the body were displaced in vibration.

By means of a horizontal pendulum the threshold of horizontal vibration were also investigated. At the same time the appearance of the vetebral column could be observed.

45

Belsheim, R. O., & J. W. Young 1960 MECHANICAL IMPEDANCE AS A TOOL FOR SHOCK OR VIBRATION ANALYSIS. (Naval Research Lab., Washington, D. C.) Project Nos. NS 711-105 and NR 501-000; NRL Rept. No. 5409. ASTIA AD-234 227.

ABSTRACT: This report introduces mechanical impedance to those already familiar with classical vibration theory. The impedance term is defined and discussed in detail. The analog between mechanical and electrical systems is noted and electrical circuit theorems which are especially applicable to mechanical systems are presented. In order to provide an introduction to the impedance concept, several simple mass-spring-dashpot systems are analyzed to obtain their impedance and the results are presented graphically. Since most structures are too complicated to yield to an analytical determination of impedance, methods for experimentally measuring mechanical impedance are discussed. Applications of impedance techniques for the general analysis of some shock and vibration problems are discussed. Material throughout the report is referenced and a fairly complete bibliography is included for those who would like more detailed information. (AUTHOR)

46

Bendat, J.S., L.D. Enochson et al. 1961 THE APPLICATION OF STATISTICS TO THE FLIGHT VEHICLE VIBRATION PROBLEM. Rept. for July 60 - June 61 on Dynamic Problems in Flight Vehicles. (Wright-Patterson AFB, Ohio) ASD TR 61-123, Dec. 1961. ASTIA AD 271 913.

ABSTRACT: A critical analysis is presented of the application of statistics to flight vehicle vibration problems. Analytical engineering procedures are proposed for determining statistical properties of a single vibration record, and for establishing the over-all vibration environment from a collection of

vibration records. Jet aircraft and several categories of missiles are broken down into definite operating phases as regards their vibration environment. Simple statistical techniques are developed for reducing the amount of data to be gathered for later processing. Statistical tests are developed for testing fundamental assumptions of randomness, stationarity, and normality. Mathematical and physical distinctions are explained between different information obtained by measuring numerous important statistical parameters, such as an instantaneous amplitude probability density function, or an autocorrelation function. (Author)

47

Benox Report: 1953 AN EXPLORATORY STUDY OF THE BIOLOGICAL EFFECTS OF NOISE (University of Chicago) Contract Ncori-020, Task Order 44, ONR Project NR 144079, 1 December 1953.

48

Benton, M. 1956 DEVICES FOR DAMPING MECHANICAL VIBRATIONS. (Naval Research Laboratory, Washington, D.C.) Bibliography No. 10. ASTIA AD-119998.

ABSTRACT: This bibliography, covering the period 1924- August 1956, includes references to periodical articles and technical report literature which offer information on damping devices.

49

Berry, C.A., and H.K. Eastwood 1960 HELICOPTER PROBLEMS: NOISE, COCKPIT CONTAMINATIONS, AND DISORIENTATION. Aerospace Med. 31(3):179-190

ABSTRACT: Frequent problems noted in helicopter operations are noise, cockpit contamination and disorientation. The noise envelopes for representative helicopters are described, and the improvement in speech interference levels by acoustical design is outlined and suggested for commercial helicopters, for all are noisy. Adequate protection against temporary threshold shifts is afforded by helmets or headsets for crews, and short flight time for passengers. Carbon monoxide is a possible cockpit or cabin contaminant as the helicopters are reciprocating engine aircraft usually with poorly sealed cockpits. The evidence of high cockpit levels is missing. Various methods of evaluation of the hazard are discussed. Disorientation occurred one or more times to all instructor pilots in a helicopter school. Representative narratives describe episodes at night, in weather and under the hood. A new hazard is the possibility of convulsion after photic stimulation by the sun's rays seen through the rotor blades.

50

Besco, R. O. 1961 THE EFFECTS OF COCKPIT VERTICAL ACCELERATIONS ON A SIMPLE PILOTED TRACKING TASK.
(North American Aviation, Inc., Los Angeles, Calif.)
Contract AF 33(600) 42058, Rep. NA 61-47, April 1961.

ABSTRACT: To determine the effects of cockpit vertical acceleration on pilot performance on a single axis pitch tracking task, an experiment was performed using a dynamic flight simulator. The aerodynamic and flight control response data used were representative of the B-70 as of June, 1960, development. Four engineering test pilots performed the compensatory tracking tasks which were varied in frequency and amplitude of command signal excursions. Tests were made under the following motion conditions: no motion, motion due to aircraft response only, aircraft motion plus mild turbulent air, and aircraft motion plus heavy turbulence. Tracking errors were analyzed. (Tufts)

51

Beyer, D.H., and S.B. Sells, 1957 SELECTION AND TRAINING OF PERSONNEL FOR SPACE FLIGHT. J. Aviation Med. 28(1):1-6. See also School of Aviation Medicine, Randolph AFB, Texas, Epitome of Space Flight, Item 35

SUMMARY: The problems of selection and training of space flight crews have been reviewed with tentative proposals based upon present concepts of the characteristics of the early space craft and its probable mission. Because these proposals must be both general and tentative until they are modified by mockups and actual experience supported by research, emphasis was placed on defining problems and presenting the broad outlines of a plan rather than a blueprint. One conclusion which seems of particular interest as a consequence of this analysis is that space flight is not drastically different from most aspects of aviation which are now familiar. When engineers solve the remaining problems of development, it is expected that personnel will be available with the resources and capabilities to undertake the mission. Space flight may thus be approached as the addition of another dimension to the gradual unfolding of the sciences which have already made magnificent accomplishments in powered flight. However, it is necessary that research and interest in the human factors' aspects keep abreast of progress in engineering.

52

Biancani, E., H. Biancani & A. Dognon 1934 [ULTRASONICS AND THEIR BIOLOGICAL ACTION] Presse med. 1503-1506, 1934
See also Rev. actinol 10:161-177, 1934.

.53

Bianconi, R. & J. P. van der Meulen 1963 THE RESPONSE TO VIBRATION OF THE END ORGANS OF MAMMALIAN MUSCLE SPINDLES.
J. Neurophysiol. 26:177-190, Jan. 1963

-54

Bierman, H.R., R.M. Wilder, Jr., & H.K. Hellems 1946 THE PHYSIOLOGICAL EFFECT OF COMPRESSIVE FORCES ON THE TORSO. (Naval Medical Research Institute) Proj. X-630, Report No. 8, 19 Dec. 1946.

-55

Blake, Ralph E. and Torsten Ringstrom 1960 THE INFLUENCE OF MASS AND DAMPING ON THE RESPONSE OF EQUIPMENT TO SHOCK AND VIBRATION
(Paper, 28th Symposium on Shock, Vibration and Associated Environments, The Departmental and Commerce Auditoriums, Washington, D.C., February 9-11, 1960) Published in ASTIA AD 244 857

ABSTRACT: Much present practice in designing for shock and vibration environments is highly conservative because impedance effects have largely been neglected. Theoretical results are reported on the amount of reduction to be expected from such effects and the way in which mass, natural frequency, and damping will influence design stress.

56

Blake, R.E. 1961 APPLICATIONS OF IMPEDANCE INFORMATION.
In: Shock, Vibration and Associated Environment Bulletin No. 30
(Office of the Secretary of Defense, Washington, D.C., January 1962) pp. 29-42, ASTIA AD-273 514

ABSTRACT: Only a few applications of impedance information have yet been made to the solution of engineering problems. However, engineering research is being carried on by several groups to develop methods, apparatus, and theorems for application to some important problems in shock and vibration. The greatest current effort is on developing more effective sound and vibration isolation systems. Improvements in methods of simulation in the testing laboratory are also being studied. Ultimately, any area of shock and vibration work which deals in complicated linear systems should benefit from applications of the techniques and knowledge being developed.

57

Blanchet, R. 1956 CONTRIBUTION A L'ETUDE DU SYNDROME HUMORAL DU AU BRUIT. (CONTRIBUTION TO THE STUDY OF THE HUMORAL SYNDROME CAUSED BY NOISE). (Thesis: Faculté de médecine de Nancy) (Bar-le Duc: Du Barrois, 1956)

ABSTRACT: Sonic vibrations transmitted by air produce, by their effect on hearing, a general body syndrome in both man and animals. Hematological changes produced in guinea pigs by two pure sounds, at an intensity of 100 decibels, consisted of neutrophilic leukocytosis and eosinophilia at a frequency of 2400 hertz, with less significant results at a frequency of 520 hertz. It appears that these changes are mediated by the autonomic nervous system and adrenal cortex which play an active role in the general adaptation syndrome. In addition, experiments concerned with noise, its nature, measurement, general physiological effects, and effects on the ear and blood composition in man and animals are reviewed.

58

Blitch, G. R., & J. Green 1961 STUDY OF THE DISSIPATION OF INTERNAL ENERGY IN A VIBRATING BEAM. (Master's Thesis, Air Force Institute of Tech., Wright-Patterson AFB, Ohio) Rept. No. GAE/Mech 61-10. ASTIA AD-259 420

ABSTRACT: Efforts were devoted to the dissipation of internal energy in a vibrating cantilever beam represented by the area of the hysteresis loop formed by the loading and unloading curves. In a cantilever beam undergoing forced transverse vibration, the phenomenon of internal damping appears as a small non-linear term in equation for the energy contained in the beam due to the deflection of the beam. The energy loss per cycle in the beam, measured by experimental techniques, is equal to the area of the hysteresis loop. The equations of the hysteresis loop contain parameters which are characteristic of the material in the beam. A detailed experimental study, based on the present analysis and design, will determine the nature and applicability of the characteristic parameters. (AUTHOR)

59

Blivaiss, B. D., L. M. Renato and P. Inna 1962 PLASMA 17-HYDROXYCORTICOSTEROIDS IN DOGS AFTER WHOLE BODY VIBRATION
In Proceedings of International Congress on Hormonal Steroids, Milano, Italy, May 1962.

60

MOTION PICTURE

Boeing Company EFFECTS OF VIBRATION ON HUMAN PERFORMANCE: EXPERIMENT I-JUDGMENT OF VIBRATION. (Boeing Company, Wichita, Kans.)
10 min., 16 mm, Color, Sound

61

Boeing Airplane Company 1957 PRELIMINARY STUDY OF AIRCREW TOLERANCE TO LOW-FREQUENCY VERTICAL VIBRATION. (Boeing Airplane Co., Wichita, Kansas) Doc. No. D3-1189, Issue No. 36, 3 July 1957. ASTIA AD 155 642.

62

Boeing Aircraft Co. 1960 BOEING HUMAN VIBRATION FACILITY. (Human Factors Unit, Boeing Aircraft Co., Wichita, Kansas) D3-3301, 28 Sept. 1960.

63

Boeing Co. 1961 A COMPARISON OF SINUSOIDAL AND RANDOM VIBRATION EFFECTS ON HUMAN PERFORMANCE. Report on Research on Low Frequency Vibration Effects on Human Performance. (Boeing Co., Wichita, Kansas) Tech. Rept. No. 2, Document No. D3-3512-2, 28 July 1961. ASTIA AD 261331

ABSTRACT: Ten male subjects performed a complex task during vertical vibration in a preliminary study to compare performance with sinusoidal, constant period random amplitude, and random (aircraft turbulence) vibration. Performance on the three subtasks varied: performance on a tracking task with delayed control-display feedback was differently affected according to type of vibration; no effect was found for a tracking task without feedback delay; and response time did not change. Results were analyzed for consistent trends in vibration effects which could be correlated with mechanical and psychological definitions of vibration for evidence of a human performance transfer function for vibration. Psychological and amplitude bases for this function could not be found, vibration acceleration (g) effects were not clear, and RMS amplitude power was correlated with constancies in performance. It was suggested that testing combinations of RMS and frequency (and related factors) could lead to a performance transfer function permitting transformation of human performance data from sinusoidal to operational vibrating environments (Author)

64

Boes, Anita 1957 BIBLIOGRAPHY OF RESEARCH REPORTS AND PUBLICATIONS ISSUED BY THE BIO-ACOUSTICS BRANCH (1947-1957). (Wright Air Development Ctr., Wright-Patterson AFB, Ohio). ASTIA AD-140 501

ABSTRACT: This bibliography is a tabulation of publications considered to be of lasting interest as a result of research activities. The 164 references are listed under 12 subject headings pertaining to specific areas in physical and biological acoustics. Technical reports and notes, memorandum reports, and the more important journal publications are included. (ASTIA)

65

Boiten, G. G. 1957 ASSESSMENT OF VIBRATION NUISANCE. (BEORDELING VAN TRILLINGSHINDER). (Instituut T. N. O. Voor Werktuigkundige Constructies, Delft) Rept. No. 345, Sept. 1956 (Royal Aircraft Establishment, Library Trans. No. 695, Oct. 1957) ASTIA AD-161 427

ABSTRACT: A brief statement of methods of analysing a particular vibration spectrum or pattern into zones as a preliminary to assessing the vibrational nuisance level of a particular source of vibration. (AUTHOR)

66

Bolds, P.G. 1961 FLIGHT VIBRATION SURVEY OF JRB-52B AIRCRAFT Report for July-November 1956. (Aeronautical Systems Div., Air Force Systems Command, WPAFB, Ohio) ASD TR 61-507, July 1961. ASTIA AD 269 208

ABSTRACT: The JRB-52B aircraft was surveyed to determine the vibration environment existing throughout the vehicle under all flight condidtions expected in service. Approximately 34,000 data points were obtained from 26 separate locations on the vehicle during 7 test flights. The data obtained were evaluated to determine the adequacy of vibration test requirements for long range bomber equipment contained in MIL-E-527A. The data indicated that the vibration test requirements of that specification were satisfactory to simulate the actual environment existing on the JRB-52B aircraft. (Author)

67

Bontchkovsky, V.F. 1928 [EFFECT OF VIBRATION OF FLOOR ON THE ORGANISM OF WORKERS IN MOTOR FACTORIES] Profess. Pat. i gig (Moskva) No. 3, 65-80.

68

Booth, G.B. 1959 RANDOM MOTION TEST TECHNIQUES 1959 Proceedings of the Institute of Environmental Sciences, Pp. 81-86

69

Bouche, R.R. 1961 INSTRUMENTS AND METHODS FOR MEASURING MECHANICAL IMPEDANCE. In: Shock, Vibration and Associated Environment Bulletin No. 30 (Office of the Secretary of Defense, Washington, D.C., January 1962) pp. 18-28, ASTIA AD-273 514,

ABSTRACT: This paper describes the performance characteristics that affect the accuracy of recently developed mechanical impedance heads. The results of calibrations and evaluation tests performed on an impedance head are described. Tests on a simple structure are made to illustrate the suitability of the head for making impedance measurements.

70

Bouche, R. R. 1961 THE ABSOLUTE CALIBRATION OF PICKUPS ON A DROP-BALL SHOCK MACHINE OF THE BALLISTIC TYPE. In 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D. C., pp. 115-122.

CONCLUSIONS: The drop-ball shock machine of the ballistic type is an inexpensive tool for use in the shock and vibration laboratory. Absolute calibrations and comparison calibrations on anvils that produce known accelerations are performed to evaluate pickups designed for shock motion measurements and other purposes. The principle advantage of the drop-ball machine over other shock machines is its capability of producing high acceleration shock motions completely free of high frequency resonances. Acceleration half-sine wave pulses as high as 15,000g and 50 micro-second duration and as low as 460g and 1.5 milliseconds duration have been obtained. It is expected lower accelerations and longer pulse durations could be obtained with larger anvils and balls and by using soft rubber padding on the anvils. However, the need for performing low acceleration shock motion calibrations is lessened since adequate sinusoidal calibration equipment can be used. Wide spread use of the drop-ball shock machine should be useful in evaluating instruments intended for shock motion measurements. It is also a useful tool for experimentally verifying the performance characteristics of acceleration pickups. (AUTHOR)

71

Bouman, H.D. 1935 THE BIOLOGICAL ACTION OF ULTRASONICS Nederland. Tijdschr Geneesk. 79:4631-4647

72

Bowain, A. 1930 VIBRATION AND VIBRATORY WAVES ON AUDITORY MEMBRANE AND TISSUES.
Arch. Intern. Laryngol. 36:769-782.

73

Bradford, R. S., R. E. Kraus, & C. J. Waters 1957 VIBRATION SIMULATION (Jet Propulsion Lab., Calif. Institute of Tech., Pasadena, Calif.) Progress Rept. No. 20-312; Contract DA 04-495-ORD-18. 15 Jan. 1957 ASTIA AD-119 152.

ABSTRACT: Two complex-wave and noise-vibration simulation systems are in operation at this Laboratory. Primarily, these systems simulate the complex-noise vibration environment to which most airborne components are subjected. Through their proper use as a tool in environmental design and research, these systems have become invaluable in increasing the reliability of all such airborne components. Each system basically consists of a programmed input, power amplifier,

vibration shake table, and system equalizer. Successful development of the first of these systems, a 5-kw system, driving a shake table of 600-lb vector force, led to the development of a much larger 40-kw system driving a 3500-lb vector-force shake table, the output acceleration of which duplicates an input-program voltage recorded on FM tape to ±3 db in the frequency band of interest and within the limits of amplifier-grid current and plate dissipation and shake-table excursion. System equalization to obtain this correspondence is provided by peak and notch filters and a graphic equalizer. (AUTHOR)

74

Bramwell, J. C. & A. V. Hill 1922 THE VELOCITY OF THE PULSE WAVE IN MAN. Proc. Rov. Soc. 93:298-306, series B

75

Brennan, J.N. 1957 BIBLIOGRAPHY ON SHOCK AND SHOCK EXCITED VIBRATION. VOL. I (INTRODUCTION AND ABSTRACTS OF TECHNICAL PAPERS) (Pennsylvania State U. College of Engineering and Architecture, University Park) Technical Rept. No. 3, Contracts DA 19-129-qm-386 and DA 19-129-qm-804, September 1957. ASTIA AD 200 830

ABSTRACT: This bibliography consists of three parts. The body of the test consists of an introduction and abstracts of 1168 technical papers on subjects related to shock motion and its measurement. This is followed by Part II, which consists of 6 summaries of abstracts related to subdivisions of the field: Dynamic Behavior of Materials Under Impulsive Loads: Dynamic Behavior of Structures Under Impulsive Loads; Impact Testing Devices; Instrumentation for easuring Impulsive Forces and Motions; The Shock Spectrum Approach to Impact Problems: Mathematical Methods for Investigating Dynamic Behavior of Structures Under Impulsive Loading. The final part consists of an appendix that includes an author index, subject index and the details of the scope of the search that resulted in these abstracts. The final part consists of an appendix that includes an author index, a subject index and the details of the scope of the search that resulted in these abstracts. The abstracts are mainly of papers that have been published in technical journals and of patents. A few government reports are also included. Originally, it was planned to include abstracts of all pertinent government documents in this publication. However it now appears desirable to publish these separately in a subsequent volume, due to the bulk of the material involved and the necessary time that will be required to process it. (Author)

76

Brennan, J. N. n.d. SHOCK AND VIBRATION. ASTIA AD 138 777.

·77

Bridgland, T. F., Jr., W. A. Hijab, & W. A. Nash 1957 FINAL REPORT, AN INVESTIGATION OF GUNFIRE-INDUCED VIBRATION IN AIRCRAFT. (Air Research & Development Command, Air Force Armament Ctr., Eglin AFB, Fla.) Contract No. AF 08(616)-36; Task 2; Part I; April 1957

ABSTRACT: A summary of the results of an investigation into vibrations induced in aircraft by firing of multigun installations. Part I presents a general theoretical treatment of the problem, based on use of the so-called generalized shock spectrum and the fatigue-equivalent acceleration; and the theory and physical description of an electronic special purpose analog simulator constructed for utilization in solution of certain equations derived from the shock spectrum analysis. This simulator, in essence, analogizes a single-degree-of-freedom mass-spring-damper system, a wide range of values of the frequency and damping parameters being available for use. Part II of the report presents the theory and design as well as operation and maintenance procedures of the analog simulator described in Part I.

.78

Brissenden, R. F., D. C. Cheatham, & R. A. Champine 1961 TOLERABLE LIMITS OF OSCILLATORY ACCELERATIONS DUE TO ROLLING MOTIONS EXPERIENCED BY ONE PILOT DURING AUTOMATIC-INTERCEPTOR FLIGHT TESTS. (National Aeronautics and Space Administration, Washington, D.C.) NASA TN D 810, April 1961.

ABSTRACT: A limited amount of data on the levels of oscillatory accelerations found to be tolerable and intolerable by one pilot during flight tests of a prototype automatic interceptor was presented. The data analyzed were taken from accelerations imposed at the pilot's head. The pilot was an observer only during flight with no complex task to perform. (Tufts)

.79

Broadbent, D. E. 1956 EFFECTS OF NOISE. Inst. Av. Med., Farnborough). FPRC 961.1

80

Brody, A.W., D.H. Lewis and B.F. Burgess Jr. 1954 RESPONSE OF CHEST WALL, ABDOMEN AND DIAPHRAGM TO FORCED OSCILLATIONS OF VOLUME. Fed. Proc. 13:38

ABSTRACT: Previous studies tested the frequency response of the lung-thorax system to sinusoidal air pumping at the mouth by comparing airflow into the mouth with transthoracic pressure. This permits separation of the total impedance to breathing into resistive, elastic and inertial components. To test whether the chest wall, abdomen and diaphragm move together or as separate

systems, velocity pick-ups (magnet and coils) were placed on the body surface during such sinusoidal pumping. At 7-11 cycles/sec., velocity over the upper anterior chest was in phase with mouth pressure in 10 supine subjects and a maximum occurred in velocity and displacement (.11 to .24 mm at a pump stroke 14 cc). At 5-8 cps, the abdomen showed a maximal amplitude (1.3-1.9 mm at pump stroke 56 cc), and at 3.4-4.1 cps the body had a maximum head-foot displacement measured by the Dock ballistocardiograph in 6 subjects (.14 to .29 mm at pump stroke 56 cc). At 1-2 cps the anterior chest and abdominal surface moved nearly together, in phase. At higher frequencies, the surface motion of the abdomen lagged the upper chest and this lag increased caudally. Above 4 cps the lower chest also lagged the upper.

81

Brody, A.W. & A.B. DuBois 1956 DETERMINATION OF TISSUE, AIRWAY AND TOTAL RESISTANCE IN MAN.
J. Appl. Physiol. 9(2):213-218

ABSTRACT: Tissue resistance has been directly measured in a group of cats and found to vary from 1.3 to 3.3 cm $H_2$0/1/sec. The average value of 2.55 cm $H_2$0/1 sec. amounted to an average of 28% of the total resistance. This agrees well with the figure of 69% for airway resistance obtained using a different method. Neither method depends on changing the viscosity or the density of the gases breathed.

82

Brody, A.W., A.B. Dubois, O.I. Nisell, and J. Engleberg. 1956 NATURAL FREQUENCY, DAMPING FACTOR, AND INERTANCE OF THE CHEST-LUNG SYSTEM IN CATS. Am. J. Physiol. 186: 142-148. July 1956

ABSTRACT: A study of the local surface velocity of the chest and abdomen as a function of the frequency of sinusoidal pressure waves introduced into the airways via the trachea, was made in 15 cats. The study confirmed and extended the observations DuBois et. al. had previously made in human beings and demonstrated that the effects seen were not produced by any part of the airway above the trachea. Comparison is made of this data with the averaged data obtained by using a plethysmograph to integrate the surface responses of the cat. The natural frequency (9.6 ± 0.6 cps), damping factor (2.0 ± 0.25), resistance (K_1 13.5 ± 2.3; K_2 76 ± 21 cm $H_2O/L/ec)^2$, and elastance (230 ± 26cm H_2O/L) were measured and the inertance (0.09 ± .008 cm $H_2C/L/sec$ 2) was calculated.

83

Brooks, G. W. & S. A. Clevenson 1960 CONSIDERATION OF VIBRATION ENVIRONMENTS IN SPACE FLIGHT SYSTEMS. 1960 Proceedings of the Institute of Environmental Sciences, 81-90

84

Brown, Roy, H.M. Jacklin, S. Zand et al 1948 VEHICLE VIBRATION (Society of Automotive Engineers)

ABSTRACT: The seven discussions include criticism and complimentary comments on R.N. Janeway's "Vehicle Vibrations to Fit the Passenger."

85

Buchmann, E. 1961 SHIP VIBRATION
In 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D. C. (Mt. Prospect, Ill.: Institute of Environmental Sciences, 1961). pp. 189-196.

ABSTRACT: Knowledge of the vibration characteristics to be expected of ships during any operation and in any sea conditions is necessary for the designer of shipboard equipment. The sources of vibration and the corresponding vibration levels are discussed for two classes of Navy ships, the 692 class destroyer and the ESSEX class carrier. (Author)

86

Buchmann, E. 1962 CRITERIA FOR HUMAN REACTION TO ENVIRONMENTAL VIBRATION ON NAVAL SHIPS. (Paper, Annual Meeting of the Institute for Environmental Sciences, Chicago, Ill., 10 April 1962) June 1962. ASTIA AD 404 834

ABSTRACT: A search of existing literature on human reactions to vibrations was made to obtain a guide for establishing norms for crews on naval ships. Such norms are recommended as a result of this study. Further research programs are outlined. This report defines levels of motions and vibrations to which crew members are exposed during surface ship operations. The levels of vibration are also compared with those for structural items and machinery. No attempt is made to evaluate all work in this field; only that considered pertinent to problems arising from shipboard vibration is included. (Author)

87

Buchmann, E. 1962 CRITERIA FOR HUMAN RE-ACTION TO ENVIRONMENTAL VIBRATION ON NAVAL SHIPS. (David Taylor Model Basin, Washington, D. C.) Rept. 1635, June 1962

88

Bugard, P.J. 1952 MESURE DES SEUILS DE SENSATION VIBRATOIRE CHEZ L'HOMME (MEASUREMENTS OF VIBRATORY SENSATION THRESHOLDS IN MAN) Journal de Physiologie (Paris), 44(2):230-233.

ABSTRACT: Human thresholds of vibrations perception were measured with the aid of a specially designed electrovibrator producing frequencies from 50 to 1,200 cycles per second and a hyperecho generator of ultrasonic vibrations. Sensitivity varied from one person to another. Threshold values changed according to body regions affected. Local anesthesia did not affect vibratory sensation thresholds. Sensations changed from a tickle (500-900 c.p.s.) to a stinging sensation (900-1,200 c.p.s.), which became quite intense(at 1,500 c.p.s.) and persisted after the stimulus had ceased. At 19,600 c.p.s. the threshold sensation was that of a velvety feeling, which changed into a prickling sensation and was finally perceived as intense heat. At very high frequencies (936,000 c.p.s.) perception was retarded for about 10 to 20 seconds and ended in a burning sensation.

89

Burger, E. J. Jr., 1960 THE EFFECTS OF VIBRATION ON THE HUMAN ORGANISM (Presented to the Seminar in Aviation Medicine, Harvard School of Public Health; Reproduced by the Guggenheim Center for Aviation Health and Safety.) April, 1960.

ABSTRACT: The need for considering vibration as a hazard was illustrated with vibration spectra of present-day and future vehicles. The fundamental physical properties of a mechanical system were outlined. Experimentally determined effects of vibration on the human organisms were examined under the headings of mechanisms of perception, physiological effects, psychological effects and organic injury. The use of impedance measurements in increasing human tolerance to vibrations was noted.

90

Burgess, J. C. 1958 VIBRATION ISOLATION OF HIGH SPEED TRACK VEHICLES (U.S. Air Force Flight Test Center, Edwards AFB, Calif.) AFFTC TR-58-19, April 1958. ASTIA AD 152 143

Summary: Track tests were conducted to develop critieria for the design of resilient slipper mounts (isolators) for high speed track vehicles. The following criteria are applicable: (1) the isolating mechanism must be designed

to operate under the action of downward as well as upward reaction forces at the slipper, and (2) the natural frequency of the isolators is fixed by the track operational requirements of (a) a 19-g dynamic load factor and (b) a ±0.25-in. maximum allowable vertical vehicle displacement. Cantilever single-leaf springs were chosen to fulfill the first of these criteria. Results indicate that track irregularities are a major cause of the severe vibration environment of the track vehicle. Resilient slipper mounts are effective in reducing the contributions of track irregularities to the vehicle vibration environment. Vibration environments at any location in the vehicle are related to the natural frequencies and inherent damping of nearby structural components. Internal damping in the vehicle structure was very high. Water brake entry provides the most severe load factors (up to 20g.). Other slipper load factors were less than 10g.

91

Burris-Meyer, H., T. W. Forbes & W. L. Woolf 1942 EFFECT OF SOUND ON MAN AND MEANS FOR PRODUCING SUCH SOUND.
(Stevens Institute of Technology, Hoboken, New Jersey) Contract No. OEMsr197 Proj. 17.3-1, Nov. 9, 1942. ASTIA ATI 27 438.

ABSTRACT: This is the answer to the question of what sound as a military weapon can do to men. The breadth and scope of the investigation, and the personnel and equipment available to it, constitute an assurance that, except as hereinafter indicated, the field is exhausted.

Noise intense enough to knock a man out cannot be produced under combat conditions by any device which cannot more readily perform a more effective military task.

No non-associative sound can accomplish a tactical task until its intensity is high enough to make its spectrum of secondary importance.

Non-associative sound has tactical value as a means of interfering with communication at locations not easily reduced by conventional weapons, and as a panic breeder.

Associative sound has military value as a means of deception, and of building up or deteriorating morale.

Meaningful and non-meaningful sounds may be useful in selection, training and indoctrination of military personnel. (ASTIA)

92

Burton, Ralph 1958 VIBRATION AND IMPACT (Reading, Mass.: Addison-Wesley Publishing Co., Inc., 1958) Lib. Cong. Card No. 58-5055

Contents:

Chapt. 1. Introduction
2. Free Vibration

3. Vibratory Systems Commonly Found in Machinery
4. Damping
5. Steady Forced Vibration
6. Impact
7. Nonlinear Vibration
8. Measurement: Instruments and Analogs.
9. Systems with Two Degrees of Freedom
10. Numerical Computation of Natural Frequencies for Systems with Many Degrees of Freedom.
11. Waves
12. Vibrating Beams and Related Subjects
13. Analysis of Control Systems
14. Fatigue

93

Busnel, R. C., 1957 SOME EXAMPLES OF ULTRASONIC FREQUENCY SENSITIVE AND FREQUENCY INSENSITIVE BIOLOGICAL REACTIONS. In E. Kelly, ed., Ultrasound in Biology and Medicine (Washington: American Institute of Biological Sciences, 1957) Chap. 9, pp. 156-164.

94

Busnengo, E. 1959 ALCUNI EFFETTI DELL'ESPOSIZIONE DELL'UOMO AI RUMORI E ALLE VIBRAZIONI DI MOTORI A TURBO-PROPULSIONE. II. EFFETTI SULL'ELETTROCARDIOGRAMMA (SOME EFFECTS OF EXPOSING MAN TO NOISE AND VIBRATION OF TURBOJET ENGINES II. EFFECTS ON THE ELECTROCARDIOGRAM)
Rivista di Medicina Aeronautica e Spaziale (Rome), 22 (2): 73-84, April-June, 1959 (In Italian, with English summary)

ABSTRACT: Cardiovascular reactions to acoustic and vibratory stimuli (noise and vibration in jet prop-aircraft) were electrocardiographically studied in twenty-three normal men whose work exposed them to these stimuli daily. Elevated vagal tonus was exhibited in both ECG and examination of cardiac frequency and rhythm. Cardiovascular response is related to the intensity and duration of the stimuli, vago-sympathetic equilibrium, breakdown of part or one of the neuro-regulatory systems, and the humoral transmission mechanism of sympathetic and vagal stimuli. Based on ECG recordings, the author concludes that the effects of jet engine noise and vibration are of a physiologic rather than pathologic nature.

VIBRATION

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95

Caldwell, W. W., Jr. 1959 REVIEW OF SOME PROBLEMS OF CREATING A RANDOM VIBRATION ENVIRONMENT IN THE LABORATORY. In 1959 Proceedings of the Institute of Environmental Sciences, Annual Technical Meeting, April 22-24, 1959, La Salle Hotel, Chicago, Illinois (Institute of Environmental Sciences, Mt. Prospect, Ill.) pp. 87-90

ABSTRACT: Random vibration testing is imperative since no equivalent periodic wave test truly simulates random environments. It is important, however, to know what can be expected of a random vibration test. Know the problems before you begin and do not try to deliver test results which are unrealistic. It is up to the environmental engineer to inform those who are responsible for writing test specifications just what can be done. (AUTHOR)

96

Campbell, H., 1957 ASCORBIC ACID LEVELS IN TISSUES OF NORMAL AND NOISE EXPOSED ANIMALS. (Masters Thesis, Pennsylvania State University, June 1957)

97

Carome, E.F. 1950 ELECTRONIC VIBRATION METER
Trans. Amer. Geophys. Union, v. 31, pp. 529-530

ABSTRACT: A completely portable electronic instrument which appears to have wide application in the field of vibration measurement has been developed. The circuit is such that a meter responds to the maximum amplitude of a transient or continuous voltage input. The instrument provides a simple means of measuring accelerations in structures.

98

Carrote Voga, M. 1946 [VIBRATIONS AND NOISES IN AIR MEDICINE] Gac. med. espan. 20: 284

99

Carter, C.W. 1960 INTERNATIONAL LIST OF HUMAN FACTORS FILMS. Human Factors. 2 (2): 62-69, May 1960

ABSTRACT: This annotated bibliography presents 54 references to films dealing with human factors problems in man-machine design. The subjects covered include emergency escape and survival systems, zero gravity studies, medical aspects of high intensity noise, illumination and dark adaptation, anthropometrical techniques, simulated decompression studies, aircrew fatigue problems, and the effects of whole body vibration on human performance. The references are categorized by source in order to facilitate procurement of certain films desired by the reader.

100

Carter, E.T., E.J. Largent, and W.F. Ashe. 1961 SOME RESPONSES OF RATS TO WHOLE BODY MECHANICAL VIBRATION: II. METABOLIC GAS EXCHANGE. Archives of Environmental Health. 2: 378-383

ABSTRACT: A total of 64 rats were subjected to mechanical sinusoidal vibration Measurements of respiratory gas exchange were performed at regular intervals during exposure to the vibration and during a comparable control period. No increase in gas exchange was observed at any frequency for a vibration amplitude of .062 inch. At an amplitude of .125 inch a rise in gas exchange was noted at frequencies above 15 cps, and at an amplitude of .25 inches a rise appears above 5 cps.

101

Castellanos, F.J. 1948 ACCION DE LAS VIBRACIONES SOBRE EL ORGANISMO (The effect of vibration on the organism) Rev. san. aeronaut. 1: 121-124

102

Castor, J. G. 1945 AERO-MEDICAL RESEARCH. II. BASIC STUDIES ON VIBRATION. (Far East Air Force, Air Tech. Intelligence Group, Tokyo) Report No. 111, 11 December 1945. ASTIA ATI 55 510.

ABSTRACT: An outline is given of research conducted by the Japanese Naval Aero-Medical Research Division on the effect of vibration and the part it might play in fatigue, visual acuity, and efficiency and comfort of flying personnel. Results indicated that in general there is a relation between factors of vibration and visual acuity. Various shock absorbers were also studied, and the air cushion was found to be best when inflated to 30-50 mm Hg pressure. Vibration begins to be felt at about 100 cycles per minute at an amplitude of 0.2 to 1.3 mm, and discomfort to vibration begins at 800 cycles and becomes unbearable at 1200 cycles per minute. An attempt was made to determine the effects of vibration on fatigue and results were calculated in terms of calories expended per hour.

103

Catterson, A. D., G. N. Hoover and W. F. Ashe 1961 HUMAN PSYCHOMOTOR PERFORMANCE DURING PROLONGED VERTICAL VIBRATION
Aerospace Medicine 32(3):225, March 1961.

ABSTRACT: In a pilot study of human performance under vibration, Fraser, Hoover, and Ashe found that the ability of subjects to accomplish a tracking task while subject, tracking equipment, and visual display all vibrate is affected by frequency, amplitude, and plane of vibration. To further study this effect of vibration on performance, volunteer subjects were exposed to vibration in the vertical plane for twenty minutes at each of six selected frequencies from 2 cps through 15 cps, and at two amplitudes, 0.06 in. and 0.12 in. The subjects used a control stick to center a moving light on a square panel display for two five-minute periods near the beginning and end of each twenty-minute vibration exposure. Error was electronically summed with respect to time. Each subject served as his own control, and a learing curve was obtained for him during his successive experiences with the task. Results were statistically analyzed and revealed changes in performance relating to frequency, amplitude, and time duration of vibration.

104

Chambers, L.A. 1935 THE ACTION OF INTENSE SONIC VIBRATION ON PEPSIN AND TRYPSIN
Am. J. Physiol. 109; 19
See Also Biol. Abstr. 9; 17974, 1935

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Chambers, L.A. 1935 THE ACTION OF INTENSE SONIC VIBRATION ON PEPSIN AND TRYPSIN
Biol. Abstr. 9; 17974,
See also Am. J. Physiol. 109; 19

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Chambers, L.A. 1935 THE EFFECT OF INTENSE SOUND WAVES ON SOME BIOLOGICALLY IMPORTANT CHEMICAL REACTIONS Am. J. Med. Sci 190; 857
See also Chem. Abstr. 30; 6774, 1936

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Chambers, L.A. 1937 THE INFLUENCE OF INTENSE MECHANICAL VIBRATION ON THE PROTEOLYTIC ACTIVITY OF PEPSIN J. Biol. Chem. 117; 639-649

108

Chan, G.S. 1948 THE EFFECTS OF ULTRASONIC VIBRATIONS ON MAN(Naval Research, Navy Dept. Sands Point, Port Washington, Long Island, N.Y.) Contract No. N6ori-151, Task Order No. 1, 15 April 1948. ATI 41233 or ATI 54 744
Report No. 151-1-15 Project No. 20-M-1b

ABSTRACT: The effects of ultrasonic vibrations on man were investigated. The literature contains somewhat contradictory reports about the physiological and psychological effects of exposure to engines, to devices used to produce ultrasonic vibrations experimentally, and of participation in high speed flight. The effects upon man are alleged to involve nausea, equibrial disturbances, fatigue, mental confusion, headache, auditory, visual and motor disturbances. The effects are said to be transient. Some of the effects of ultrasonic energy when applied locally to man have been demonstrated. Under the conditions studied, sonic components exceed the ultrasonic vibrations in intensity, and intensity levels appear to be reduced as engine speed decreases. With increasing airspeed, the overall intensity level of noise increases and strong energy component may appear at ultrasonic frequencies as well as in the audible range

109

Chandler, R.F. 1962 DETERMINATION OF EQUIVALENT NATURAL FREQUENCY INDICATED BY ACCELEROMETERS MOUNTED OVER THE STERNUM DURING HUMAN IMPACT IN THE G DIRECTION. (Aeronautical Research Lab., Holloman AFB, New Mexico) Report No. ARL-TDR-62-29, December 1962.

110

Chauchard P, H. Mazoue 1960 ACTION OF VIBRATIONS ON NERVOUS EXCITABILITY. C. R. Soc. Biol. (Par)154:329-30

111

Chilton, Ernest G. 1946 DYNAMIC CHARACTERISTICS OF RUBBER SUPPORTS FROM VIBRATION TABLE DATA Journal of Applied Physics 17:492-5

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Christensen, R.J. and R[illegible]sch 1934 EFFECT OF HIGH FREQUENCY SOUND WAVES ON OXIDASE ACTIVITY Pl[illegible]ysiol. 9: 385-386
See Also Chem Abstr [illegible] 4758, 1934

113

Ch'U, C. H. 1960 [EFFECT OF GENERAL VERTICAL VIBRATIONS ON CERTAIN PHYSIOLOGICAL FUNCTIONS IN MAN.]
Tr. Leningrad Sanitarnogig Med. Inst. 61: 159-167, 1960

114

Chu, Wen-Hwa and H.N. Abramson 1961 APPLICATION OF THE GENERALIZED PHASE-PLANE-DELTA METHOD TO MULTI-DEGREE-OF-FREEDOM VIBRATING SYSTEMS. (Southwest Research Inst., San Antonio, Tex.) Technical rept. no. 4, ASTIA AD-261 740, 1 June 1961.

ABSTRACT: The phase-plane-delta method of Jacobsen is extended to multi-degree of-freedom systems governed by differential equations of second order. Applications to initial value problems of two-degree-of-freedom systems are presented as demonstrations of the practical utility of the method. Agreement with exact solutions for linear systems (free and forced oscillations) and with approximate solutions for nonlinear systems (free and forced oscillations) is excellent. A practical truncation error analysis is included as an appendix, which shows that the method is a second order process. (Author)

115

Clark, C.C. 1962 HUMAN CONTROL PERFORMANCE AND TOLERANCE UNDER SEVERE COMPLEX WAVEFORM VIBRATION WITH A PRELIMINARY HISTORICAL REVIEW OF FLIGHT SIMULATION. (Paper, NASA Symposium, St. Louis Missouri, 30 April - 2 May 1962) Martin-Baltimore Engineering Report 12406

116

Clark, C., B. Cooper, & C. Blechschmidt 1963 HUMAN VIBRATION AND IMPACT ISOLATION WITH A PROTOTYPE FULL LENGTH AIR BAG RESTRAINT SYSTEM. (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 28 - May 2, 1963)

117

Clark, W. S., K. O. Lange & R. R. Coermann 1962 DEFORMATION OF THE HUMAN BODY DUE TO UNI-DIRECTIONAL FORCED SINUSOIDAL VIBRATION.
Hum. Factors 4: 255-274, Oct. 1962

118

Clarkson, B. L., & R. D. Ford 1961 EXPERIMENTAL STUDY OF THE RANDOM VIBRATIONS OF AN AIRCRAFT STRUCTURE EXCITED BY JET NOISE. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 61-70; ASTIA AD-258 591; March 1961.

ABSTRACT: Recordings have been made of the strains induced in a full scale rear fuselage test structure of the Caravelle air-liner when one jet engine is running at maximum take-off thrust. The analysis has been concentrated on the strains in the centers of panels. Correlation measurements indicate that the larger panel strains occur above 500 c. with the frames acting as boundaries. The main resonance peak in each panel has been identified with the fundamental stringer-twisting mode but the mode-shapes for the two smaller peaks have not been completely determined. An attempt has been made to calculate the panel resonant frequencies theoretically. (AUTHOR)

119

Clemedson, C. J. 1962 MEDICOBIOLOGICAL EFFECTS OF MECHANICAL VIBRATIONS AND RADIATION. I. VIBRATIONS.
In Svensk. Lakartidn 59:866-884, March 22, 1962 (Sw)

120

Clevenson, Sherman A. and George W. Brooks April 1960 CONSIDERATIONS OF VIBRATION ENVIRONMENTS IN SPACE FLIGHT SYSTEMS.
1960 Proceedings of the Institute of Environmental Sciences, 81-89.

ABSTRACT: This paper briefly discusses several factors which govern vibration environments in space flight systems such as structural properties and the vibratory components of loads resulting from engine thrust, separation shocks, and acoustic noise. Some data on vibration levels measured during past flights are given and the results of a trend study of possible vibration levels of future space payloads are shown. Some vibration and spin-balacing test setups for projects SHOTPUT, ECHO, and MERCURY are shown. Samples of measured data on the internal and external noise levels of a space capsule during static firing are given together with a flight time history of internal noise levels from launch to reentry. The paper also presents a discussion of type approval and flight acceptance tests and shows sample specifications aimed at improving the reliability of space payloads.

121

Clevenson, S. A., D. A. Hilton, & W. T. Lauten 1961 VIBRATION AND NOISE ENVIRONMENTAL STUDIES FOR PROJECT MERCURY. In 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D. C. (Mt. Prospect, Ill.: Institute of Environmental Sciences, P. O. Box 191) pp. 541-546

SUMMARY: Several of the vibration and noise studies conducted for the Mercury

capsule and its components are described. Particular attention is given to the experimental techniques used and the main results obtained.
Laboratory vibration data for a full-scale capsule both on a large vibration exciter and in the presence of a noise field are presented along with vibration measurements obtained during the flight readiness firing at Cape Canaveral and during a portion of an actual flight.
Acoustic measurements are presented of internal and external noise environments during the launch and free-flight conditions of the capsule. Particular attention is given to a discussion of a unique series of noise environmental tests of a full-scale manned capsule. These environmental tests were accomplished by utilizing the exhaust of a large blowdown-type wind tunnel as the noise source to simulate the rocket motor noise at liftoff and the aerodynamic noise during the exit flight phase. Other topics dealt with briefly are capsule noise transmission characteristics, surface shingle sonic fatigue tests, and exploratory communication studies in the presence of intense noise. (AUTHOR)

122

Coermann, Rolf N. D. EFFECT OF VIBRATION AND NOISE ON THE HUMAN ORGANISM. (Die Wirkung von Erschuetterungen and Laerm..auf den Menschlichen Organismus)
(Royal Aircraft Establishment, Farnborough, Hants) ASTIA ATI 55 041; ASTIA ATI 55 001.

ABSTRACT: The effects of vibration and noise on the human organism were investigated in order to eliminate any deleterious influences which may impair the efficiency of flying personnel. The physiological and psychological aspects of the transmission of vibration, and the possible impairment of the auditory organs as a result of noise are discussed. Vibrations of small amplitude have been shown to be detrimental to vitality and the ability to concentrate. The purely mechanical effect of vibration on eyesight is also discussed. Deafness as a result of aircraft noise is possible, but the physiological and psychological effects of noise are more important. Effective protection of flying personnel is considered imperative.

123

Coerman, R. R. n.d. THE EFFECT OF VIBRATION AND NOISE ON THE HUMAN ORGANISM (Dept. of Commerce, Washington, D. C.) WADC Translation No. 349, PB 24679T.

ABSTRACT: In the face of high demands today made on aircrews it is imperative to eliminate as far as possible all influences which may prejudice their efficiency. Mechanical vibration and noise represent such injurious factors. Not only are they subjectively extremely unpleasant, but they also produce a marked physiological effect. Apart from the directly deleterious effect of hearing, resulting from noise, maximum efficiency also is impaired as a result of vibration and noise. It is therefore a matter of prime importance for aircrews to have the most extensive protection against these influences.

124

Coermann, R. 1931 DIE EMPFINDLICH KEIT DES MENSCHEN GEGEN ERSCHUTTERUNGEN (EFFECT OF VIBRATIONS ON THE HUMAN SYSTEM) Zeitschrift des Verein deutscher Ingenieure 1526, 19 Dec. 1931.

125

Coermann, R. 1937 EQUIPMENT USED TO DETERMINE EFFECT OF SOUND AND OSCILLATIONS ON THE HUMAN BODY. (Untersuchungen ueber die Einwirkung von Schall und Erschuetterungen auf den menschlichen Organismus) ASTIA ATI-27030, November 10, 1937.

ABSTRACT: Detailed description is given of experimental equipment used to determine the effect of sound and oscillations upon the human body. It was to be determined with the aid of systematic experiments the manner in which oscillations act upon the human body, as well as the functions chiefly affected the most harmful frequencies, the physical magnitude upon which this effect depends, and the maxima permissible for practical application. The apparatus required to furnish the answers to the problems is required to transmit mechanical oscillations of 30 to 1000 cps and amplitudes up to 2 mm to the human body. The design of oscillographs, shockmeters, etc., and their mode of application is explained.

126

Coermann, R. 1938 UNTERSUCHUNGEN UBER DIE EINWIRKUNG VOL SCHWINGUNGEN AUF DEN MENSCHLICHEN ORGANISMUS (Investigations Regarding the Effects of Vibration on the Human Organism) Jahrb. Deutch. Luftfahrtforschung, 3: 111-142. WADC Translation No. 349
See also: Luftfahrtmedizin, 4: 73-117, 1940

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Coermann, R. 1938 [EFFECT OF MECHANICAL VIBRATIONS.] Luftfahrtmed. 2:295.

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Coermann, R. 1939 LAERM EINWIRKUNG IM FLUGZEUG Deutsche Versuchanstalt fuer Luftfahrt E. V., Forschungsbericht Nr. 1102. September 12, 1939.

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Coermann, R. 1939 DIE WIRKUNG VON ERSCHUTTERUNG UND LARM AUF DER MENSCHLICHE ORGANISMUS. (THE EFFECTS OF VIBRATION AND NOISE ON THE HUMAN ORGANISM.) R.A.E. Library Translation No. 121
From Ringbuch der Luftfahrttechnik, Part VF1, GDC. 10/7686, 1946.

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Coermann, R. 1939 INVESTIGATIONS ON THE EFFECT OF VIBRATION ON THE HUMAN ORGANISM
Ind. Psychotech 16; 169-206
See also Psychol. Abstr. 14; 1286 (1940)

131

Coermann, R. 1940 UNTERSUCHUNGEN ÜBER DIE EINWIRKUNG VON SCHWINGUNGEN AUF DEN MENSCHLICHEN ORGANISMUS (Investigation of the Effects of Vibration Upon the Human Organism)
Luftfahrtmedizin 4:73-117.
Also available as R.A.E. Library Translation No. 217 (1947). ASTIA AD 266 614.

132

Coermann, R. 1940 INVESTIGATIONS ON THE EFFECT OF VIBRATION ON THE HUMAN ORGANISM. Psychol. Abstr. 14:1286
See also Industr. Psychotech. 16:169-206

ABSTRACT: A study of the effects of mechanical vibrations ranging from 15 to 1000 cycles. Various physiological and psychological tests were applied before and after a 2-hour exposure to the vibrations, and the frequency of maximal influence was determined. Visual acuity was the only sensory function to be disturbed. The more "mental" functions were especially affected by small amplitudes of vibration. An interference with the patellar reflex is the most striking of the physiological effects. Vibrations above 140 cycles are not mechanically transmitted to the head, provided the amplitude is not too great. For every subject there are resonance frequencies at which the visual disturbance is especially great.

133

Coermann, R. 1946 EFFECTS OF VIBRATIONS AND NOISE ON HUMAN ORGANISM. (Lib. Trans. No. 121, RAF,) (Dept. of Commerce, PB 24679-T)
ASTIA ATI 55 001.

ABSTRACT: From the results obtained, the sort and degree of effect to be expected as a result of noise and vibration, are clearly established. It is

shown that a main effect lies in the province of nervous physiology. Mainly vibrations of small amplitude in particular have been shown to be detrimental to the vitality and ability to concentrate. The purely mechanical effect of vibration on the eyesight has been explained and necessity of a vibration free place for the observer pointed out. The appearance of deafness as a result of aircraft noise is regarded as possible, but it has been shown that the psychological and physiological, effects of noise are much more important. Effective protection for flying personnel against noise and vibration is therefore demanded.

134

Coermann, R., 1959 THE RESPONSE OF THE HUMAN BODY TO LOW FREQUENCY VIBRATIONS. (Paper, presented at the Society of Experimental Stress Analysis Annual Meeting, October 21, 22, 23, Detroit, Michigan)

135

Coermann, R.R., G.H. Ziegenruecker, A.L. Wittwer & H.E. von Gierke 1959 THE PASSIVE DYNAMIC MECHANICAL PROPERTIES OF THE HUMAN THORAX-ABDOMEN SYSTEM AND OF THE WHOLE BODY SYSTEM. (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: The vibration dynamics of the thorax-abdomen system and of the whole body system have been studied more extensively with sinusoidal vibration excitation. The new results to be reported are combined with previously published data and observations on the dynamics of the system under various types of load: whole body vibration, transient acceleration, blast exposure, respirator excitation and rapid decompression. An attempt is made to give a generalized, unified model of the mechanical system with approximate values for its constants, so that it can be used to calculate the dynamic mechanical response to different loadings. This model should serve as a guide in future experimentation, in the planning and interpretation, of physical measurements, in the interpretation of physical measurements, in the interpretation of the various types of damages and in develop-

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Coermann, R. 1959 MECHANICAL IMPEDANCE OF THE HUMAN BODY IN THE SITTING AND STANDING POSITION AND ITS SIGNIFICANCE FOR THE SUBJECTIVE TOLERANCE TO VIBRATIONS. (Paper, presented at the 3rd Annual Meeting of the Biophysical Society, Pittsburgh, Pa., February 1959)

137

Coermann, R. A., G. H. Zieguerecker, A. L. Wittwer, & H. E. von Gierke 1960 THE PASSIVE DYNAMIC MECHANICAL PROPERTIES OF THE HUMAN THORAX - ABDOMEN SYSTEM AND OF THE WHOLE BODY SYSTEM. Aerospace Medicine 31(6):443-455, June 1960

ABSTRACT: The physical and physiological effects of vibrations and impulsive forces applied to the body depend on the dynamic mechanical properties of the body. In order to obtain quantitative insight into the parameters of the mechanical body system, mechanical impedance measurements on sitting subjects were performed; the results of these measurements, which exhibit resonance maxima for the impedance at 5 and 11 cps., are presented with respect to the effective parameters of the circuit and the forces and energy transferred to the body.

Since vibration and impact injuries as well as subjective tolerances indicate that the thorax-abdomen subsystem of the body is very sensitive when excited by mechanical forces, a detailed study of this system on subjects in the supine position was made. Abdominal wall displacements, oscillating changes in chest circumference and periodic air flow through the mouth were measured for periodic, longitudinal vibration excitation. The resonance of all these response curves is between 3 and 4 cps

A generalized unified model of the total thorax-abdomen system is derived with approximate values for its constants. This model can be used to calculate the dynamic mechanical response to different types force application: whole body vibration, respirator excitation and slow rising blast waves and decompression. Steady state as well as impulsive loadings can be studied on the circuit. This model may be used as a guide in future experimentation, in the interpretation of physical measurements and various types of damage and in developing and understanding protective measures.

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Coermann, R.R. 1961 MECHANICAL IMPEDANCE OF THE HUMAN BODY IN SITTING AND STANDING POSITION AT LOW FREQUENCIES. (Aerospace Medical Lab., Wright-Patterson AFB, Ohio) ASD TR 61-492, September 1961

ABSTRACT: The theory of mechanical impedance of systems with one or more degrees of freedom is applied to the human body. A method of measuring mechanical impedance and determining parameters of the vibrating system is developed. Impedance curves for longitudinal vibrations of a sitting and standing subject are established for the frequency range of 1-20 cps. The influence of varied posture and restraining systems is investigated. Dynamic movements of body parts are measured directly or indirectly, and compared with the impedance curves. The responsible elements in the body for the apparent resonances are identified. Correlations between the impedance function of the body and the subjective tolerance curve to vibration are found and the reasons for the tolerance limits are elucidated. The variability of subjective tolerance due to varying posture, restraining systems, cushions, duration of exposure and vibrations are discussed, and conclusions for the development of protective devices are drawn. The correlation between the steady state response of the human body system and the effects of impact are discussed.

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Coermann, R. R. 1962 THE MECHANICAL IMPEDANCE OF THE HUMAN BODY IN SITTING AND STANDING POSITION AT LOW FREQUENCIES.
Hum. Factors 4:227-253, Oct. 1962

140

Coermann, R. R., E. B. Magid & K. O. Lange 1962 HUMAN PERFORMANCE UNDER VIBRATIONAL STRESS.
Hum. Factors 4:315-324, Oct. 1962

141

Coermann, R 1962 COMPARISON OF THE DYNAMIC CHARACTERISTICS OF DUMMIES, ANIMALS AND MAN
(In: Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, pp. 173-184)

ABSTRACT: The effect of extrinsic transient forces on the living organism is greatly dependent upon the relative displacement of tissues and organ complexes caused by the accelerative forces within the body. The magnitudes of these displacements are not only a function of the magnitude and time characteristics of the applied force, but also a function of the dynamic characteristics of the system being excited. In the investigation of the effects of impact on man, comparative experiments using dummies and animals have necessitated the consideration of their dyanmic characteristics relative to those of man. The frequency spectrum of such a characteristic can be determined by excitation with steady state sinusoidal forces utilizing the concept of "steady state" mechanical impedance. However, since such systems do not have linear parameters throughout the range of acceleration occurring during impact, it is necessary to determine also the "transient" impedance by definite abrupt decelerations.

"Steady state" impedances were determined for men, bears, monkeys and dummies in the frequency range 1 to 20 cps. at low accelerations. Each showed different resonant frequencies and damping factors. Resonances of inner organs and portions of the skeleton were measured by other methods on men and dogs. A device to produce definite deceleration patterns with variable magnitude and duration was developed. A program to determine the "transient" impedances of men, bears, monkeys and dummies was initiated and preliminary results are shown.

142

Cohen, A. A. 1961 DEVELOPMENT OF SIMULTANEOUS SHOCK AND VIBRATION ISOLATION
In 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D. C. pp. 663-666

ABSTRACT: A stiff or high resonant frequency isolator may be satisfactory for shock but unsatisfactory for vibration isolation. There is an obvious need for

an isolator that will protect equipment against shock as well as vibration. A material with a non-linear spring constant and one that could utilize the total height allowed an isolator could have the capacity to absorb energy due to shock and also isolate vibrations. A study was made of several materials which might meet these requirements, and flexible plastic foam was selected as a possibility.

143

Cohen, L. H. & S. B. Lindley 1938 STUDIES IN VIBRATORY SENSITIVITY. Amer. J. Psychol. 51:44-62, Jan. 1938.

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Cole, E. B. 1950 THE THEORY OF VIBRATIONS FOR ENGINEERS 2nd Ed. (London: Crosby Lockwood, 1950)

145

Constant, H. 1932 AIRCRAFT VIBRATION. J. Roy. Aeronautical Soc., 36:205-250

146

MOTION PICTURE

Cooper, B., K. McCluskey, & C. Clark 1963 PERFORMANCE DURING LAUNCH VEHICLE VIBRATIONS. (Martin Company, Baltimore, Md.) Life Sciences Technical Film Rept. No. 3, Aug. 1963

147

Cope, F. W. & B. D. Polis 1957 CHANGE IN PLASMA TRANSAMINASE ACTIVITY OF RHESUS MONKEYS AFTER EXPOSURE TO VIBRATION, ACCELERATION, HEAT, OR HYPOXIA. (Naval Air Development Center, Johnsville, Pa.) Rept. No. NADC-MA-5718, ASTIA AD 209 173.

ABSTRACT: Significant increases in plasma glutamic-oxalacetic transaminase levels were observed in monkeys exposed to vibration, acceleration, heat, hypoxia, or noise and confinement stress. In all but 1 of 17 animals, no specific tissue damage was evident. The increase in plasma transaminase is interpreted as a non-specific stress effect. The data suggest that caution should be exercised in basing clinical judgments on serum transaminase levels.
(Author)

148

Cope, F. W., & B. D. Polis 1957 SOME EFFECTS OF PROLONGED LOW FREQUENCY VIBRATION ON THE MOLECULAR AND CELLULAR COMPOSITION OF BLOOD. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5715; 6 Nov. 1957
ASTIA AD 209 172.
See also; J. Aviation Med. 30:90-96, 1959.

ABSTRACT: Rhesus monkeys were exposed to vertical sinusoidal vibration of amplitude 0.1 inch and frequency 20 cps for 3 hours a day for 8 - 12 successive days. The monkeys were strapped, in a sitting position, on a vertically vibrating table top. Control monkeys were placed nearby. The vibrated monkeys showed no grossly visible abnormalities. On the first day of vibration, the neutrophile counts and plasma transaminase levels rose abruptly, and then gradually decreased as the vibration was repeated on successive days. These changes were interpreted as nonspecific changes such as may be characteristic of the General-Adaptation-Syndrome and do not necessarily indicate any specific tissue damage such as myocardial infarction of the monkey. Similar changes of lesser magnitude were produced by merely handling the monkeys. Plasma glucose and ascorbic acid levels and eosinophile counts which are known to change with stress, were maximally depressed by the mild stress of handling the animals. No additional effect on these determinations could be ascribed to vibration. The data obtained with monkeys suggest that a rise in transaminase activity merely reflects a general response to a stressful state. (AUTHOR)

149

Cope, F.W. 1958 ELASTIC CHARACTERISTICS OF ISOLATED SEGMENTS OF HUMAN AORTAS UNDER DYNAMIC CONDITIONS. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5809, 13 Aug. 1958. ASTIA AD-209 084.

See also J. Applied Physiol. 14(1):55-59, Jan. 1959

SUMMARY: When isolated segments of human descending thoracic aorta were caused to change their volume rapidly and continuously in sinusoidal fashion with pulse pressures and pulse rates maintained in the physiological range, the resulting pressure-volume curves showed slight but consistent increases in stiffness, compared to pressure-volume curves obtained on the same specimens when inflated stepwise. There was introduced into the pressure measuring system a time lag of sufficient magnitude to eliminate the hysteresis loop. The extent of hysteresis in the aorta was not determined because time lags in the aorta could not be distinguished from time lags in the measuring equipment.(Author)

150

Cope, F. W. 1958 EFFECTS OF AGEING, DRUGS, EXERCISE AND OTHER STRESSES ON THE ELASTIC CHARACTERISTICS OF THE INTACT LIVING HUMAN AORTA. (Naval Air Development Center, Johnsville, Pa.) NADC-MA-5815, 19 Nov. 1958.

SUMMARY: A method was developed by which aortic distensibility characteristics can be computed in the intact living human, if systolic and diastolic

arterial pressures, heart rate and cardiac output are known. In this way the aortic characteristics of a large series of normal men of different ages were computed. Comparing these results with measurements on excised aortas, a more pronounced trend toward increasing aortic stiffness with increasing age is evident in living than in dead aortas. Norepinepherine and exercise apparently cause the living aortas to constrict but to become more distensible. The same change occurs after 30 min. of high spinal anesthesia. The ganglionic blocking agents hemamethonium pentamethonium, and tetraethylammonium usually cause the living aorta to become stiffer, presumably due to dilation. The aortas of patients with pulmonary disease usually react in different fashion to exercise or tetraethylammonium. The increased aortic distensibility that occurs with the hypertension induced by norepinepherine or exercise acts as a compensatory mechanism by decreasing systolic pressure (Author)

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Cope, F.W. 1959 PROBLEMS IN HUMAN VIBRATION ENGINEERING. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA 5902, 6 March 1959. ASTIA AD 216 507.

See also Ergonomics 3(1):35, Jan. 1960.

ABSTRACT: Vibration is considered to include the oscillatory motion of traveling vehicles. The predominent linear sinusoidal component of this motion is usually in the vertical direction and of 0-50 cps in frequency. A human or animal, subjected to vibration, may exhibit a variety of symptoms and anatomical damage. These effects may be diminished by shielding the operator from the vibration of the vehicle by means of an elastic device. A variety of suitable devices are available. However, excessive shielding is undesirable in that it will increase the relative motion of the operator with respect to the vehicle which may be expected to cause performance decrements. (Author)

152

Cope, F.W., and D. Polis. 1959 INCREASED PLASMA GLUTAMIC-OXALACETIC TRANSAMINASE ACTIVITY IN MONKEYS DUE TO NONSPECIFIC STRESS EFFECT. J. Aviation Med. 30(2):90-96.

ABSTRACT: Significant increases in plasma glutamic-oxalacitic transaminase levels in monkeys have been found after exposure to vibration, acceleration, heat, and noise and confinement stress. In all but one of fourteen animals, no specific tissue damage was evident. Repeated exposure of the same monkey to the same intensity of vibration stress produced progressively smaller mean increases in the plasma transaminase levels. The data suggest that an increase in plasma transaminase activity can occur as a nonspecific stress effect. It follows that caution should be exercised in basing clinical judgements on serum transaminase levels.

153

Cope, F.W. 1959 ELASTIC CHARACTERISTICS OF ISOLATED SEGMENTS OF HUMAN AORTAS UNDER DYNAMIC CONDITIONS.
J. Applied Physiol. 14(1):55-59, Jan. 1959
See also (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5809. 13 Aug. 1959. ASTIA AD 209 084.

SUMMARY: When isolated segments of human descending thoracic aorta were caused to change their volume rapidly and continuously in sinusoidal fashion with pulse pressures and pulse rates maintained in the physiological range, the resulting pressure-volume curves showed slight but consistent increases in stiffness, compared to pressure-volume curves obtained on the same specimens when inflated stepwise. There was introduced into the pressure measuring system a time lag of sufficient magnitude to eliminate the hysteresis loop. The extent of hysteresis in the aorta was not determined because time lags in the aorta could not be distinguished from time lags in the measurement equipment. (Author)

154

Cope, F.W. & B.D. Polis 1959 SOME EFFECTS OF PROLONGED LOW FREQUENCY VIBRATION ON THE MOLECULAR AND CELLULAR COMPOSITION OF BLOOD.
J. Aviation Med. 30:90-96
See also U.S. Naval Air Development Center Rept. No. NADC-MA-5715, Nov. 6, 1957.

ABSTRACT: Rhesus monkeys were exposed to vertical sinusoidal vibration of amplitude 0.1 inch and frequency 20 cps for 3 hours a day for 8-12 successive days. The monkeys were strapped in a sitting position on a vertically vibrating table top. Control monkeys were placed nearby. The vibrated monkeys showed no grossly visible abnormalities. On the first day of vibration, the neutrophile counts and plasma transaminase levels rose abruptly, and then gradually decreased as the vibration was repeated on successive days. These changes were interpreted as nonspecific changes such as may be characteristic of the General-Adaptation-Syndrome and do not necessarily indicate any specific tissue damage such as myocardial infarction of the monkey. Similar changes of lesser magnitude were produced by merely handling the monkeys. Plasma glucose and ascorbic acid levels and eosinophile counts, which are known to change with stress, were maximally depressed by the mild stress of handling the animals. No additional effect on these determinations could be ascribed to vibration. The data obtainedd with monkeys suggest that rise in transaminase activity merely reflects a general response to a stressful state.

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Cope, F. W. 1959 PROBLEMS IN HUMAN VIBRATION ENGINEERING
(Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.)
BuMed Proj. no. NM 18 01 12.4, rept. no. 2; (TED ADC AE 1409);
Rept. no. NADC-MA-5903 6 March 1959 ASTIA AD 216 507

ABSTRACT: Vibration is considered to include the oscillatory motion of

traveling vehicles. The perdominent linear sinusoidal component of this motion is usually in the vertical direction and of 0-50 cps in frequency A human or animal, subjected to vibration, may exhibit a variety of symptoms and anatomical damage. These effects may be diminished by shielding the operator from the vibration of the vehicle by means of an elastic device. A variety of suitable devices are available. However, excessive shielding is undesirable in that it will increase the relative motion of the operator with respect to the vehicle which may be expected to cause performance decrements. (Author)

156

Cope, F.W. 1960 PROBLEMS IN HUMAN VIBRATION ENGINEERING.
Ergonomics 3(1):35, Jan. 1960
See also (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5902, 6 March 1959. ASTIA AD-216 507.

ABSTRACT: Vibration is considered to include the oscillatory motion of traveling vehicles. The predominent linear sinusoidal component of this motion is usually in the vertical direction and of 0-50 cps in frequency. A human or animal, subjected to vibration, may exhibit a variety of symptoms and anatomical damage. These effects may be diminished by shielding the operator from the vibration of the vehicle by means of an elastic device. A variety of suitable devices are available. However, excessive shielding is undesirable in that it will increase the relative motion of the operator with respect to the vehicle which may be expected to cause performance decrements. (Author)

157

Corso, J. F. 1952 EFFECT OF NOISE ON HUMAN BEHAVIOR.
(Wright-Patterson AFB, Ohio) WADC Tech. Rept. 53-81, Dec. 1952.
ASTIA AD 18259

ABSTRACT: The present report is a comprehensive summary of a program of research undertaken in the Dept. of Psychology of the Penn. State College from 24 March 1949 to 31 October 1952 on the effects of high intensity noise on human behavior. In all, six major studies were conducted and are reviewed, with the following information provided for each study; abstract, purpose, procedure, results and conclusions, and summary statement. In general, the results of this series of studies show that noise has no marked effect on mental performance.

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Corti, U.A. 1959 VIBRATION MEASUREMENTS ON LIVING SUBJECTS.
Schweiz Med Wschr 89:576-81, 30 May 1959

159

Coulter, N.A. and J. C. West 1960 NONLINEAR PASSIVE MECHANICAL PROPERTIES OF SKELETAL MUSCLE
(Wright Air Development Division, Wright-Patterson Air Force Base, Ohio)
Proj. 7232; Task 71784; Contract No. AF 33(616)-5780, WADD TR 60-636

ABSTRACT: The nonlinear, passive mechanical properties of skeletal muscle were investigated. The response of frog gastrocnemius muscle to sinusoidal displacements over a frequency band of 0.5 to 25 cps was determined. From the experimental data a nonlinear differential equation characterizing the passive mechanical behavior of muscle was constructed

160

Coussoulakos, A., H. Maschas, and G. Yannoulis 1962 PATHOLOGICAL DISORDERS CAUSED BY VIBRATIONS IN NON-FLYING PERSONNEL OF ATHENS AIRPORT.
(Troubles pathologiques provoques par les vibrations concernant le personnel non navigant de l'aerodrome d' Athenes)
Revue de medecine aeronautique, (Paris), 1 (4): 18-20. July-Aug. 1962

ABSTRACT: Airport noise produces not only stato-acoustic disorders, but also general disorders (fatigue, irritability, weakness). It is also responsible for mental, behavioral, and neurological disorders (insomnia, concentration difficulties, headaches, vertebral pain, depression, visual disorders), cardiovascular disorders (tachy-cardia, extrasystole, bradycardia), digestive disorders (dyspepsia, nausea, vomiting, duodenal ulcer), and blood disorders (poly-nucleosis with eosinophilia). Etiopathogenesis is related to the terrain, hearing acuity, the frequency, character, and duration of exposure to noise, former disorders, heredity, and hormono-vegetative factors. Special medical and audiometric selection criteria, and personal protective devices (ear plugs, helmets) are recommended for nonflying personnel exposed to noise daily.

161

Cramer, R. L., P. J. Dowd, & D. B. Helms 1963 VESTIBULAR RESPONSES TO OSCILLATION ABOUT THE YAW AXIS. (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 28 - May 2, 1963)

ABSTRACT: Nystagmus varies systematically in amplitude and phase with the frequency of oscillation. The relationships can be expressed in terms of a simple analog. Both these relationships can be altered by repeated stimulation in a conditioning program. (AUTHOR)

162

Crampton, G. H., & F. A. Young 1953 THE DIFFERENTIAL EFFECT OF A ROTARY VISUAL FIELD ON SUSCEPTIBLES AND NON-SUSCEPTIBLES TO MOTION SICKNESS. J. Comp. Physiol. Psychol. 46:451-453

SUMMARY AND CONCLUSIONS: 1) Two groups of Ss, one susceptible and the other not susceptible to motion sickness, were subjected to a rotating room situation in which they remained stationary. The resulting nausea symptoms were categorized on an arbitrary four-point scale. 2) The results indicate that individuals susceptible to motion sickness are also susceptible to nausea in a rotary visual field situation, and, conversely, nonsusceptibles are resistant. 3) It is concluded that some of the individual differences in regard to nausea found in previous studies utilizing rotary visual fields may be related to the motion sickness susceptibility of the subjects. (AUTHOR)

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Crede, C.E. 1955 VIBRATION AND VIBRATION ISOLATION IN AIR-CRAFT AND GUIDED MISSILES. (Barry Controls, Inc., Watertown, Mass.) Progress rept. no. 257 ASTIA AD- 118 627

ABSTRACT: "This report reviews some of the latest developments in vibration and in vibration and shock isolation with particular reference to piloted aircraft and guided missiles. The use of discrete and continuous spectra to define environmental conditions is discussed, and the significance of these concepts in the design and testing of equipment is reviewed. Mention is made of certain effects which may be important in the isolation of high frequency vibration, including standing waves in vibration isolators and the resilience of structural members of the mounted equipment. The problems introduced by the requirement of isolation during sustained acceleration are discussed, and graphical means for predicting the change in natural frequency of a particular non-linear isolator during sustained acceleration is included. Reference is made to shock transmissibility of isolators, and to limitations on isolator deflection as governed by available space. Finally, the report includes a discussion of techniques for selection of optimum characteristics for isolators by use of an analog computer, and gives an example of the application of this technique." (BCI abstract)

164

Crede, C. E. 1957 PRINCIPLES OF VIBRATION CONTROL. In C. M. Harris, ed., Handbook on Noise Control (New York: McGraw-Hill, 1957) Chap. XII.

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Crisman, R.B., & C.L. Forrest 1957 HUMAN FACTORS IN THE DESIGN OF HIGH PERFORMANCE AIRCRAFT. (Paper, SAE National Aeronautical Meeting, April 1957)

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Critchlow, E.F. 1944 MEASUREMENT AND PREDICTION OF AIRCRAFT VIBRATION. S. A. E. J. 52:368-378

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Crocco, G.A. 1951 LA SOPPORTAZIONE FISIOLOGICA NEI MISSILI A REAZIONE (PHYSIOLOGICAL ENDURANCE AND ROCKET FLIGHT.) Aerotecnica, (Rome) 31:55-59

168

Crook, Mary C. 1960 SUMMARY OF REPORTS ON VIBRATION SURVEYS ISSUED DURING 1959. (David Taylor Model Basin, Washington, D.C.) Report no. 1402; ASTIA AD-232 642

ABSTRACT: Tests on the USS Skipjack (SSN-585) showed that the hull vibration was not excessive when compared with levels on other submarines. The hull vibrated in its fundamental 2-noded mode whenever the rudder or stern was predominantly in the athwartship direction, and it was not nearly as much in evidence at speeds in excess of 10 kn as at lower speeds. It is believed that the rudder-ram-hydraulic system has a natural frequency near that of the 2 noded hull mode (3.3c submerged, 3.7c surfaced) when the ship advances at low speeds, but that the rudder frequency changes with speed, due to the spring-like effect of the hydrodynamic lift and moment. Blade frequency hull vibration at a submerged 105 rpm was twice that previously reported; this condition is attributed to increased excitation arising from resonant whirling vibration. This large blade frequency resonant whirling vibration (center of shaft moving in an elliptical path) was measured near 105 rpm. At this speed the shaft vibrated with an amplitude of the order of 40 mils peak-to-peak, 5 vibrations per shaft revolution. There were strong indications that the floodhole cover in no. 4 ballast tank was open, possibly giving rise to Helnholtz-type excitation. A list of formal reports published during 1959 is appended.

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Cummings, S. B. 1938 THE EFFECTS OF LOCAL ANESTHESIA ON TACTILE AND VIBRATORY THRESHOLDS. J. Exp. Psychol. 23:321-338.

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Curry, B. and Hsi, E. 1949 BIPLIOGRA[illegible]PERSONICS OR ULTRASONICS 1926-1949 Oklahoma Agr. Mech. Col[illegible], Research Foundation, Stillwater, Oklahoma. See also: Chem. Abstr. 44:4298d (1950)

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Curtis, A. J. 1958 RANDOM VIBRATION TESTING SIMPLIFIED. S.A.E. Journal 66(11):127, Pt. 2

ABSTRACT: Fatigue damage in actual environments can be found in accelerated lab tests by using an "equivalent peaks" technique. The effect of low-intensity long-time random vibrations can be found by testing a part at a short-time high-intensity vibration level. This is done by calculating the number of times a damaging peak acceleration is applied to a part. The same number of peaks are then applied in an accelerated lab test. Since the vibrations being considered are of the random type, probability density functions for the distribution of the magnitude of the peaks are used. Narrow-band random vibration is assumed since most fatigue damage occurs at resonant frequencies.

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Cyriax, E. 1948 MANUAL VIBRATIONS AND NERVE FRICTIONS, WITH SPECIAL REFERENCE TO PERIPHERAL FACIAL PARALYSIS Brit. J. Phys. Med. 11, 144-146

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Danowski, T.S., C. Moses Jr., and H.M. Margolis 1960 VIBRATORY SENSE AND OSCILLOMETRIC INDEX IN GOUT AND IN RHEUMATOID ARTHRITIS.
Amer. J. Med Sci. 239:295-300, March 1960

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Davis, H. 1948 BIOLOGICAL AND PSYCHOLOGICAL EFFECTS OF ULTRASONICS J. Acoust. Soc. Am. 20:605-607

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Davis, H., 1948 VIBRATION AND ITS PHYSIOLOGICAL EFFECTS.
Medical News Letter, Aviation Supplement, 9: 1-4

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Davis, H., H. G. Parrack and D. H. Eldredge 1949 HAZARDS OF INTENSE SOUND AND ULTRASOUND
Annals of Otology, Rhinology and Laryngology 58:732, September 1949.

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Davis, H. 1951 NOISE: EFFECTS ON HUMAN BEHAVIOR AND COMMUNICATION. American Medical Assoc. Arch. Indus. Hygiene & Occupational Med. 3:227-231

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Davis, H. and Associates 1953 ACOUSTIC TRAUMA IN THE GUINEA PIG J. Acoust. Soc. Amer. 25:1180-1189

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Davis, H., D.H. Eldredge, et al. 1954 HIGH-INTENSITY NOISE AND MILITARY OPERATIONS: AN EVALUATION(Armed Forces NRC Committee on Hearing and Bio-Acoustics, Wash, D.C.) CHABA Rept. No. 1, 25 Jan. 1954

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Davis, H., ed. 1958 AUDITORY AND NON-AUDITORY EFFECTS OF HIGH INTENSITY NOISE. (Naval School of Aviation Medicine, Johnsville, Pa.) Res. Proj. NM 130199.1. 7., 6/58

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Davis, H., Chairman 1962 PANEL DISCUSSION: ENVIRONMENTAL EFFECTS ON CONSCIOUSNESS. In Schaefer, K. E., ed., Environmental Effects on Consciousness. (New York: The MacMillan Co., 1962) Library of Congress Catalog Card No. 61-9079, pp. 132-146

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Deily, W.H., I. Glassman & D.B. Houghton 1952 A DYNAMIC AIRCRAFT SIMULATOR FOR STUDY OF HUMAN RESPONSE CHARACTERISTICS. (The Franklin Institute Laboratories for Research and Development, Philadelphia, Pa.) Final Report No. F-2169, Sept. 30, 1952. ASTIA AD 52 725.

ABSTRACT: This report covers the design and construction of a dynamic simulator of an aircraft in flight with which "human frequency responses" to visual signals may be measured for the purpose of determining optimum characteristics of an aircraft's controls.

The dynamic simulator comprises an aircraft cockpit, a program unit which presents visual input stimuli on a cathode-ray tube in view of the pilot an electronic analog computer which computes the aircraft equations of

motion and resultant stimuli (target) motions, and a recorder to record pilot responses and other desired quantities. The aircraft simulated is the F-30A jet fighter.

Validation of the simulator indicates that the device "flies" like the F-80A. A separate report on the validation phase is under preparation.

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Denisov, V. & M. Klevtsov 1962 BIOTELEMETRY (Trans. of Radio, Moscow (USSR) (10):16-17, 1961) (Office of Technical Services. Washington, D. C.) 62-11106

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Dennis, J. P., & M. A. Elwood 1958 THE EFFECTS OF VIBRATION EXPERIENCED IN DIFFERENT SEATING POSITIONS. (Ministry of Supply, Clothing and Stores Experimental Establishment) Rept. No. 78

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Dennis, J. P. 1960 THE EFFECT OF WHOLE BODY VIBRATION ON A VISUAL PERFORMANCE TASK (Directorate of Physiological & Biological Research, Clothing & Equipment Physiological Research Establishment) Rep. No. 104; ASTIA AD-247 249; Aug. 1960

ABSTRACT:
Introduction & Object: These experiments are concerned with the relationships between a range of vibration conditions (from 5-37 c.p.s.) experienced by subjects sitting on an ordinary tank seat, the amounts of movement at the head and the associated losses in visual performance.
Summary: (1) Visual performance was significantly affected at all conditions when the motion of the table approximated to ±½ peak g and at all but one condition (19 c.p.s.) when the table motion approximated to ±¼ peak g. Vibration at the ±¼ peak g level increased errors over the non-vibration condition by 25%; at ±½ peak g this increase in error was 55%.

(2) Rate of change of acceleration of the head is shown to correlate with visual performance r=0.61. This relationship is not necessarily consistent over the experimental conditions. (AUTHOR)

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Jahrbuch d. Deutschen Luftfahrtforschung 1942 pp. I 794-I803
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Rev. med. RioGrande do Sul. (Brazil) 1: 278-287, May-June 1945

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Dieckmann, D. 1955 THE EFFECT OF MECHANICAL VIBRATION ON MAN: A REVIEW AND SUMMARY OF RESEARCH TO DATE. (Report from the Max-Planck-Institute of Occupational Physiology, Dortmund. Available as a British Railways Research Translation)

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Dieckmann, D. 1957 EINFLUSS VERTIKALER MECHANISCHER SCHWINGUNGEN AUF DEN MENSCHEN (Effects of Vertical Mechanical Vibration Upon Man)
Int. Z. Angew. Physiol. (Berlin) 16: 519-564.

194

Dieckmann, D. 1957 A STUDY OF THE INFLUENCE OF VIBRATION ON MAN.
Ergonomics, 1: 347-355

ABSTRACT: The influence of mechanical vibration of the human body was studied in the standing and sitting positions. The range of frequencies was up to 100 cps. At the lowest frequencies of the movement of the body follows that of the platform. Near 4 to 5 cps there is a resonance maximum of body movements. Higher frequencies induce lower amplitudes of body vibrations. If the vibration of the shoulder is taken as 100% and compared with the head,

the maximum relative amplitude occurs between 20 and 25 cps. A scale of [illegible] was developed [illegible] during of strain from 5 to 40 cps strain is [illegible] velocity of vibration, below this acceleration is [illegible] Above 40 cps the amplitude serves as a standard of strain. The [illegible] ements of the head of a subject standing on a horizontally vibrating table are elliptical. With an increase of frequency the elipse becomes more vertical, so that at 4 or 5 cps the movements are mainly vertical although the vibration is horizontal. The large elliptical form at 2 cps results from resonance.

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Dieckman, D. 1958 EINFLUSS HORIZONTALER MECHANISCHER SCHWINGUNGEN AUF DEN MENSCHEN (Influence of Horizontal Mechanical Vibrations on Humans) Internat. Zeitschrifte Angew. Physiol. 17:67-83

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Dieckmann, D. 1958 EINFLUSS HORIZONTALER MECHANISCHER SCHWINGUNGEN AUF DEN MENSCHEN, (Influence of Horizontal Mechanical Vibrations on Humans) Internat. Ztschr. angew. Physiol. 17: 83-100

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Dieckmann, D. 1958 MECHANISCHES MODELL FUR DEN VERTIKAL SCHWINGENDEN MENSCHLICHEN KORPER. (Mechanical models for the vertically vibrating human body.) Internat. Ztschr. angew. Physiol. 17:67

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Dieckmann, D. 1958 EIN MECHANISCHES MODELL FÜR DAS SCHWINGUNGSERREGTE HAND-ARM SYSTEM DES MENSCHEN. (A mechanical model for the hand-arm system of men stimulated by vibrations.) Internat. Ztschr. angew. Physiol. 17:125

199

Dieckmann, D. 1958 STUDY OF THE INFLUENCE OF VIBRATION ON MAN. Ergonomics 1(4):347-355, Aug. 1958

ABSTRACT: To study the influence of horizontal and vertical mechanical vibrations (up to 100 cycles per second) on the human body in standing and sitting positions, physical and physiological methods as well as subjective assessments were employed. Resonance phenomena are described and a strain scale is given for these vibration excitations. Using these techniques, a man sitting on a seat in a rail-motorcar is described.

200

Dieckmann, D. 1959 EFFECTS OF MECHANICAL VIBRATIONS OF AUTOMOBILES ON HUMANS. ATZ Automobiltechnische Zeitschrift (Germany) 59 (10):297-302. SLA Trans. No 59-17397

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Di Macco, G. 1938 PATHOLOGICAL ACTION OF ULTRASONIC WAVES: A REVIEW OF LITERATURE Arch. ital. med. sper. 2, 66-86

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Dindinger, H. 1956 UNTERSUCHUNGEN UBER EIN EMPFINDUNGSSTARKEMASS FUR VIBRATIONEN DES MENSCHLICHEN KORPERS: DIE VIBRONSKALA. (RESEARCH ON A MEASURE OF THE INTENSITY OF SENSATION OF VIBRATIONS OF THE HUMAN BODY: VIBRON-SCALE) (Thesis: Medical Faculty of Friedrich-Alexander University, Erlangen) (München: Mikrokopie, 1956)

ABSTRACT: A scale was developed for the measurement of sensations of vibration in the frequency range of 50-200 c.p.s. at threshold to medium intensities. The Vibron-scale follows in general the Veg-Scale developed by S. S. Stevens for the perception of weights. If the vibron values are arranged in a geometric series, the progression follows Stevens' law (sensation increases as the cube root of stimulus energy). Practical application of this scale is envisioned for the quantitative measurement of vibration stress on the human organism during flight and car travel.

203

[illegible]triyevskiy, Sergey Yevgen'yevich 1960 SOME THEORIES OF VIBRATIONS WITH SELF-DAMPING AND THEIR EVALUATION FROM THE POINT OF VIEW OF EXPERIMENTAL DATA. Nekotoryye Teorii Kolebaniy S Sobstvennym Zatukhaniyem i Ikh Otsenka s Tochki Zreniya Opytnykh Dannykh (Moscow: 1957) PP. 1-85 (Aerospace Technical Intelligence Center, Wright-Patterson AFB, Ohio, Translation No. MCL-684) ASTIA AD-256 614; 21 Nov. 1960

ABSTRACT: The different dependences of vibration damping on the internal resistance in the material is examined. It is customary to call such vibrations vibrations of elastic bodies with self-damping. A new theory is proposed in which vibration damping is considered as a function of both velocity and displacement. The theory also considers damping as being proportional to the second degree polynomial of deformation. (AUTHOR)

204

Document Service Center, Armed Services Technical Information Agency 1957 SHOCK AND VIBRATION. ENTRIES SELECTED BY DR. J. NORTON BRENNAN, PENNSYLVANIA STATE UNIVERSITY, IN CONJUNCTION WITH CONTRACT DA 19-129-qm-804. REPORT BIBLIOGRAPHY. (Document Service Center, Armed Services Technical Information Agency, Dayton, Ohio) ASTIA AD-138 776

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Dognon, A. and E. Biancani 1938 PHYSICOCHEMICAL AND BIOLOGICAL EFFECTS OF ULTRA-VIOLET RAYS AND ULTRA-ACOUSTIC SOUNDS. Ann. inst. d'actinol 12; 61-64

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Dognon, A. and E. Biancani 1938 ULTRASONICS AND THEIR BIOLOGICAL ACTION Radiologica (Berlin) 3; 40-54

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Donskaia, L. V. and M. F. Stoma 1960 [PHYSIOLOGICAL ANALYSIS OF THE EFFECT OF VIBRATIONS ON THE ORGANISM.] In Tr. Leningrad Sanitarnogig Med. Inst. 61:37-48, 1960 (Russian)

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Douvillier, J.G., Jr., H.L. Turner, J.D. McLean, & D.R. Heinle 1960 EFFECTS OF FLIGHT SIMULATOR MOTION ON PILOTS' PERFORMANCE OF TRACKING TASKS. (National Aeronautics and Space Administration, Washington, D.C) NASA TN D-143, Feb. 1960. ASTIA AD 231 341

ABSTRACT: The effect of motion of a flight simulator on pilots' performance of a tracking task has been investigated by comparing the air-to-air tracking performance of two pilots in flight, on a motionless flight simulator, and on a flight simulator free to roll and to pitch. Two different attack displays were used.

It was found in tracking a maneuvering target that: (1) the results from the moving flight simulator resembled the results from flight much more than did those from the motionless si ulator; and (2) that in flight the conventional circle-dot display was superior to a drone display. For simpler tracking tasks it was not possible to detect these differences.

209

Draeger, R.H., D.E. Goldman, & C.B. Cunningham 1947 SHOCK AND VIBRATION BULLETIN NO. 2 - MARCH 1947. (Office of Naval Research, Naval Research Laboratory, Washington, D.C.) ASTIA ATI 75123

ABSTRACT: Topics covered at a symposium on shock and vibration are presented. A committee was set up to clarify and unify ideas and to report such terminology definitions, and standards as will help in the uniformity, understanding, and progress in the field of science. The effects of personnel shock, blast, and vibration were also discussed. It was demonstrated that the purpose of such investigations was to provide protection for human beings and structures involved in Fleet operations. In addition, a detailed description together with photographs is given of the German Askania vibrograph.

210

Drazin, D.H. 1959 EFFECTS OF LOW-FREQUENCY HIGH-AMPLITUDE WHOLE-BODY VIBRATION OF VISUAL ACUITY
(Flying Personnel Research Committee, Air Ministry) FPRC Memo 128 Nov. 1959
AD-317 619

ABSTRACT: Four subjects were tested for visual acuity in 10 conditions of vertical sine-wave vibrations at frequencies between 1 and 3 cps and amplitudes between 1.125" and 4.5". Visual acuity test material vibrated in phase with the subject was found to decrease as either amplitude or frequency increased. At frequencies between 1 and 2.5 cps acuity was found to regress linearly on peak acceleration. A more marked decrement of acuity at 3 cps is attributed to body resonance.

The results are discussed with special reference to their bearing on aircrew performance in high-speed low-level flight.

211

Drazin, D. H. 1960 THE EFFECTS OF VIBRATION ON VISION. (Ergonomics Res. Soc. Annual Conf., March 1960.)

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Drazin, D. H. & J. C. Guignard 1960 SOME EFFECTS OF LOW FREQUENCY VIBRATION ON VISION.
Proc. 5th Euro. Cong. Aviation Med., London, 1960.

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Drazin, D. 1960 OSCILLATORY MOTION IN FLIGHT.
Proceedings of the 5th European Congress of Aviation Medicine

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Drazin, D. H., & J. C. Guignard 1962 SOME EFFECTS OF LOW FREQUENCY VIBRATIONS ON VISION. In Barbour, A. B., & H. E. Whittingham, eds., Human Problems of Supersonic and Hypersonic Flight (New York, Oxford, London, Paris: Pergamon Press, 1962) pp. 339-342

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Drechsler, B. and V. Styblova 1957 ELECTROMYOGRAFICKA STUDIE U PRACUJICICH VYSTAVENYCH MECHANICKYM OTRESUM. (Electromyographic study of workers exposed to mechanical vibrations.) Pracovni lek. 9:292-298

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Drogichina, E. A. & N. B. Metlina 1959 K KLINIKE VIBRATSIONNOI BOLEZNI (The Clinical Picture of Vibration Sickness).
Klinicheskaia Meditsina (Moscow) 37(1):104-110, Sept. 1959 (In Russian, with English summary)
(Translation Services Branch, Foreign Technology Div., Wright-Patterson AFB, Ohio) Translation FTD-TT-62-539/1, 20 April 1962. ASTIA ATI 280 946

ABSTRACT: The clinical picture of vibration sickness is extremely diverse. The symptomatology includes local vasomotor derangements of the axon reflex type, and a genreal systemic reaction evoked by the effect of vibration on reflexes. Foue stages of the disease are distinguished. The first two stages are characterized by reversible vasomotor disorders, while in the third and fourth stages the pathologic process becomes stabilized and may lead to more or less permanent damage. The severity and course of the disease depends not only on the duration and intensity of the vibration, but also on the individual sensitivity of the organism to that particular vibration. High frequency vibration ahs the most adverse effects on the human organism. Experimental findings show that the extent of injury varies with the individual and is related to a deficiency in the endocrine and autonomic nervous systems. Current concepts in the treatment and prophylaxis of vibration disease are discussed.

218

Drogichina, E.A. & N.A. Metlina [illegible] IONNOI BOLEZNI, VYZVANNOI VOZDEISTVIEM OBSHCHI[illegible] (On THE CLINICAL PICTURE OF VIBRATION SICKNESS CAUSED BY [illegible] OF GENERAL V[illegible])
Gigiena truda i professional[illegible] zabolevaniia (Moscow), 6 (7): 15-22. July 1962. In Russian, [illegible] English summary ([illegible])

ABSTRACT: Vibration sickness proceeds [illegible] manifests itself in a specific syndrome: autonomic pol[illegible] by sympathalgia, disturbances of the vibration sense [illegible] sensations received by skin receptors, disturbances of the a[illegible] nervous system, and changed capillary circulation in the fingers. Diagnostic importance is attached to the lateration of the pulse in the arteria dorsalis pedis, resembling endarteritis. Other symptoms include vestibular pathology with lateral nystagmus, functional disturbances characteristic of neurotic reactions, and hyperthyroidism. Vibration disease is reversible and amenable to treatment.

219

DuBois, A.B., A.W. Brody, D.H. Lewis, and B.F. Burgess 1954 RESPONSE OF CHEST WALL, ABDOMEN AND DIAPHRAGM TO FORCED OSCILLATIONS OF VOLUME.
Fed. Proc. 13: 38

ABSTRACT: Previous studies tested the frequency response of the lung-thorax system to sinusoidal air pumping at the mouth by comparing inflow to the mouth with transthoracic pressure. This permits separation of the total impedance to breathing into resistive, elastic and inertial components. To test whether

the chest wall, diaphragm and abdomen move together or as separate systems, velocity pick-ups (magnet and coils) were placed on the body surface during such sinusoidal pumping. At 7-11 cps. Velocity over the upper anterior chest was in phase with mouth pressure in 10 supine subjects and a maximum occurred in velocity and displacement, (.11 to .24 mm at a pump stroke of 14 cc.) At 5-8 cps the abdomen showed a maximal amplitude (1.3-1.9 mm at pump stroke 56 cc), by the ballistocardiograph in 6 subjects (.14- .29 mm at pump stroke 56 cc.) At 1-2 cps the anterior chest and abdominal surface moved together, in phase. At higher frequencies, the surface motion of the abdomen lagged the upper chest and this lag increased caudally. Above 4 cps the lower chest also lagged the upper.

220

DuBois, A.B., A.W. Brody, and D.H. Lewis. 1956 OSCILLATION MECHANICS OF THE LUNGS AND CHEST IN MAN. J. Appl. Physiol., 8:587-594

ABSTRACT: The chest was driven by an oscillating air pump which generated sinusoidal pressure waves at the mouth or around the body and the over all impedance of the chest was measured by a pressure gage and flow-meter, at frequencies from 2 to 15 cps. The frequency response characteristics of the chest wall were measured with velocity transducers and indicated probably resonant frequencies of 7-15 cps. The frequency response characteristics of the diaphragm and abdomen were indirectly deduced from measuring velocity of the abdominal surface and headward-footward velocity of the body with respect to the table, and was found to be about 6 cps. The airways can probably be characterized as a resistance-capacitance system leading to the chest wall and diaphragm which may be represented as a visco-elastic massive surface exhibiting both perpindicular and transverse surface waves in response to the driving thoracic pressures.

221

Duffner, L. R., & L. H. Hamilton 1960 EFFECTS OF LOW-FREQUENCY HIGH-AMPLITUDE VERTICAL SINUSOIDAL VIBRATION ON RESPIRATION IN HUMAN SUBJECTS. Fed. Proc. 19:374

ABSTRACT: Although man is exposed to low-frequency whole-body vibration whenever he travels, little is known of the physiological effects of this environmental factor. The effects of sinusoidal vibration on respiration were investigated with 10 normal male subjects. Vital capacity, minute ventilation, breathing frequency, and expired air composition were measured before, during, and after a 4 minute exposure to vibrations of 2 to 7 cps at accelerations of 0.15 and 0.35 g. Oxygen consumption increased during vibration and dropped toward control values during the recovery period. Minute ventilation and tidal volume increased while breathing frequency decreased immediately after vibration began, remained unchanged during the entire period of exposure and returned to control values as soon as vibration ceased. Vital capacity was not significantly changed during the vibration or recovery periods.

222

Duffner, L. R., L. H. Hamilton & M. A. Schmitz 1962 EFFECT OF WHOLE-BODY VERTICAL VIBRATION ON RESPIRATION IN HUMAN SUBJECTS. J. Appl. Physiol. 17:913-916, Nov. 1962.

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Durand, F.L., 1960 AN EVALUATION OF A PROTOTYPE NOISE EXPOSURE. (Masters Thesis, Ohio State University) June 1960

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Dvorak, Josef 1958 ZDRAVOTNICKE PROBLEMY LETU V KOSMICKEM PROSTORU (Health Problems of Flights in the Cosmic Space) Prakticky lekar 38(10): 401-403

VIBRATION

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Earmark, N. O. 1951 VIBRATION, SONIC AND MECHANICAL, ACTION ON AIR FORCE PERSONNEL. (Aero Med. Lab., Wright-Patterson Field, June 1951.

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Echlin, F. and A. Fessard 1938 SYNCHRONIZED IMPULSE DISCHARGES FROM RECEPTORS IN THE DEEP TISSUES IN RESPONSE TO A VIBRATING STIMULUS. J. Physiol. 93:312.

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Eckel, W. 1954 ELEKTROPHYSIOLOGISCHE UND HISTOLOGISCHE UNTERSUCHUNGEN IM VESTIBULARISKERN GEBIET BEI DREHREIZEN (Electrophysiological and Histological Investigations in the Field of the Vestibular Nucleus During Rotary Stimuli)
Arch. Ohren- Nasen- u. Kehlkopfh. (Berlin) 164: 487-513

228

Edwards, D. A. W. 1948 REPORT ON SUBJECTIVE SENSATIONS RECORDED BY AN OBSERVER EXPOSED TO HIGH INTENSITY AIRBORNE VIBRATION WITH NOTES ON OTHER PHYSIOLOGICAL EFFECTS.
(Flying Personnel Research Committee, Farnborough, England) FPRC 688(a), May 1948. ASTIA ATI 46 724.

ABSTRACT: Subjects were exposed to several noise and vibrations sources including three athodyds, a modified gas turbine, several gas turbines installed in aircraft, propeller and engine noise from high-powered reciprocating engines and synthetic aircraft noise generated by a loud-spea ker. The observer used various types of ear protection which consisted of ear plugs and helmets. Several simple neurological tests were made plus a few recofdings of the pattern of respiratory rate and minute volume. The observers efficiency was tested at different noise levels of each source and his physiological reaction noted, also the sensations felt by him. Tinnitus and temporary loss of hearing resulted in several cases. The most aggravating symptom was a superimposed tinnitus pitch of 2000 cps. Uncomfortable body sensations were experienced only during a "rough" run of the atho s.

229

Edwards, D.A.W. 1948 FIRST REPORT ON THE EFFECT OF HIGH INTENSITY VIBRATIONS ON SOME ANIMALS (Flying Personnel Research Committee, Institute of Aviation Medicine, Farnborough, England) FPRC 688(b) May 1948, ATI42768

ABSTRACT: A series of experimental exposures of rats, mice and guinea pigs to vibrations, both air and structure borne, and covering a range of frequencies from subsonic to ultra-sonic and intensitites up to 135 db were conducted, and the reactions of these animals are described and discussed. In view of the peculiar susceptibility of rats to audiogenic stimuli they are considered to be unsuitable animals for these experiemtns. The reactions of the mice and guinea pigs used, although they may throw some light upon the psychology and physiology of these animals, do not contribute in any positive manner to a knowledge of the effects of such sources of vibration upon human beings

230

Edwards, D. A. W. 1950 SOME OBSERVATIONS ON THE EFFECTS ON HUMAN SUBJECTS OF AIR AND STRUCTURE BORNE VIBRATIONS OF VARIOUS FREQUENCIES. (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. No. 753; ASTIA AD-115 863; Sept. 1950

ABSTRACT: A number of ground engineers working daily at test beds for gas turbines and ram jets were questioned about their experiences and sensations when exposed to the radiation from the power units. A group of civilian test pilots employed by two firms on testing Derwent and Nene jet engines were similarly questioned. Two pilots and one ground engineer who complained of bizarre symptoms were questioned and examined in detail. A detailed study of subjective impressions of exposure to high intensity structure borne and air borne vibrations was carried out by the author. During this study attempts were made to estimate the changes, if any, in respiratory pattern and oxygen consumption associated with exposure to the vibrations. During the development of the investigation it became obvious that an improvement in the sound attenuating capacity of the standard flying helmet was an urgent need, and that a suitable method of ear protection was necessary for the comfort and welfare of aircrew and ground engineers. The principles of the design and development of ear defenders were reviewed and an attempt made to improve the existing patterns. (ASTIA)

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Fijkman, E. & A. J. H. Vendrik 1960 DYNAMICS OF THE VIBRATION SENSE AT LOW FREQUENCY.
J. Acoust. Soc. Amer. 32(9):1134-1139, Sept. 1960.

ABSTRACT: The dynamic properties of the vibration sense in the human skin were investigated in a series of experiments. By means of psychophysical methods, threshold values with different time courses and durations were determined.. Sinusoidal deformations and deformations linearly increasing with time were used. The results were described by a simple model yielding

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Eldred, K.M., W.J. Gennon & H.E. von Gierke 1956 CRITERIA FOR SHORT TIME EXPOSURE OF PERSONNEL TO HIGH INTENSITY JET AIRCRAFT NOISE (Wright Air Development Center, WP-AFB, Ohio) WADC T 55-355

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Eldred K., William Roberts, and R. White 1961 STRUCTURAL VIBRATIONS IN SPACE VEHICLES. (Northrop Corp., Hawthorne, Calif.) WADD TR 61-62; ASTIA AD-273 334; Jan 1961

ABSTRACT: Study was made of forcing functions and their characteristics, methods of estimating a combined response, and proof tests required to qualify structure and equipment. The report is presented in three parts. Part One discusses the various sources of vibratory energy which can result in vehicle vibration including rocket noise, aerodynamic pressure fluctuations, wind shear and gust, meterorites and direct mechanical coupling. Part Two discusses the prediction of vibratory response through both empirical and analytical approaches, and includes a thorough discussion of the single degree of freedom system, resonance-on-resonance, panels, shells, mobility, generalized force, joint acceptance, correlations and other statistical tools. Part Three contains a discussion of fatigue and mal-function, the properties of an ideal test, implications of and methods for obtaining a simplified composite response and an examination of various test equivalences. (Author)

234

Eldredge, D. H., H. O. Parrack and H. F. Koster 1948 PHYSIOLOGICAL EFFECTS OF INTENSE SOUND. (USAF, AMC, Wright-Patterson AFB, Ohio) MCREXD Report 695-71B, May 1948.

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Eldredge, D. H. and H. O. Parrack 1949 BIOLOGICAL EFFECTS OF INTENSE SOUND. J. of Acoustical Soc. of Amer. 21:55.

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Eldredge, D. H., & H. O. Parrack 1950 SOUND PROBLEMS IN THE AIR FORCE U. S. Air Force Medical J. 1(4):449-461, April 1950

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Eldredge, D. H., H. O. Parrack, & H. Davis 1951 SOME RESPONSES OF THE EAR TO INTENSE HIGH-FREQUENCY SOUND. (USAF, W-PAFB, Ohio) TR 6564, Sept. 1951

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Elfson, D.G. and L. Wheeler Jr. 1951 RESONANCE IN THE HUMAN OPERATOR. (USAF Aero Med. Lab.) Tech. Report no 5834, April 1951

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El'piner, I. E. 1960 O BIOLOGICHESKOM DEHSTIVII ULTRAZVUKOVYKH VOLN (Biological Effect of Ultrasonic Waves) (Trans. of Zhurnal Obshchey Biologii (USSR) 15(1):18-30, 1954). (Office of Technical Services, Washington, D.C.) 60-21118

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Eppele, K. R., & G. D. Shipway 1959 CORRELATION STUDIES OF RANDOM AND SINE WAVE VIBRATION TESTS. In 1959 Proceedings of the Institute of Environmental Sciences, Annual Technical Meeting, April 22-24, 1959, La Salle Hotel, Chicago, Illinois (Institute of Environmental Sciences, Mt. Prospect, Ill.) pp. 45-49

241

Ernsthausen, W. 1950 SOUND AND VIBRATION IN AIRCRAFT. German Aviation Medicine, World War II (Washington: Dept. of the Air Force, 1950) Vol. 2, Chap. VII-A

ABSTRACT: This paper shows the range of amplitudes and frequencies of mechanical vibration energy to which man is exposed in aircraft, and the properties by which his organs handle this stress. The resulting effect can be greater than first seem possible.

Each impulse of energy from without is usually conveyed to the cerebral cortex and reflex centers. Sympathetic and parasympathetic fibers innervate not only the smooth musculature, but each organ, each muscle, spinal cord and spinal ganglion. Marked interference with the vegetative process is indicated by the pupillary and eyelid reflexes originating in the hearing organ; the abrupt tonus variations of the skeletal muscles during exposure to impact-like sound stimuli; the nausea, nystagmus, loss of tendon reflexes, and changes in circulation and respiration due to vibration; the paralytic phenomena due to detonation waves and the effect of high-speed shells on the nervous plexi of the abdominal cavity.

The insight gained thus far is mostly based upon independent partial results A survey devoted especially to the central coupling functions has not yet been made.

242

Ernsthausen, W., & W. W. von Wittern 1950 MEASUREMENT OF SOUND AND VIBRATION WITH REFERENCE TO PHYSICAL AND PHYSIOLOGICAL PROBLEMS OF AVIATION. German Aviation Medicine World War II (Washington: Dept. of the Air Force, 1950) Vol. 2, Chap. VII-B

ABSTRACT: This chapter discusses the theory and technique of measuring the parameters of sound and vibration. Detail of some specific transducer elements particularly of the differential transformer type is given.

243

Ernsting, J. 1961 RESPIRATORY EFFECTS OF WHOLE BODY VIBRATION. (Flying Personnel Research Committee, Gr. Brit.) Rept no. FPRC/ 1164, ASTIA AD-263 854, May 1961

ABSTRACT: The respiratory effects of vertical sinusoidal vibration applied to the buttocks of a seated subject have been investigated over the frequency range 1.7-9.5 c/s at acceleration amplitudes of up to + or - 1 g. Vibration at certain frequencies and accelerations caused a significant increase in pulmonary ventilation. At the highest frequency there was an increase in oxygen consumption. Under all the conditions investigated, however, there was a true hyperventilation as evidenced by the reduction in end-expiratory and arterial carbon dioxide tensions. At all the frequencies investigated there was modulation of the respiratory flow by the vibration. The oesophageal and gastric pressures also oscillated at a frequency equal to that applied to the subject. When a constant acceleration was applied at all frequencies the gastric pressure oscillations were greatest at a forcing frequency of 3c/s. The addition of external resistances to respiratory flow reduced the volume of gas oscillating in and out of the respiratory flow reduced the volume of gas oscillating in and out of the respiratory tract. It also reduced the degree of hyperventilation produced by a given combination of vibration frequency and acceleration.

244

Ernsting, J. and J. C. Guignard SOME EFFECTS OF LOW-FREQUENCY VIBRATION ON RESPIRATION (R.A.F. Institute of Aviation Medicine)

ABSTRACT: Pulmonary ventilation and respiratory gas exchange have been measured in man during whole-body sinusoidal vibration at frequencies from 1.7 to 9.5 c/s and acceleration-amplitudes up to 1 g. The changes observed are discussed relation to physical resonance phenomena in the seated body.

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Ernsting, J. 1961 THE EFFECT OF WHOLE-BODY VIBRATION ON RESPIRATION. (Ergonomics Res. Soc., 1961 (In Press).

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Errebo-Knudsen, E.O. 1953 MENNESKELEGEMET OG RUMMET (THE HUMAN BODY AND SPACE) In: Errebo-Knudsen, E.O., et al, Verdens-rummets erobring (Conquest of Space) (Copenhagen: Reitzel) Pp. 51-67

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Errebo-Knudsen, E.O., et al 1953 VERDENS-RUMMETS EROBRING (CONQUEST OF SPACE) (Copenhagen: Reitzel,1953)

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Errebo-Knudsen, E.O. 1960 RUMFARTSMEDICM: DE BIOLOGISKE PROBLEMER RED OPHOLD UDEN FOR JORDENS ATMOSFAERE (SPACEFLIGHT MEDICINE: BIOLOGICAL PROBLEMS OF TRAVELING OUTSIDE THE EARTH'S ATMOSPHERE)
Naturens Verden (Copenhagen), pp. 1-8, 30-32, Jan. 1960, in Danish

ABSTRACT: The results of Russian and American studies in spaceflight, as presented in papers at the 2nd World and 4th European Congress of Aviation Medicine in Rome, October, 1959, are summarized in this paper. The potential dangers in space flight are reviewed with details of Project Mercury. Various biological, neurological, and psyciological problems are reviewed. The possibility of human life on other planets in our solar system is discounted.

VIBRATION

F

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Fanucchi, F. and L. Bussi 1943-1944 THE BIOLOGICAL ACTION OF ULTRASONICS Sperimentale 97:251

250

Faubert, D. B., B. S. Cooper, & C. C. Clark 1963 TOLERANCE AND PERFORMANCE UNDER SEVERE TRANSVERSE (±Gx) VIBRATION. (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, April 28 - May 2, 1963)

ABSTRACT: Seven male subjects, exposed to vertical vibration while in the supine position in a prototype Mercury couch, made 115 runs at peak couch accelerations ranging from $1G_x \pm 1G_x$ to $1G_x \pm 3.5G_x$ at 11, 22, 140 and 22 + 70 cps, and $(1G_x \pm 0.5G_x)$ at 11 cps + $(1G_x \pm 4G_x)$ at 140 cps. Tasks consisted of: (1) push button responses after detecting changes of two linear meters, parallel to the body y and z axes, which moved with the subject; (2) reporting meter number changes; and (3) response times to a panel abort light requiring manual operation of a panel switch. After familiarization runs, mean meter change response times were 0.5 seconds at rest, 0.7 seconds at $1G_x \pm 1G_x$ at 11 cps, 1.0 second at $1G_x \pm 2G_x$ at 11 cps, and greater than 1.5 seconds at $1G_x \pm 3.5G_x$ at 11 cps, for a short durations, after which time subject discomfort precluded further meter response. Accelerometers located on the couch and also on the chest, helmet, and hip showed acceleration ratio amplifications (to 4x at the head) which can occur in this restraint system. Blurring of the vision was judged less severe than when under equivalent G_z vibration conditions. Blurring and body acceleration ratios decreased progressively at the higher frequencies. At $1G_x \pm 2G_x$ at 11 cps, some subjects experienced severe chest pains and headaches even when straining. At $1G_x \pm 1G_x$ peak at 11 cps, which we recommend designating as $1G_x \pm 0.7G_x$ RMS with an accompanying power spectrum, here all at 11 cps, simple adequate performance was maintained for 60 seconds. Problems of vibration isolution are discussed.

251

Faubert, D.B., B.S. Cooper & C.C. Clark 1963 TOLERANCE AND PERFORMANCE UNDER SEVERE TRANSVERSE (+Gx) VIBRATION. (Life Sciences Department, Martin Company, Baltimore, Md.) Rept. ER 12838, Feb. 1963.

ABSTRACT: Seven male subjects, exposed to vertical vibration while in the supine position in a prototype Mercury couch, made 115 runs at peak couch accelerations ranging from 1Gx+1Gx to 1Gx+3.5Gx at 11, 22, 140, and 22 +70 cps, and (1Gx± 0.5Gx) at 11 cps + (1Gx±4Gx) at 140 cps. Tasks consisted of: (1) push button responses after detecting changes of two linear meters, parallel

to the body y and z axes, which moved with the subject; (2) reporting meter number changes; and (3) response times to a panel abort light requiring manual operation of a panel switch. After familiarization runs, mean meter change response times were 0.5 seconds at rest, 0.7 seconds at 1Gx±1Gx at 11 cps, 1.0 second at 1Gx±2Gx at 11 cps, and greater than 1.5 seconds at 1Gx±3.5Gx at 11 cps, for a short duration, after which time subject discomfort precluded further meter response. Accelerometers located on the couch and also on the chest, helmet, and hip showed acceleration ration amplifications (to 4x at the head) which can occur in this restraint system. Blurring of the vision was judged less severe than when under equivalent Gz vibration conditions. Blurring and body acceleration ratios decreased progressively at the higher frequencies. At 1Gx±2Gx at 11 cps, some subjects experienced severe chest pains and headaches even when straining. At 1 Gx±1Gx peak at 11 cps, which we recommend designating as 1Gx±0.7Gx RMS with an accompanying power spectrum, here all at 11 cps, simple adequate performance was maintained for 60 seconds. Problems fo vibration isolation are discussed. (Aerospace Medicine 34(3):254, March 1963)

252

Feddersen, W. E. 1962
THE ROLE OF MOTION INFORMATION AND ITS CONTRIBUTION TO SIMULATION VALIDITY
(Bell Aerospace Corporation, Bell Helicopter Company Division, Fort Worth, Texas)
Rep. No. D228-429-001 April ASTIA AD 281 855

ABSTRACT: The use of a motion simulator in the evaluation and testing of those display and instrumentation concepts which are central to the objectives of the Army-Navy Instrumentation Program (ANIP) poses the same question that is asked of any testing device; namely, to what extent does the device allow a valid evaluation of the developments under consideration. The ultimate in validity in such a situation would be achieved when operator behavior in the simulator corresponds precisely to control behavior in the system being simulated which, in this case, is a helicopter in all of its different flight modes. Since it is unrealistic to expect exact behavior correspondence in the two situations the task is one of determining the extent or degree of approximation.

This report summarizes the results of a series of three investigations, both simulator and flight test, designed to determine the relative proficiency allowed by motion information in the simulator in a hovering flight mode and, secondly, to determine with appropriate measures the degree to which control behavior in the helicopter is approximated by behavior in the simulator when the tasks are equivalent.

The proficiency results are reported in terms of integrated absolute error scores about the various axes defining the hovering task, and the behavioral data, that is, the data indicative of the way in which the helicopter and simulator are controlled by the operator, are presented in the form of auto-correlation functions.

253

Federov, E.K. 1962 THE DECISIVE STEP IN THE CONQUEST OF COSMIC SPACE
Science and Culture (Calcutta) 28(1): 11-14, Jan. 1962

ABSTRACT: Soviet space efforts preparatory to manned space flight included studies dealing with: (1) the conditions encountered during space flight (accelerations, temperature changes, weightlessness, radiations) and means of protecting the astronaut from their effects; (2) providing normal living conditions in the space cabin; and (3) medical selection techniques and training format for astronauts. The system devised for the constant medical supervision of both the pilot's health and working capacity in all stages of flight is discussed. Y.A. Gagarin's orbital flight (April 12, 1961) is briefly mentioned.

254

Fedorov, Ye. 1961 ACCOMPLISHMENT OF THE CENTURY
Izvestiya 4 cols.; 13 April 1961.

255

Fedotov, Yu. 1960 BEFORE TAKE-OFF INTO SPACE
Krasnaya zvezda P. 3; 18 May 1960.

256

Fedotov, Yu. 1960 EARTH-SPACE-EARTH
Krasnaya zvezda Pp. 3-4; 2 December 1960

257

Ferguson, G.H. 1940 NOISE AND VIBRATION CONTROL Can. Pub. Health J. 31:613-618

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Finkle, A. L., & J. R. Poppen 1948 CLINICAL EFFECTS OF NOISE AND MECHANICAL VIBRATION OF A TURBO-JET ENGINE ON MAN. J. Applied Physiol. 1:183-204, Sept. 1948

259

Fishbein, W.I., and L.C. Salter 1950 THE RELATIONSHIP BETWEEN TRUCK AND TRACTOR DRIVING AND DISORDERS OF THE SPINE AND SUPPORTING STRUCTURES. Reprint from Industrial Medicine and Surgery 19(9):444-445, Sept. 1950

ABSTRACT: At least 15,000,000 persons in the United States daily or intermittently operate trucks, farm tractors, buses, taxicabs, locomotives and construction equipment, exclusive of the huge number of operators of rough-riding equipment in the Armed Forces.

A review of medical literature reveals few references to the possible etiologic contributions of truck and tractor driving to various disorders of the spine and supporting structures.

So far as could be determined no formal study of the occupational hazards of truck drivers was undertaken until 1938. Even in that study the "ride problem" was completely ignored. From findings available it appears that the question of how much of a medical aspect there is to the occupational conditions inherent in the operation of rough-riding vehicles, except possibly in the field of aeronautics, is one that has not received the attention and study it deserves, especially when the number of such operators is considered.

For more information on the relationship between disorders of the spine and supporting structures and the driving of trucks and tractors this survey was made.

260

Fitts, Paul M. 1947 PRELIMINARY STUDIES OF THE EFFECT OF VIBRATION, ILLUMINATION AND TYPE SIZE ON LEGIBILITY OF NUMERALS (Engineering Division, Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio) Serial No. TSEAA-694-1F June, 1947. ASTIA ATI 64 451 or ASTIA ATI 6672

ABSTRACT: Preliminary studies were made of the effects of vibration, illumination, and type size upon the speed and accuracy with which numerals could be differentiated from one another. On a reading task requiring judgments of the similarity or difference of numerals, the effect of vibration amplitude is generally comparable to that of brightness and type size within the range of values used in the experiment. Observers can adjust effectively to different values of amplitude, brightness, or type size within fairly wide limits. However, a combination of unfavorable values may go beyond the capacity to adjust and produce significant impairment.

261

Fitts, Paul 1948 STUDIES OF THE EFFECT OF TYPOGRAPHICAL SPACING ON THE LEGIBILITY OF NUMERALS UNDER VIBRATION, BY M.N. CROOK, G.S. HARKER, A.C. HOFFMAN AND J.L. KENNEDY, TUFTS COLLEGE (Aero Medical Laboratory , Engineering Division, Wright-Patterson AFB, Dayton, Ohio). Memorandum Report No. MCREMD-694-15 ASTIA ATI 139 063

ABSTRACT: The purpose of this report is to present the results of further

research conducted by the authors of the Institute for Applied Experimental Psychology, Tufts College under contract with the Air Materiel Command. The present study constitutes a continuation of exploratory studies of the effect of a number of interacting variables on the legibility of instruments, tables and printed matter used in aircraft. It was found that no serious difficulty should be experienced in new-type aircraft by crew members who have to read tables and charts printed according to standard practice, unless a combination of unfavorable conditions, such as poor lighting, excessive vibration and small type size, is encountered.

262

Flamme, A.L. 1931 INFLUENCE ET LIMITES PHYSIOLOGIQUES DE LA VITESSE ET DE SES DERIVES(ACCELERATIONS, CHOCS, TREPIDATIONS)(INFLUENCE AND PHYSIOLOGICAL LIMITS OF SPEED AND ITS DERIVATIVES (ACCELERATION, IMPACT, AND VIBRATION) Arch. Med. mil. 95:263-302

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Fleisch, A. 1931 VENOMOTORENZENTRUM UND VENENREFLEXE. II. MITTEILUNG. BLUTDRUCKZUGLER UND VENENREFLEXE. (Venomotor Centers and Venal Reflexes Bloodpressure Regulator and Venal Reflexes)
Pflüg. Arch. ges Physiol. (Berlin) 226: 393-410

264

Floyd, J. 1957 BEHAVIORAL AND METABOLIC EFFECTS OF NOISE IN MICE (Master's Thesis, Department of Zoology and Entomology, Pennsylvania State University, September 1957.)

265

Flume, J. L. 1962 EFFECT OF VIBRATION AND TEMPERATURE ON THE SPECIFIC REACTIVE CAPACITY OF ANTISERUM. (School of Aerospace Medicine, Brooks AFB, Texas) SAM-TDR-62-48; March 1962

ABSTRACT: The effect of heat and shaking on the specific reactive capacity of antiserum was investigated by both precipitation and passive hemagglutination. Results indicate that, while the capacity of the antiserum to precipitate with homologous antigen is destroyed by heat, the antiserum is still capable of causing agglutination of red blood cells sensitized with the antigen. It is possible that in the heat-treated preparations of antiserum there exist protein molecules of various degrees of denaturation which are detectable by passive hemagglutination but not by the less sensitive precipitation technic. The increase in precipitability observed when antiserum is vigorously shaken might be due to a change in molecular configuration with resulting exposure of antibody reactive sites. (AUTHOR)

266

Flynn, P. D. 1950 ELASTIC RESPONSE OF SIMPLE STRUCTURES TO PULSE LOADINGS. (Ballistics Research Laboratory, Aberdeen, Md.) BRL Memo Rept. No. 525

267

Forbes, A. R. 1960 THE EFFECTS OF WHOLE-BODY VIBRATION ON COMPENSATORY TRACKING PERFORMANCE. (Royal Air Force, Inst. of Aviation Med., Farnborough) I. A. M. Report No. 144. May 1960.

ABSTRACT: Two experiments are described in which subjects performing a tracking task were exposed to vibrations the frequency range of which was the same as that in which the bulk of vibrations recorded in aircraft during flight through turbulent air are found.

It was found that exposure to vibration caused a significant impairment of tracking performance, although it was not possible to derive a linear relationship between the parameters of the vibration stimulus and performance It is concluded that the factors affecting performance included shoulder-girdle resonance and degraded visual acuity as well as julting of the subjects' arm and hand during vibration.

268

Forkois, H.M. and R.W. Conrad. 1953 A LARGE DISPLACEMENT AMPLITUDE MACHINE FOR PHYSIOLOGICAL APPLICATIONS. (Naval Research Laboratory, Wash.,D.C.) Report no. 4151, June 1953 ASTIA AD 15594

ABSTRACT: A direct drive mechanical vibration machine was designed which produces vertical sinusoidal excursions up to 4 inches and handles loads up to 200 lb at accelerations not exceeding 15 g. The frequency range is from 2 to 50 cps. The calibration of the amplitude scale was accurate to within 3% for small loads and to within 6% for large loads at high accelerations. Records are presented of the wave form of the steady state motion and of the starting and stopping transients.

269

Forster, F. and A. Holste 1937 THE BIOLOGICAL EFFECTS OF ULTRASONICS Naturwissenschaften 25:11-12

270

Foster, J. E. 1961 CORRELATION BETWEEN RANDOM AND SINUSOIDAL VIBRATION EXCITATION BY MEANS OF COMPARING ELECTRICAL NOISE GENERATED RATHER THAN THROUGH FATIGUE FAILURES. (Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D. C.; Paper not available at publication)

271

Foster, J.E. 1961 RANDOM-SINUSOIDAL VIBRATION CORRELATION STUDY. (Collins Radio Co., Cedar Rapids, Iowa) WADD TN 61-43, ASTIA AD-267 509, July 1961

ABSTRACT: Avionic equipments were tested to determine if a correlation exicted on the basis of electrical degradation of the output signal. Two electro-mechanical equipments were used in conducting this correlation study. A description of test procedures and major components of testing equipment is given. Typical plots of empirical data are shown of each equipment indicating electrical noise response generated at particular levels of sinusoidal and random excitation. To show whether or not correlation exists between the two means of excitation, cross-plots of data at distinct frequencies were made in every plane of excitation, where feasible. The results show that no well-defined correlation exists between sinusoidal and random excitation. In some cases there was not even a distinguishable reproduction of frequency from one mode of excitation to the other. (Author)

272

Fournier, E. 1957 EFFETS PATHOLOGIQUES DES SONS, ULTRA-SONS, BRUITS ET VIBRATIONS INDUSTRIELLES (Pathological Effect of Sounds, Ultra-Sounds Noise and Industrial Vibrations)
Bulletin médical (Paris) 71: ii

273

Fowler, R.C. 1955 DAMAGE TO ANIMALS DUE TO VIBRATION.
In U.S. Assistant Secretary of Defense (Research and Development) Washington D.C., Shock and Vibration Bulletin No. 22 Supplement. Pp. 16-19, July 1955.

ABSTRACT: As part of the basic problem of determining the mechanical and biological properties of the human when subjected to sinusoidal motion of varying amplitude and frequency, Navy Medical Research Laboratory has conducted an experimental survey of possible pathological consequences to small animals when subjected to severe, controlled, continous vibration. The results reported herein are preliminary, and must in no way be considered binding or conclusive.

274

Franke, E. K. 1948 MEASUREMENT OF THE MECHANICAL IMPEDANCE OF THE BODY SURFACE. USAF, Air Materiel Command, Memo Rept. No. MCREXD-695-71C, June 1948.

275

Franke, E.K, H. Oestreicher and W.W. von Wittern 1950 PROPAGATION OF SURFACE WAVES OVER THE HUMAN BODY. Fed. Proc. 9:42

ABSTRACT: A well established wave pattern appears on a body surface, such as that overlying the rectus femoris, when the surface is in firm contact with and driven by a small piston (diameter 1 in.) at frequencies near 100 cps. This pattern is easily observed and photographed by stroboscopic light. The wavelength was determined by measuring through several wavelengths, the change of phase of the deflection as a function of distance from the center of the piston. For this purpose the vibrations were detected by a capacitative device which used the body as one electrode and a small disc at a suitable distance as the other. This arrangement did not disturb the wave propagation. Changes of capacity due to the vibrations are converted into electrical signals by operating the condenser in a high frequency resonant circuit. The propagation velocity was found to be constant at about 160 cm/sec. in the frequency range 15-150 cps. When the amplitude of the exciting piston is held constant, 1) at any frequency the wave amplitude varies inversely with the square of the distance, and 2) at any distance the wave amplitude varies inversely with frequency. Theoretical considerations concerning the wave propagation in viscous-elastic media give a general picture of the mechanism of the waves and their relation to the elastic properties of the medium. Such considerations show also that the waves are essentially shear waves in this frequency range.

276

Franke, E. K. 1950 MECHANICAL IMPEDANCE OF THE SURFACE OF THE HUMAN BODY. J. Appl. Physiol. 3:582-590.
See also: Wright Air Develop. Center, Wright-Patterson AFB, Ohio. Tech. Rept. No. 54-24.

ABSTRACT: By means of methods previously developed for the investigation of acoustical and mechanical vibrations, the impedance of the body surface was measured. It is shown that it is possible to calculate the stiffness constant of the muscle from the results obtained. A non-linear relation between stiffness and applied pressure was established experimentally. From the impedances measured, contact time and rebound of a hammer striking the body were calculated. In this way, the results of the impedance method could be checked against those obtained with a ballistic method published recently. The agreement was satisfactory.

277

Franke, E.K. 1951 MECHANICAL IMPEDANCE MEASUREMENTS OF THE HUMAN BODY SURFACE (USAF, Wright-Patterson AFB) TR 6469
See also J. Appl. Physiol. 3:580-590

278

Franke, E. K., H. E. von Gierke, H. L. Oestreicher, H. O. Parrack & W. W. von Wittern 1951 PHYSICS OF VIBRATIONS IN LIVING TISSUES. (Aero Medical Laboratory, Air Materiel Command, Wright-Patterson AFB, Ohio) AF TR No. 6367, Feb. 1951. ASTIA ATI 108 737.

ABSTRACT: The experimental data about the behavior of vibrating body tissue for the frequency range zero to 20 Kcps are summarized. The results show that the vibratory energy is absorbed by the body surface in several ways and that for the distribution of the energy inside the body tissue in the different frequency ranges different types of wave propagation are important. The results suggested a theory where the propagation of vibratory energy in soft human body tissue is compared to the wave propagation in a viscous elastic compressible medium. The general physical conclusions of this theory are briefly outlined and the three types of wave propagation to be expected, the shear waves, the compression waves and the surface waves are characterized. By applying this theory specifically to the cases experimentally investigated where the vibrating force is applied prependiculary to the body surface it is shown that the simplified model of a vibrating sphere in a viscous elastic medium describes entirely the mechanical behavior of the body tissue. The qualitative agreement between the calculated and measured characteristics in terms of impedances was found to be sufficiently good, that it is possible to determine out of this agreement approximate values for the shear elasticity and the viscosity of the body tissue, the most important of the unknown physical constant involved in the theory. With these constants known the mechanical behavior of the body surface can be calculated for the whole frequency range from zero to about 10^6 cps in the ultrasound range. The theory enables us also to estimate from the impedance characteristic measured on the body surface, the kind of wave propagation inside the body. That is, it shows how much of the total energy entering the body is distributed in the body in the form of shear waves and how much as compression waves.

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Franke, E.K., H.E. Von Gierke, H.L. Oestreicher, H.O. Parrack and W.W. von Wittern. 1951 PROPAGATION OF SURFACE WAVES OVER THE HUMAN BODY. (Wright Air Development Center, Wright-Patterson AFB, Ohio) A.F. Technical Report No. 6464, June 1951

Abstract: Waves propagating over the surface of the human body are theoretically and experimentally investigated. They are photographed by means of synchronized stroboscopic light and their propagation velocity and amplitude determined by an accurate electrical measuring method.

The comparison of the measured values with the results of the theoretical analysis allows the determination of the coefficient of elasticity of human tissue.

280

Franke, E. K. 1951 MECHANICAL IMPEDANCE MEASUREMENTS OF THE HUMAN BODY SURFACE. J. Appl. Physiol. 3:580-590
(See also USAF, Wright-Patterson AFB, Aero Medical Lab. Technical Rept. 6469)

ABSTRACT: By means of methods previously developed for the investigation of acoustical and mechanical vibrations, the impedance of the body surface was measured. It is shown that it is possible to calculate the stiffness constant of the muscle from the results obtained. A non-linear relation between stiffness and applied pressure was established experimentally. From the impedances measured, contact time and rebound of a hammer striking the body were calculated. In this way, the results of the impedance method could be checked against those obtained with a ballistic method published recently. The agreement was satisfactory.

281

Franke, E.K., 1952 IMPEDANCE OF THE HUMAN MASTOID.
Journal of the Acoustical Society of America, 24: 410-411

ABSTRACT: The impedance of the human mastoid was determined by means of vibrating piston, one end of which was placed in firm contact with the body surface. The impedances of several subjects were measured. The compliance c and the resistance r were calculated from the results; the average values were $c = 1.5 \times 10^{-6}$ cm/dyne and $r = 1.0 \times 10^{4}$ dyne/cm/sec, for an area of the piston base of 1 cm^2 and an application force of 250 g. It is shown how the impendance depends on the area and the application force of the piston. A critical review of the literature on the subject is given.

282

Franke, E.K., H.E. von Gierke, F.M. Grossman and W.E. von Wittern 1952 THE JAW MOTIONS RELATIVE TO THE SKULL AND THEIR INFLUENCE ON HEARING BY BONE CONDUCTION. Journal of the Acoustical Society of America, 24(2):142-14[illegible], March 1952

ABSTRACT: Opening and closing the mouth increases the sound pressure produced by bone conduction in the closed auditory canal by as much as six to ten decibels in the frequency range between 40 cps and 700 cps. This difference is explained by vibrations of the lower jaw relative to the skull. The resonance curve of this motion was measured and used to calculate the influence of the lower jaw motion on the sound level in the closed auditory canal. The results show that the measured frequency response of the difference in sound pressure open mouth vs closed mouth, may be explained entirely by vibrations of the lower jaw.

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Franke, E. K., H. E. von Gierke, H. L. Oestreicher, H. O. Parrack, & W. W. von Wittern 1952 PHYSICS OF VIBRATION IN LIVING TISSUES. J. Appl. Physiol. 4:886-900, 1952.
See also USAF, Wright-Patterson AFB, Ohio, Aero Med. Lab. AF TR 6367, 1951.

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Franke, E. K. 1954 THE RESPONSE OF THE HUMAN SKULL TO MECHANICAL VIBRATIONS. (Wright Air Development Center, Wright-Patterson AFB, Ohio) Tech. Rept. No. 54-24. ASTIA AD 61 817.
See also J. Accoustical Soc. Am. 28:1277-1285. 1956.

ABSTRACT: This report describes measurements of the mechanical impedance and of the resonance frequencies of the human skull. The measurements were made in the frequency range from 200 to 1,600 cps, the skull being excited to vibration by means of an electrodynamically driven piston with a small contact area. Data were obtained from living subjects, a dry skull preparation and a human cadaver. The modulus of elasticity of skull bone, calculated from the resonance frequency of the skull, is consistent with the value obtained by static measuring methods. The propagation velocity of bending waves in the skull bones, also calculated from the resonance frequency, agrees satisfactorily with the experimentally determined propagation velocity. It is shown, finally, that a vibrating spherical shell is a suitable model for the skull and describes its vibration patterns with good approximation.

285

Franke, E. K. 1955 THE MECHANICS OF VIBRATION IN THE HUMAN BODY. Supplement to Shock and Vibration Bulletin, No. 22, 7-15.

ABSTRACT: This paper discusses the principles of the application of mechanics to the human body. To illustrate the proceedure for constructing a simplified model, a few examples of work at Wright Air Development Center are presented. The mechanical behavior of the human tissue is treated as a semi-infinite visco-elastic medium and that of the whole body as a simple harmonic oscillator.

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Franke, E. K. 1956 THE RESPONSE OF THE HUMAN SKULL TO MECHANICAL VIBRATIONS J. Acoustical Society Am. 28:1277-1285, 1956.

ABSTRACT: This report describes measurements of the mechanical impedance and of the resonance frequencies of the human skull. The measurements were made in the frequency range from 200 to 1,600 cps, the skull being excited to vibration by means of an electrodynamically driven piston with a small contact area. Data were obtained from living subjects, a dry skull preparation and a human cadaver. The modulus of elasticity of skull bone, calculated from the resonance frequency of the skull, is consistent with

the value obtained by static measuring methods. The propagation velocity of bending waves in the skull bones, also calculated from the resonance frequency, agrees satisfactorily with the experimentally determined propagation velocity. It is shown, finally, that a vibrating spherical shell is a suitable model for the skull and describes its vibration patterns with good approximation.

288

Franke, E. K., & K. M. Hildreth 1956 LOCAL VASCULAR RESPONSE TO VIBRATIONS. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TN 56-297; ASTIA AD-97 106; July 1956

ABSTRACT: Measurements were made of the heat flow through the human body surface after stimulation by mechanical vibrations from hand tools. Studies were restricted to the frequency range between 2000 and 20,000 cycles/min; vibrations in this range are produced by light hand tools, such as hand grinders and polishers. The heat flow of 13 male subjects, whose average age was 20 yr, was determined; heat flow was used as an indication of vascular response, since vascular response accompanies any change in peripheral blood circulation. A flow calorimeter was used to measure heat flow, and a vibrating piston was used as the vibrating source. Results indicated that after vibration exposure, heat flow increased to an amount which corresponded to a dilation of peripheral capillaries. The time required for heat flow to return to a normal, previbrational level was variable from subject to subject. (ASTIA)

289

Franken, P.A. 1960 METHODS OF SPACE VEHICLE NOISE PREDICTION. (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC-TR-58-343

ABSTRACT: Possible sources of noise in space vehicle are reviewed. Information is summarized describing the various fluctuating pressure fields that may exist at the vehicle exterior. The response of the vehicle structure to these pressure fields and the resulting radiation of noise to the internal spaces are studied analytically. The need for new theoretical and experimental knowledge in specific areas is emphasized. The effects of rocket engine noise on communication and hearings are considered in detail. General comments are made concerning vehicle and equipment design for noise control.

290

Fraser, F.T. 1963 ASPECTS OF THE HUMAN RESPONSE TO HIGH SPEED LOW LEVEL FLIGHT. (Royal Canadian Air Force, Institute of Aviation Medicine, Toronto, Ontario, Canada)

ABSTRACT: As a preliminary investigation of the human response to high speed

low level flight, a T-33 aircraft was flown at not more than 100-feet AGL and approximately 400K on a selected course for a duration of about 40 minutes per run. Three pilots of differing anthropomorphic form each made several flights in varying conditions of turbulence. Continuous acceleration tracings were registered on an airborne recorder, from the seat, the "hard hat", and the pilot's hip, along with ECGs and pneumograms. A photographic record of head movement was obtained. Analysis of the tracings showed the dimensions of vertical accelerations and jolts, the predominant frequency response, etc. ECG showed no abberations, but varied in rate in association with buffeting and flying stress. Pneumograms showed the effects of buffeting on respiratory rate and pattern. A technique was devised for analysing the tracing in terms of jolt function, believed to give a closer representation of the intensity and duration of the buffeting. Subjective reports, borne out by the photographic record, indicated that on some runs the pilot was approaching the limit of his ability to control the aircraft. Pilots varied in their subjective and physiological response. (Aerospace Medicine 34(3):255, March 1963.)

291

Fraser, N. M. 1960 HUMAN PERFORMANCE UNDER VIBRATION. (National Institute of Health RF Project, Ohio State University, Columbus, Ohio) Sept. 1960; Appendix IV

292

Fraser, T. M., G. Hoover, & W. F. Ashe 1960 HUMAN PERFORMANCE UNDER VIBRATION: PHYSIOLOGICAL AND PSYCHOMOTOR RESPONSE OF A VIBRATING SUBJECT MONITORING A VIBRATING DISPLAY. (Paper, 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960)

ABSTRACT: Human subjects were serially exposed on a shake table to a spectrum of vibration that combined each of the selected frequencies and amplitudes with each of the three planes of space. Frequencies ranged from 2 to 12 cps, and amplitudes from 0.06 to 0.25 inches. While under vibration, the subjects monitored, by a control stick, a two-dimensional, visual display presented on a bank of lights mounted on the table. Error was electronically computed. Statistical analysis demonstrated differences in performance relating to frequency, amplitude, and plane. By exposing subjects under similar conditions of vibration to a nonvibrating display, differences were also observed between performance, during which both subject and display were vibrating, and performance, in which the subject only was vibrating. Physiological responses concurrently investigated included electrocardiography, electromyography, respiration, body damping, and postvibration blood pressure. Specific physiological changes were observed.

293

Fraser, T.M., G.N. Hoover, & W.F. Ashe 1960 ASPECTS OF THE PHYSIOLOGICAL RESPONSE TO WHOLE-BODY VIBRATION
Paper, American Physiological Society Fall Meeting. Stanford, California. August 23, 1960

294

Fraser, T.M., G.N. Hoover, and W.F. Ashe. 1961 TRACKING PERFORMANCE DURING LOW FREQUENCY VIBRATION. Aerospace Med. 32(9):829-835, Sept. 1961.

ABSTRACT: Healthy subjects were exposed to harmonic sinusoidal vibration in 48 randomly selected combinations of 3 planes, 4 frequencies, and 4 amplitudes, namely 2, 4, 7, and 12, cps, and 1/16, 1/8, 3/16, and 1/4 inch. After training to proficiency in the nil vibration state, the subjects' performance of a similarly vibrating tracking task was measured. Measurements were also made of the ability of vibrating subjects to track a non-vibrating task.

Decrement in performance was observed related to plane, and to function of amplitude modified by a fractional exponent of frequency.

A significant difference was observed between the performance of a vibrating task and non-vibrating task.

295

Fraser, T.M. 1961 THE PATHOLOGY OF LOW FREQUENCY VIBRATION. (Presented at the 4th Joint Committee on Aviation Pathology, Toronto, Oct., 1961.)

ABSTRACT: This paper reviews the literature selecting evidences for traumatic injury as a result of vibration. Certain aspects of the physiological responses to vibration are reviewed in their relationship to secondary pathology. Several approaches to a study of vibration pathology are discussed.

296

Freberg, C. R., & E. N. Kemler 1943 ELEMENTS OF MECHANICAL VIBRATIONS (New York: Wiley, 1943)

298

Freeman, D.E. 1961 VIBRATIONAL SPECTROSCOPY IN OPTICS AND SPECTROSCOPY (Tufts U., Medford, Mass.) Scientific rept. no. 2, ASTIA AD-266 394, November 1961

ABSTRACT: Since 1959, when the Optical Society of America commenced cover-to-cover translation of the Russian journal, Optika i Spektroskopiya, the translated version, Optics and Spectroscopy, has contained about 150 articles in the field of vibrational spectroscopy. The quality of the translations in high and merits the close attention of spectroscopists. This review, dealing with the period from January, 1959 until March, 1961, is not intended to be exhaustively comprehensive but is focussed on selected topics, so that some articles, especially those of a more empirical nature, are omitted. (Author)

299

Frenzel, H., K. Hinsberg, and H. Schultes 1933 METHOD OF EXPERIMENTAL STUDY OF BIOLOGICAL ACTION OF ULTRASONIC WAVES, Z. ges. exptl. Med. 89: 246-251

300

Freundlich, H., K. Sollner and F. Rogowski 1932 BIOLOGICAL ACTION OF ULTRASONIC WAVES Klin. Wochschr. 11: 1512-1513

301

Frings, H., C. H. Allen and I. Rudnick 1948 THE PHYSICAL EFFECTS OF HIGH INTENSITY AIR-BORNE ULTRASONIC WAVES ON ANIMALS. J. of Cellular and Comparative Physiology. 31:339-358.

302

Frings, H., M.Frings & A. Kivert 1950 BEHAVIOR PATTERNS OF THE LABORATORY MOUSE UNDER AUDITORY STRESS - AND APPENDIX (Pennsylvania State College, State College, Pa.; AMC, Wright-Patterson AFB, Dayton, O.) AF-TR-6028; September 1950, ATI 85939

ABSTRACT: Mice of three strains (albino, C-57, and dba) were tested for susceptibility to audiogenic seizure over the age range 15 to 50 days. The sound stimulus was a 10 kc per sec note at an average intensity of 99db. The seizure pattern and pre-seizure behavior of the mice as well as the seizure susceptibility as affected by age, sex, and strain of mice are discussed. The apparatus used in the experiment, which allows control of the sound stimulus in the study of audiogenic seizure in rodents, is described. It was found that there were few inter-strain or sex differences in behavior or in incidence of seizures. In general, C-57 mice seem least susceptible and dba mice most susceptible, but great individual variation in susceptibility and pattern was observed even within the same litter. The analysis of commercial mouse diet and dog-biscuit distributed by two companies is appended.

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Frings, H. and I. Senkovits 1950 DESTRUCTION OF THE PINNAE OF WHITE MICE BY HIGH INTENSITY AIR-BORNE SOUND. (U. S. A. F., Air Materiel Command, Wright-Patterson AFB, Ohio) USAF TR No. 6029, July 1950 (Unclassified, English).

304

Fry, W.J. and V.J. Wulff 1950 EFFECT OF ULTRASOUND ON NERVOUS TISSUES. Fed. Proc. 9:45

ABSTRACT: Ultrasound was applied to peripheral nerve, crayfish ventral nerve cord and spinal cord of the frog. Ultrasound was without effect on excitability wave form of the spike potential or propagation velocity of peripheral nerve, even after prolonged exposures. The excised crayfish ventral nerve cord exposed to ultrasound exhibited a reduction of spontaneous activity after several seconds exposure and recovered its original activity about one minute after the ultrasound was turned off. Frogs positioned so that ultrasound was incident on the dorsal surface over the lumbar enlargement evidenced paralysis of the hind legs after 4.3 seconds exposure (at room temperature) and produced paralysis after 7.3 seconds exposure (at 1°-2°C.) Histological examination of the sciatic nerves showed extensive degeneration of nerves and examination of the spinal cord exhibited a maximal rise of 1° - 2° C. The spinal cord of intact frogs exhibited temperatures rises as great as 40° C. By using frogs cooled to 1° C. and reducing the ultrasound exposure to two 4.3-second pulses interrupted by 4-minute cooling off period, it was demonstrated that temperature rises did not exceed 15°C. and that paralysis of the hind legs occurred during the second 4.3 second exposure. Similar experiments on frogs (room temperature) indicated paralysis upon exposure to ultrasound pulses of 0.80 second, delivered at a rate of 2.0/sec. and no paralysis upon exposure to sound pulses of 0.010 second delivered at a rate of 20/sec., yet the latter procedure produced a higher cord temperature than the former.

305

Fry, W.J. and R B. Fry 1953 TEMPERATURE CHANGES PRODUCED IN TISSUE DURING ULTRASONIC IRRADIATION.
Journal of the Acoustical Society of America 25:6-11, Jan. 1953.

ABSTRACT: This paper is concerned with the technique of temperature measurement in living tissue during irradiation by high intensity ultrasound. The intrepretation of data obtained by the use of thermocouples is presented. The specific biological object used in this study is the spinal cord of rats exposed by laminectomy. This particular preparation serves to illustrate the relative importance of the heat conduction process in contributing to the temperature change as a function of the proximity of the imbedded thermocouple to bone and the time elapsed after initiation of the exposure.

The ultrasonic frequency used in these studies was 980 kc. The sound intensities incident on the cord were between 60 and 80 watts/cm^2. The experimental results presented in the paper are used to obtain values for the acoustic absorption coefficient of the tissue of the spinal cord. The range of values obtained for the intensity absorption coefficient per centimeter from measurements made on six adult rats at various positions in the spinal cord is 0.19 to 0.23 if the heat capacity of the tissue at constant pressure is 1.00 calorie/cm^3.

306

Fry, W.J. and R.B. Fry 1954 DETERMINATION OF ABSOLUTE SOUND LEVELS AND ACOUSTIC ABSORPTION COEFFICIENTS BY THERMOCOUPLE PROBES - EXPERIMENT. Journal of the Acoustical Society of America 26:311-317, May 1954.

ABSTRACT: A stable, readily constructable thermocouple probe has been developed to determine absolute sound levels in ultrasonic fields in liquid media. This paper includes criteria for design of such probes and a discussion of experimental measurements made with such a device.

It is a consequence of the method that if the sound intensity at an appropriate size thermocouple junction imbedded in an absorbing medium is known the acoustic absorption coefficient of the material can be determined. The method thus makes possible the determination of absorption coefficients of minute quantities of material.

The probe consists of a thermocouple imbedded in a sound absorbing medium which closely matches in density and sound velocity the medium in which the sound level is to be determined. In use the transducer which generates the acoustic field is excited to generate sound pulses with a rectangular envelope. The initial time rate of change of the temperature at the thermocouple junction is determined. In addition to the measurement of the temperature change, the calculation of the absolute sound intensity requires only a knowledge of the absorption coefficient of the imbedding material and its heat capacity per unit volume at the temperature at which the measurements are made.

The experimental results include a comparison of the sound level determined by a thermocouple probe and a determination by radiation pressure methods. The values obtained by the two methods agree within the uncertainty of the experimental measurements.

307

Fry, W.J., Fry, F.J., Fry, R.B., Tucker, D. and Welkowitz, W. 1954 PHYSICAL ACTION OF INTENSE HIGH FREQUENCY SOUND ON VERTEBRATE TISSUE. (Wright Air Develop. Center, Air Research and Develop. Command, Wright-Patterson AFB, Ohio) WADC Techn. Report 54-152, September 1954. ASTIA AD 56 536.

ABSTRACT: This report reviews the work accomplished on contract AF33(038)20922 from its inception to January 1, 1954. The work has included an extensive investigation of the physical mechanism of the action of sound on tissue. Tissue of both the central nervous system and of muscle has been used in the work. A new type of acoustic probe has been developed as a primary result of this work. Another result evolving from the temperature study has been a method of measuring acoustic absorption coefficients of tissue. Additional studies of the physical mechanism of acoustic action on the tissue have been concerned with cavitation. Histological studies of irradiated tissue have been made and a more extensive histological investigation is planned. Studies in which tissue of the central nervous system is irradiated show that both reversible and irreversible effects can be produced by the sound. (Part B of this report is catalogued by ASTIA as AD 151 086)

308

Fry, W. J., J. F. Brennan & J. W. Barnard 1957 HISTOLOGICAL STUDY OF CHANGES PRODUCED BY ULTRASOUND IN THE GREY AND WHITE MATTER OF THE CENTRAL NERVOUS SYSTEM.
In Elizabeth Kelly, ed., Ultrasound in Biology and Medicine. (Washington: American Institute of Biological Sciences, 1957) Chap. VII, pp. 110-130.

309

Fry, W. J., L. D. Dreyer, & F. Dunn 1958 PHYSICAL ACTION OF INTENSE HIGH FREQUENCY SOUND ON VERTEBRATE TISSUE. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 54-152, Part II; ASTIA AD-151 086, Mar.

ABSTRACT: The work described and the results presented in Part A of this report relate to the initiation of an elaborate series of experiments designed to yield information regarding the fundamental physical mechanisms involved in the irradiation of biological materials with ultrasound. The work was undertaken to demonstrate that it is possible to realize accurately reproducible results on a suitably prepared and precisely irradiated biological specimen. In Part B some aspects of the muscle contraction problem are discussed and an elaborate precision muscle irradiation laboratory, including a new type of myograph are discussed. Results with this instrument are not included. Part A of this report is catalogued by ASTIA as AD 56 536.

310

Fryer, D. I. 1960 PHYSIOLOGICAL EFFECTS OF DYNAMIC EXPOSURE TO RAM PRESSURES (Paper, 31st Annual Meeting of the Aerospace Medical Association , Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960)

311

Fusco, M. P. Piccoli, O. Elmino & A Rossi 1962 [THE MODIFICATIONS OF BLOOD COAGULATION IN EXPERIMENTAL ANIMALS (RABBITS) SUBJECTED TO VIBRATIONS.] Boll. Soc. Ital. Biol. Sper. 38:1007-1008, 31 Oct. 1962 (It)

312

Fusco, M., P. Piccoli, O. Elmino & A. Rossi 1962 [BEHAVIOR OF THE PERIPHERAL CIRCULATION IN ANIMALS SUBJECTED TO VIBRATIONS]
Boll. Soc. Ital. Biol. Sper. 38:1009, 31 Oct. 1962 (It)

313

Fusco, M., O. Elmino, A. Rossi, & A. Silvestroni 1962 COMPORTAMENTO DEL CIRCOLO PERIFERICO IN ANIMALI SOTTOPOSTI A VIBRAZIONI. (Behavior of Peripheral Circulation in Animals Subjected to Vibrations) Folia medica (Napoli), 45(11):1051-1058. Nov. 1962. In Italian.

A study was made of the behavior of the peripheral rheogram and the cutaneous temperature in two groups of rabbits subjected to vibrations. In the first group an increase in cutaneous temperature by about 3° C., and increase of the presystolic wave of the rheogram was seen after an hour of vibration. These changes were reversed within 24 hours. In the second series, the animals were subjected to vibration for 15 days, for one hour daily, and readings were taken at 24-hour intervals after the last vibration. No changes were observed in relation to the initial readings. Blood stasis, with vibratory microtrauma, appears to affect the blood vessel wall by conditioning it to a dyskinetic state first, and then to a spasmic state, thereby inducing the complex disease syndrome caused by vibrating instruments.

VIBRATION

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Gaeuman, J. V., G. N. Hoover & W. F. Ashe 1961 OXYGEN CONSUMPTION DURING HUMAN VIBRATION EXPOSURE.
(Paper, 32nd Annual Meeting of the Aerospace Medical Association, Palmer House, Chicago, Ill., April 24-27, 1961)

ABSTRACT: Human subjects were exposed to whole body vibration at varying amplitudes and frequencies. They were seated unrestrained on a shake-table and free to assume the most tolerable posture which would also permit them to periodically carry out a fairly difficult tracking task. Oxygen consumption, carbon-dioxide elimination, and respiratory volume were measured and compared to resting controls in an attempt to estimate the amount of voluntary and involuntary protective muscular activity involved during vibration. (Aerospace Med. 32(3): 231, March 1961)

315

Gaeuman, J.V., G.N. Hoover, and W.F. Ashe. 1962 OXYGEN CONSUMPTION DURING HUMAN VIBRATION. Aerospace Med. 33: 469-474

ABSTRACT: The data support the hypothesis that human subjects can tolerate severe degrees of whole body vibration if they are unrestrained and allowed to protect themselves. This protection is apparently a function of positioning the body and by voluntary and involuntary muscular garding to dampen the vibration and reduce the transmission of stress to the vulnerable body areas. These efforts result in an increase in metabolic activity which is strikingly reflected in oxygen uptake. At levels of 6-15 cps, near the primary and secondary body resonance points, the increase in oxygen consumption is nearly linear with increasing frequency of vibration. The magnitude of increased metabolic load resulting from this effort is not extreme, but significant; and since it must be a constant effort, it is sufficient to be a substantial contributor to fatigue in subjects exposed to vibration over extended periods of time. On the other hand, there is objective evidence of a sedative and somnolent effect of vibration at 2 cps, which is well below body resonance. It may be these vibrations are responsible for the subjective dorwsiness occuring in persons exposed to vibrations of machinery and vehicles.
Finally, there appears to be an induced hyperventilation at 6 cps, possibly as a result of the resonance of the abdominal organ mass producing diaphragmatic pressure, or alterations in respiratory mechanics induced by physical discomfort. One may speculate on the possibility of respiratory alkalosis sufficient to contribute to impaired function.

316

Gagge, A.P. 1945 HUMAN FACTORS IN AIRCRAFT DESIGN.
(U.S. AAF-ATSC, Engineering Division, Aero Medical Laboratory)
TSEAL-3-3-695-53, 29 May 1945.
See also Air Surgeon's Bulletin, 2(9):298-301, 1945.

ABSTRACT: This paper deals with all the problems of human factors except the question of design arising in connection with instruments and controls. Such items as g tolerances; visual acuity, depth perception, night vision, sound tolerance; temperature, altitude tolerance, and space requirements.

317

Galef, A.E. 1960 A QUASI-SINUSOIDAL VIBRATION TEST AS A SUBSTITUTE FOR RANDOM VIBRATION TESTING
(Paper, 28th Symposium on Shock, Vibration and Associated Environments, The Departmental and Commerce Auditoriums, Washington, D.C., February 9-11, 1960)
Published in ASTIA AD 244 857

ABSTRACT: A vibration test, using a modulated sinusoid, is shown to be a reasonable compromise between the random vibration often measured in the field and the sinusoidal vibration of many test specs. It may be performed with existing electrodynamic shakers with only minor modifications, the input required is relatively insensitive to damping in the test specimen, and a good approximation to a Rayleigh distribution of stress amplitudes can be attained.

318

Galkin, A.M., A.R. Kotova, A.V. Petrov, et al. 1958 ISSLEDOVANIIA ZHIZNEDEIATEL' NOSTI ZHIVOTNYKH PRI POLETAKH V GERMETICHESKIKH KABINAKH RAKET DO VYSOTY 212 KM. (STUDIES ON VITAL FUNCTIONS OF ANIMALS DURING FLIGHTS IN HERMETIC CABINS OF ROCKETS UP TO 212 KM)
In: Preliminary Results of Scientific Researches on the First Soviet Artificial Earth Satellites and Rockets, Articles XIth, Section of I G Y Program (Rockets and Satellites) No. 1 (Moscow, Academy of Sciences, 1958)
Pp. 112-129. JPRS/DC-288: 5-28.

ABSTRACT: Medico-biological investigations during rocket flights into the atmosphere have been conducted systematically in the Soviet Union since 1949, for the purpose of studying shifts in certain physiological functions, behavior of the animals during flights, and any bodily changes as a result of the flights. In 1957, 14 dogs (only 5 dogs are listed, although some were flown 2 or 3 times) were flown in pairs (1 anaethetized, the other normal) in hermetically sealed biopacks on 7 distinct flights to altitudes of 62 to 130 miles. Pre- and post-flight examinations included blood, chest X-ray, EKG, blood pressure, respiration and pulse, urinalysis, temperature, and body weight. Blood pressure, pulse, and respiration were registered during 3-hr. training periods in the cabin and during centrifuge training. A telemetric control system registered the compartment shell temperature, thermoinsulating lining, and barometric pressure inside the cabin. Physio-

logical functions were measured by means of pickoffs, amplifying units, automatic pressure devices, electric clocks, and automatic optical recording devices. Motion pictures were taken at intervals during flight. The state of the physiological functions was not successfully registered during all parts of the flight projectory, inasmuch as abrupt changes in the direction of action G-stresses interfered with instrument operation and caused sharp animal movements which were reflected in the quality of the recordings. Some data are illustrated, although data are cited for determining the extent of experimental successes. Conclusions were as follows: (1) The vitally necessary conditions were guaranteed by the hermetically sealed cabin. (2) Acute disorder in the physiological functions did not occur, and no postflight changes in behavior were observed. (3) The pulse and respiration rates and the blood pressure of the conscious animals increased during the active part of the flights. During the period of dynamic weightlessness the registered physiological parameters were maintained at a high level for the first two to three minutes, with a tendency to decrease. The physiological indices returned to their original level within 4 to 5 mins. after dynamic weightlessness had begun. In the anaesthetized animals, the pulse rate, respiration, and blood pressure did not differ from their original values during the period of weightlessness. (4) The recovery system guarantees safe landing, although additional work is necessary to insure stabilization and more favorable deceleration conditions during the nose sections' fall from altitudes of 200 km and higher.

319

Ganshina, A. N. 1961 [SOME DATA ON THE COMBINED EFFECT OF RADIATION AND VIBRATION ON AN ANIMAL BODY. (MORPHOLOGICAL STUDY)] Med. Radiol (Moskva) 6:71-75, May 1961 (Russian)

320

Gantmakher, F.P., and M.G. Krein 1950 OSCILLATION MATRICES AND KERNELS AND SMALL VIBRATIONS OF MECHANICAL SYSTEMS. (Translation, Atomic Energy Commission) AEC-TR-4431

ABSTRACT: The purpose of this book is to introduce the reader to a new circle of algebraic ideas, which, in our opinion, represents a natural mathematical base for the investigation of the so-called oscillation properties of small harmonic oscillations of linear elastic continua.

321

Garcia-Austt E., and Migliaro, E.G. 1959 FFFECT OF MECHANICAL VIBRATION ON THE ELECTROCORTICOGRAM. An Fac Med Montevideo 44:285-92

322

Garrill, R.A. & F.W. Snyder 1957 PRELIMINARY STUDY OF AIRCREW TOLERANCE TO LOW-FREQUENCY VERTICAL VIBRATION. (Boeing Airplane Company, Wichita, Kansas) Document No. D3-1189, Issue No. 36, Contract No. AF 34(601)-2975

ABSTRACT: Five aircrewmen were subjected to vertical harmonic motions of frequencies ranging from 3 to 30 cps with input accelerations ranging to a maximum of over 2.5 g. The subjective judgments of the effect of the vibrations on the aircrewmen were reported by them in terms of a 5-point scale. The results of the subjective judgment tests indicate that aircrewmen are able to tolerate unexpectedly high levels of vibratory acceleration for relatively short periods at the frequencies explored. Transmissability of vibration from supporting structure adjoining the seat to just under the body of the seated airman varied with frequency. Generally, the higher frequencies were transmitted with a greater loss in amplitude of vibration (or g's) than were the lower frequencies.

The same aircrewmen performed a tracking task while being subjected to vibration of various amplitudes and frequencies. The magnitude and duration of error in tracking was electrically integrated to produce a comparable score for each vibration condition. It was tentatively found that there were statistically significant decrements in performance under vibration conditions which were judged to be nearly "intolerable." In addition, there were some notable individual differences in response to the various vibration conditions.

323

Garrote, V.M. 1946 VIBRATIONS, NOISES AND TOXIC SUBSTANCES IN AERO MEDICINE Gac. med. espan. 20:284-288

324

Garrote Vega, M. 1946 VIBRACIONES RUIDOS Y SUSTANCIAS TOXICAS EN MEDICINA AEREA. (Vibration, noise and toxic substances in aviation medicine.) Gac. Med. espan. 20:284-288

325

Gaspa, P. 1953 PROBLEMES PHYSIOLOGIQUES POSES PAR L'ASTRONAUTIQUE (PHYSIOLOGICAL PROBLEMS POSED BY SPACE FLIGHT) Rev. path. gen. comp. 53: 1485-1503

326

Gauer, O., H. Savely, & R. Edelberg 1952 DISCUSSION AT THE PANEL SESSION DURING THE 19TH SYMPOSIUM ON SHOCK AND VIBRATION. (Wright Air Development Center, Wright-Patterson AFB, 10-11 Sept. 1952)

327

Gauer, O., & J.P. Henry 1953 PHYSIOLOGY OF FLIGHT.
Air Force Manual 160-30 (Washington, D.C.: U.S. Government Printing Office, July 1953) p. 133-134.

328

Gazenko, O.G. & V.B. Malkin 1960 BIOLOGY OF COSMIC FLIGHTS (BIOLOGIYA KOSMICHESKIKH POLETOV)
(Aerospace Technical Intelligence Center, Wright-Patterson AFB, Ohio)
Trans. No. F-TS-9899, Oct. 1960 ASTIA AD 257 712
Original Source: Nauka i zhian' 11: 17-22 (and p. 2 of centerfolds), 1958

ABSTRACT: Tests with animals carried in rockets up to 110 km showed normal reactions, insofar as they withstood acceleration and retardation satisfactorily, and blood pressure, pulse, and breathing increased only slightly. At heights up to 212 km, especially unfavorable effects were noticed at re-entry of the rockets into the atmosphere. However, the problem of re-entry of 450 km has been solved. Soviet researchers are especially concerned with the problem of re-entry of passengers from space ships. Great difficulties have yet to be overcome in solving re-entry at supersonic velocities. The effects of acceleration are being thoroughly studied, whereby it was found that acceleration of 10 G may be endured for several minutes. However, acceleration should be considerably lower than this to maintain operating ability. The authors describe the different operation of re-entry from a cosmic flight; catapulting of pressure cabin from the space ship, slowing down of descent by means of reactive drives and parachute, and finally landing of the cabin with a parachute.

329

Gazenko, O.G. & V.I. Yazdovskiy 1961 SOME RESULTS OF PHYSIOLOGICAL REACTIONS TO SPACE FLIGHT CONDITIONS
Paper: XII th International Astronautical Congress in Washington, D.C., Oct. 4, 1961

ABSTRACT: In this discussion of the problems of overload and weightlessness, it is noted that a direct dependence of blood oxygenation on the rate of the blood stream testifies to the active participation of hemodynamics of pulmonary circulation in the oxygenation of the blood in the lungs. Thus, active rearrangement of pulmonary circulation can within certain limits insure the preservation of the necessary blood oxygenation level. However, in view of the apparent inequality of the volumes of blood ejected by the right and left ventricles, and taking into account the progressive storage of blood in the lungs, it is difficult to imagine the possibility of enduring increased gravitation for a lengthy period of time. In the study of the mechanisms of the action of overloads on the central nervous system, tests with aminazine as a means of blocking the impulsation at the level of the reticular formation of the middle brain offer promise. The differences in the frequency of pulse and breathing registered by Gagarin and Titov in centrifugal tests and during actual flight are attributed to emotional stress. With regard to weightlessness, the definite instability which has been indicated in the central apparatus which controls vegatative functions probably results from a change in the afferent impulses. Titov noted unpleasant sensations of vestibular character during the entire period of weightlessness. These require a careful analysis. (CARI)

330

Gazenko, O.G. 1962 SOME PROBLEMS OF SPACE BIOLOGY
Akademiya nauk SSSR. Vestnik (Moskva) 32(1): 30-34, Jan. 1962

ABSTRACT: The General Assembly of the Otdeleniye biologicheskikh nauk Akademii nauk SSSR (Department of Biological Sciences of the Academy of Sciences USSR) met in Moscow in 1961 to discuss problems of space biology. Over 30 reports were made and three films shown. N.M. Sisakyan, V.V. Parin, V.N. Chernigovskiy, and V.I. Yazdovskiy reported on "Problems of Space Biology and Physiology." In the report "Some General Results of Medical and Biological Experiments on Cosmic Earth Satellites", O.G. Gazenko, A.M. Genin, and V.I. Yazdovskiy discussed the main results of the biological experiments. The following three main problems exist at present in space biology: (1) clarification of effect of extreme factors of space on living terrestrial organisms; (2) elaboration of the biological fundamentals of safeguarding space flight; and life on other planets; (3) investigation of the conditions and forms of life beyond the earth. The factors of space flight affecting living organism may be divided into three groups: (1) overstrain, vibrations, engine noise, weightlessness; (2) ultraviolet, infrared, and visible ranges of radiation, ionizing radiation, concentration of gas and solid matter, temperature conditions, etc.; (3) insulation, restricted space, peculiarities of the microclimate, rhythm of life, nutrition, etc. The cosmonauts Yu. A. Gagarin and G.S. Titov are mentioned. Under the effect of weightlessness, the two Soviet cosmonauts felt a change of heart beat, diziness, and sickness. The effect of overstrain and protective measures are serious problems. Perfection of biotelemetry is of great importance for the development of space biology. Lately, methods have been elaborated, permitting to study the coordination of arbitrary movements of man and the blood supply to the brain. (CARI)

331

Gazenko, O. 1962 SPACE BIOLOGY
(Joint Publications Research Service, Washington, D.C.) JPRS-16677
Transl. from Nedelya (Moscow), Aug. 5-11, 1962, Pp. 6-7

ABSTRACT: This article discusses the role of biology in the space sciences in terms of the effects of the space environment on living organisms, and of the methods for selecting and training the astronaut. The space environment problems covered are weightlessness, overloading, radiation, and psychological stresses. The importance of considering these psychological factors when selecting astronauts is considered, and methods of training under isolated conditions are described.

332

Geldard, F.A. and B. Gilmer 1934 A METHOD FOR INVESTIGATING THE SENSITIVITY OF THE SKIN TO MECHANICAL VIBRATION. J. Gen. Psychol 11: 301-310

See Also: Psychol. Abstr. 9: 2589 (1935)

333

Geldard, F.A. and B.vH. Gilmer 1935 A METHOD FOR INVESTIGATING THE SENSITIVITY OF THE SKIN TO MECHANICAL VIBRATION Psychol. Abstr. 9:2589
See Also: J. Gen. Psychol 11:301-310

ABSTRACT: The authors describe an adequate method and an efficient apparatus for the investigation of skin sensitivity to mechanical vibration.

334

Geldard, F. A. 1940 THE PERCEPTION OF MECHANICAL VIBRATION: I. HISTORY OF A CONTROVERSY.
J. gen. Psychol. 22:243-269, 1940.

335

Geldard, F. A. 1940 THE PERCEPTION OF MECHANICAL VIBRATION: II. THE RESPONSE OF PRESSURE RECEPTORS.
J. gen. Psychol. 22:271-280, 1940.

336

Geldard, F. A. 1940 THE PERCEPTION OF MECHANICAL VIBRATION: III. THE FREQUENCY FUNCTION.
J. gen. Psychol. 22:281-289, 1940.

337

Geldard, F. A. 1940 THE PERCEPTION OF MECHANICAL VIBRATION: IV. IS THERE A SEPARATE "VIBRATORY SENSE"?
J. gen. Psychol. 22:291-308, 1940.

338

Geldard, F. A. 1953 THE HUMAN SENSES (New York: John Wiley & Sons, Inc., 1953).

339

Generales, C.D. J., Jr. 1960 SPACE MEDICINE AND THE PHYSICIAN.
New York State J. of Medicine 60(11):1741-1761, June 1, 1960.

ABSTRACT: Reviews the background of man's desire to travel through interplanetary space from year 1500 A.D. Discusses various aspects of space medicine,

including psychological problems of weightlessness, isolation, day-night cycle. Lists human factors in space travel which need further research. The task of space medicine is to adjust man to space environmental conditions which effect him physically and psychologically.

340

Gerathewohl, S.J. & G.R. Steinkamp 1958 HUMAN FACTORS REQUIREMENTS FOR PUTTING A MAN INTO ORBIT
In: Hecht, F., ed., IXth International Astronautical Congress, Proceedings, 1958. (Vienna: Springes - Verlag, 1959)

341

Gerhardt, H.J. & H. Wagner 1962 DIE WIRKUNG DOSIERTER GERAUSCHBELASTUNG AUF DIE MIKROFONPOTENTIALE DER MEERSCHWEINCHENSCHNECKE (THE EFFECT OF MEASURED NOISE STRESS ON THE COCHLEAR MICROPHONICS IN THE GUINEA PIG)
Archiv fur Ohren-Nasen-und Kehlkopfheilkunde (Berlin), 179(5): 458-472.

ABSTRACT: Guinea pigs were exposed to white noise at intensities of 105 decibels, 120 db., and 130 db. The effects were investigated by registering the frequency spectrum of the cochlear microphonic (Mp). The decrease of the Mp under noise stress extended over the entire frequency spectrum. Statistical analysis showed an increasing decline of the Mp in the direction of the low end of the spectrum. There were no dips dimilar to the "c^5 dip" in man. Diagrams of the degree of noise damage in relation to noise intensity and duration of exposure reveal that under a critical threshold for noise stress, noise of any duration of exposure does not have an adverse effect on hearing, but above this threshold noise damage increases sharply linear to stress intensity. The decline of the Mp is largest in the beginning of exposure. The stress effects are already marked after 30 minutes.

342

Gertel M. 1961 DYNAMICS OF HORIZONTAL VIBRATION TESTING
In 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D. C. (Mt. Prospect, Ill.: Institute of Environmental Sciences, P. O. Box 191) pp. 577-584

SUMMARY: In summation, a dynamic analysis of the rotation-translation coupling problems inherent in horizontal (and vertical) vibration testing has been presented with the objective of pointing out how these problems can be minimized. It has been shown that a slip plate or oil table device embodies a high effective rotation stiffness which is ideally suited to minimizing crosstalk due to rotation coupling. Further, the limitations of slip tables with respect to allowable driving force eccentricity and useful frequency range has been presented in order to promote more effective utilization of these devices by vibration test engineers. (AUTHOR)

343

Getline, G. L. 1955 VIBRATION TOLERANCE LEVELS IN MILITARY AIRCRAFT. Supplement to 22nd Shock and Vibration Bulletin. (Office of Secretary of Defense, Washington, D. C.) pp. 24-27.

ABSTRACT: In light of Air Force experience with operation of military aircraft, the author seeks to correlate presently available data on the levels of vibration discomfort and tolerance.

344

Giedt, R.R. 1958 VIBRATION MEASUREMENTS AND THEIR MEANING. (Paper, presented at the American Rocket Society Semi-Annual Meeting, Statler Hotel, Los Angeles, Calif., June 9-12, 1958) ARS 619-58

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Gillings, W.H. 1950 THE EFFECTS OF INTERPLANETARY FLIGHT Brit. Interplan. Soc. J. 9: 105-107, May 1950

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Gilmer, B. von H. 1935 THE MEASUREMENT OF THE SENSITIVITY OF THE SKIN TO MECHANICAL VIBRATION. J. Gen. Psychol. 13:42-61. See also Biol. Abstr. 10:10930 (1936)

347

Gilmer, B.v.H. 1936 A STUDY OF THE REGENERATION OF VIBRATORY SENSITIVITY J. Gen. Psychol. 14:461-462

348

Glanvill, A. D., et al. 1937 THE MAXIMUM AMPLITUDE AND VELOCITY OF JOINT MOVEMENTS IN NORMAL MALE HUMAN ADULTS. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TN 55-159 See also Human Biology 9:197-211

349

Goldberg, M.N., R.A. Mills & W.V. Blockley 1960 INSTRUMENTATION PACKAGE FOR INFLIGHT PHYSIOLOGICAL STUDIES. (North American Aviation, Inc., Los Angeles, Calif.) WADD TR 60-83, Feb. 1960. ASTIA AD 236 039.

ABSTRACT: An instrumentation package was developed for the monitoring of pilot physiological status during flights in the X-15. Data recorded include electrocardiograph signals, respiratory flow rates, skin and deep body temperatures, and helmet-suit and suit-cockpit pressure differentials. Environmental and flight tests were performed to determine the characteristics of the package and to survey subject response during stress. The package is capable of driving a pulse duration modulation (PDM) system for telemetering pressure data. Descriptions of the components and methods of use are included.

350

Goldman, D. E. 1946 MECHANICAL FORCES - TABLE I. ESTIMATED TOLERANCES OF UNPROTECTED HUMAN BODY TO VARIOUS MECHANICAL FORCES. J. Aviation Med. 17(5):426-430, Oct. 1946.

ABSTRACT: Aviation personnel, especially those in military service, are subjected to a wide variety of mechanical forces including changes in ambient pressure, acceleration, wind blast and vibration as well as the forces associated with parachute escape, crashes, explosions and missile casualties. Little is known of the actions of these forces or of means of protection against them.

Eventually it should be possible to accumulate a background of information sufficient to permit generalizations and to allow specific predictions to be made as to tolerances and requirements for protection.

A listing of complexities must be made to enable an intelligent choice to be made of methods for handling problems which must be solved.

A first step, the performance of a structural analysis of the human body, involves a study of the geometrical and physical layout and the determination of the elastic properties of the various parts and connections.

Secondly, a vibration analysis should yield considerable information of value. Resonance measurements can be used to find natural frequencies, damping coefficients, effective masses and spring constants.

From such orderly investigations, it should be possible to learn a great deal about basic physiology and some of its practical consequences. A table of human tolerance limits of various grades and for various forces is essential for engineers concerned with the design of aircraft and of other machinery involving close human association.

351

Goldman, D.E. 1947 VIBRATION STUDIES ON THE HUMAN BODY. In SHOCK AND VIBRATION BULLETIN NO. 2 - MARCH 1947 (Office of Naval Research, Naval Research Lab., Washington, D.C.) ATI 75123

ABSTRACT: The ultimate practical purpose of shock and vibration studies is to set up safety limits at various levels, and to find out the requirements for protective devices. A joint project has been set up, in which the Naval Research Laboratory is responsible for the engineering and physical aspects, and the Naval Medical Research Institute for the biological and medical aspects. A brief discussion of the various projects is given. One of the projects includes a vibration table on which human subjects can be subjected to vibrations in the frequency range from 2 to 30 or 40 cycles per second, at accelerations up to 10 g. Further, accelerometers are being obtained which are small enough and light enough to be attached to various parts of the body without interfering seriously with the mechanical properties of the body.

352

Goldman, D. E., 1948 EFFECT OF MECHANICAL VIBRATION ON THE PATELLAR REFLEX OF THE CAT. Am. J. Physiol., 155: 78

ABSTRACT: Experiments on the effects of mechanical vibration on the patellar reflexes of the cat confirm observations that such vibration produces an inhibition. It is shown that the inhibitory phenomenon is readily explained on the basis of vibratory excitation of the reflex itself. The autonomic nervous system plays no direct part in the phenomenon. The inhibition appears between 10 to 30 cps and fades out gradually above 300 cps with the apparatus used. It is suggested that the inhibitory phenomenon may underline certain effects of the exposure of man to mechanical vibration or intense sound.

353

Goldman, D. E. 1948 THE EFFECT OF MECHANICAL VIBRATION ON THE PATELLAR REFLEX OF THE CAT. (Nav. Med. Res. Instit., Nat. Naval Med. Ctr, Bethesda, Md) Proj. NM 004 001, Rept. No. 2. Pp. 1 - 4, 17 Mar. 1948.

354

Goldman, D. E. 1948 A REVIEW OF SUBJECTIVE RESPONSES TO VIBRATORY MOTION OF THE HUMAN BODY IN THE FREQUENCY RANGE 1 TO 70 CYCLES PER SECOND. (Naval Research Institute, Naval Medical Center, Bethesda, Md.) Proj. No. NM 004-001, Rept. No. 1. ASTIA ATI 47 359

ABSTRACT: Analysis has been given of measurements made by several investigators on subjective responses to mechanical vibration. It has been found possible to refer them to three levels; 1. the threshold of perception, 2, the threshold of discomfort, and 3. the threshold of tolerance.

A set of reference curves of amplitude vs frequency has been obtained subject to an estimated uncertainity of about 1/2 a log unit. The shape of these curves appears referable to the combined effects of mechanical resonance of body structures and to the frequency characteristics of the sensory mechanism involved.

Under certain conditions a cautious application of these reference curves to practical field situations may be made.

355

Goldman, D. E. 1952 MECHANICAL VIBRATION AND ITS EFFECTS ON MAN. (Naval Medical Research Institute, Besthesda, Md.) Lecture and Review Series No. 52-1; ASTIA AD-6179; 6 Feb. 1952

ABSTRACT: Reprint of a lecture delivered as part of the Training Course for Public Health Officials on "The Acoustic Spectrum" given by the School of Public Health, University of Michigan, February 5-8, 1952. A general discussion is given of low-frequency mechanical vibration in the range from one to a few hundred cycles per second with special reference to its effects on man. Matters taken up include the relevant physical properties of tissue, vibration(perception) thresholds of persons seated or standing on vibrating supports, subjective responses, physiological and pathological effects. Applications to industry and transportation are suggested and the need for further experimental work is emphasized. (Author)

356

Goldman, D.E. 1952 MECHANICAL VIBRATION AND ITS EFFECTS ON MAN in Noise - Causes, effects, measurement, costs, control (Ann Arbor, Mich.: Univ. of Mich. Press, 1952), pp 54-58

357

Goldman, D.E. and J.R. Richards 1954 THE MEASUREMENT OF HIGH FREQUENCY SOUND VELOCITY IN MAMMALIAN SOFT TISSUES. (Naval Medical Research Institute National Naval Medical Center, Bethesda, Maryland) Proj. no. NM 004 005.03.07

ABSTRACT: A two crystal interferometer for rapid measurement of sound velocity in liquids and soft animal tissues is described. Velocities can be determined to within three parts per thousand with a path length of a few millimeters. The frequencies used are 1,2,4,12, and 36 mc. Temperature is controlled to 0.1°C. A phase comparison method is used for wave length incorporating a dual heterodyne reduction to audio-frequency with presentation as a Lissajous figure on an oscilloscope. Results are given for a few mammalian tissues showing the precision and reproducibility of measurements.

358

Goldman, D. E. 1957 EFFECTS OF VIBRATION ON MAN.
In C. M. Harris, ed., Handbook on Noise Control, (New York: McGraw-Hill, 1957). Pp. 11-20.

ABSTRACT: The mechanical effect of vibration on the body is to produce motion and relative displacement. Large organs may pull on supporting ligaments and cause crushing injuries to soft tissues. Thermal effects are a direct consequence of absorption of vibrational energy. None have been observed at low frequencies but many at ultrasonic frequencies where animals may be heated to a point beyond their capacity to dissipate the heat, with consequent thermal death. Biological responses to vibration represent essentially a failure of the body to remain a passive system. Mechanical stimulation is detected by the auditory and vestibular systems, mechanical skin receptors, and internally located proprioceptors. Vibration can affect people's attitudes, feelings and work performance. Major injuries resulting from vibrations are those of hearing loss from high-level noise and hand injury from the continued use of vibrating hand tools. A survey is presented of the human body as a dynamic mechanical system and of the effects of vibration on man and his various parts. Included are tables of the physical properties of the human body, acoustical properties of soft tissues, mechanical impedance of surface of thigh, stomach, upper arm, and mastoid.

359

Goldman, D. E. and H. E. von Gierke 1960 THE EFFECTS OF SHOCK AND VIBRATION ON MAN
(Naval Medical Research Inst., Bethesda, Md.)
8 Jan. 1960 ASTIA AD 241 621

CONTENTS:

Definitions and characterization of forces
Methods and instrumentation
  Physical measurements
  Biological measurements
  Simulation of mechanical environment
  Simulation of human subjects
Physical characteristics
  Anatomy
Physical constants and mechanical transmission characteristics
  Subject exposed to vibrations in the longitudinal direction
  Subject exposed to vibrations in the transverse direction
  Vibrations transmitted to the hand
  Skull vibrations
  Impedance of soft human tissue
Mechanical data from shock forces
Effects of shock and vibration
  Effects of mechanical vibration
  Effects of mechanical shock
  Effects of shock and vibration on task performance
Protection methods and procedures
  Protection against vibrations
  Protection against rapidly applied accelerations (crashes)
  Protection against head impact
  Protection against blast waves

Tolerance criteria for various types of exposure and actual environments experienced by man
Vibration exposure
Deceleration exposure, crash, and impact

SUMMARY: (1) The determination of the structure and properties of the human body considered as a mechanical as well as a biological system.
(2) The effects of shock and vibration forces on this system.
(3) The protection required by the system under various exposure conditions and the means by which this protection is to be achieved.

360

Goldman, D.E. April 1960 THE REACTION OF THE HUMAN BODY TO EXTREME VIBRATION
(1960 Proceedings of the Institute of Environmental Sciences, C-17--)

ABSTRACT: This is a commentary on a paper presented by E.B. Magid and R.R. Coermann to the Institute of Environmental Sciences in April of 1960. The title of the paper was "The Reaction of the Human Body to Extreme Vibration."

361

Goldman, D. E. 1961 THE BIOLOGICAL EFFECTS OF VIBRATION.
(US Armed Forces, National Research Council, Committee on Hearing and Bio-Acoustics, Washington, D. C.) Contract Nonr-230005; ASTIA AD-256 926; April 1961

This report includes:
Goldman, D. E., & H. E. von Gierke 1960 THE EFFECTS OF SHOCK AND VIBRATION ON MAN. (Naval Medical Research Inst., Bethesda, Md.) Lecture and Review Series No. 60-3; 8 Jan. 1960

ABSTRACT: This report discusses the effects of vibration on man. It summarizes briefly:
(a) the measurement of vibration,
(b) the production of controlled vibratory stimulation for research purposes,
(c) the injurious effects of vibration,
(d) discomfort due to vibration,
(e) effects of vibration on task performance, and
(f) beneficial uses of vibration.
(AUTHOR)

362

Goodfellow, L.D. 1934 THE SENSITIVITY OF VARIOUS AREAS OF THE BODY TO VIBRATORY STIMULI J. Gen. Psychol 11:435-440
See Also: Psychol. Abstr. 9:2593(1935)

363

Goodfellow, L.D. 1935 THE SENSITIVITY OF VARIOUS AREAS OF THE BODY TO VIBRATORY STIMULI Psychol. Abstr. 9: 2593
See also: J. Gen. Psychol 11:435-440

364

Goodfellow, L.D. 1945 ARTIFACTS IN THE INVESTIGATION OF SENSITIVITY TO VIBRATION J. Exptl. Psychol. 35: 425-431
See also: Psychol. Abstr. 20:382 (1946)

365

Goodfellow, L.D. 1946 ARTIFACTS IN THE INVESTIGATION OF SENSITIVITY TO VIBRATION. Psychol. Abstr. 20:382
See also: J. Exptl. Psychol. 35:425-431

ABSTRACT: Six unselected female dogs were used in an experiment to determine the sensitivity of a dog's foot to mechanical vibrations of various frequencies. The frequency-intensity function was found to be essentially the same as that reported for human observers. Much more stable thresholds were obtained when a large vibrator (area of 250 mm.^{2}) was used. None of the dogs showed a loss in sensitivity to vibration after cochlear destruction. It is suggested that the serious discrepancies in results which appear in the literature on the perception of mechanical vibration are the result of the failure of experimenters to realize that the amount of energy from the contactor which actually reaches the end organ depends upon the proper matching of mechanical impendances.

366

Goodman, B. D. 1961 THE PSYCHOLOGICAL AND SOCIAL PROBLEMS OF MAN IN SPACE: A LITERATURE SURVEY
(System Development Corp., Santa Monica, Calif.) FN-5220, 2 Mar. 1961.
ASTIA AD 252 434

ABSTRACT: This bibliography brings together the reports, books, and periodical articles published through January 1961 in the specific area of behavioral science related to space flight, or as it is sometimes call space psychology. This area includes social and sensory isolation, psychological assessment and training, fatigue, confinement, performance under stress, work schedules, motivation, weightlessness, disorientation, emotional stability and the day-night cycle.

367

Goodman, B.D. 1961 PSYCHOLOGICAL AND SOCIAL PROBLEMS OF MAN IN SPACE - A LITERATURE SURVEY
American Rocket Society Journal 31(7): 863-872, July 1961

ABSTRACT: What type of man will be able to endure for months or even years the vast silence and loneliness of space, far removed from the sounds and sights of his natural environments? What type of man can remain alert and maintain his performance, deprived of ordinary sensory stimuli, enclosed in the cramped quarters of a space capsule as it leaves Earth and all that is familiar? It is the purpose of this bibliography to bring together the reports, books, and periodical articles published thru the early part of 1961 dealing with the specific area of behavioral science related to space flight, or as it is sometimes called "space psychology." This area includes problems of confinement, isolation, sensory deprivation, weightlessness, psychological assessment and training, motivation and morale, emotional stability, boredom and fatigue, performance under stress, and work load. (Author)

368

Gord, Biermann 1931 WELTRAUMSCHIFFAHRT? EINE KURZE STUDIE DES PROBLEMS (SPACE TRAVEL? A BRIEF STUDY OF THE PROBLEMS)
(Bremen: F. Leuwer, 1931)

ABSTRACT: Early history of the physical and technical problems of rocketry with a discussion of space travel.

369

Gorrill, R. B., & F. W. Snyder 1957 PRELIMINARY STUDY OF AIRCREW TOLERANCE TO LOW-FREQUENCY VERTICAL VIBRATION. (Boeing Airplane Company, Wichita, Kansas) Document No. D3-1189, July 1957

ABSTRACT: Tests were conducted with aircrewmen to 1) determine their opinion of vibration levels of short duration for each 5 points on a subjective scale under simulated operating conditions, 2) to determine quantitatively the effects of vibration upon the capability of performing a visualmotor task, and 3) to determine the differences in vibratory g's recorded adjacent to the base of the airman's spine (under the upper fabric cover of the seat cushion) and those recorded at the table of the vibration exciter (corresponding to supporting airframe structure in the operational case).

Five aircrewmen were subjected to vertical harmonic motion of frequencies ranging from 3 to 30 cps with input accelerations ranging to a maximum of over 2.5 g. The sujective judgments of the effect of the vibrations on the aircrewmen were reported by them in terms of a 5 point scale. The results of th subjective judgement tests indicate that aircrewmen were able to tolerate unexpectedly high levels ov vibratory acceleration for relatively short periods at the frequencies explored. Transmissibility of vibration from supporting

structure adjoining the seat to just under the body of the seated airman varied with frequency. Generally the higher frequencies were transmitted with a greater loss in amplitude of vibration than were the lower frequencies. The same aircrewmen performed a tracking task while being subjected to vibration of various amplitudes and frequencies. The magnitude and duration of error' in tracking was electrically integrated to produce a comparable source for each vibration condition. It was tentatively found that there were statistically significant decrements in performance under vibration conditions which were judged to be nearly intolerable. In addition, there were some notable individual differences in response to the various vibration conditions.

370

Gougerot, L. 1940 EFFETS PHYSIOLOGIQUES DES FORCES D'INERTIE, ETUDE DES EFFETS CIRCULATOIRES, RESPIRATOIRES ET VESTIBULAIRES CHEZ L'AVIATEUR. (The Psychological Effects of Inertia Forces. Study of the Circulatory, Respiratory and Vestibular Effects in the Aviator) (Paris: Maloine, 1940)

371

Graham, E.W. & A.M. Rodriguez 1952 RESPONSE OF SOME LINEAR SYSTEMS TO RANDOM FORCES WITH REFERENCE TO AIRCRAFT BUFFETING. (Douglas Aircraft Co., Inc., Santa Monica, Calif.) Rept. No. SM-14517, Sept. 1952. ASTIA AD 240 250.

ABSTRACT: In connection with aircraft buffeting, some studies are made of mechanical systems subjected to random forces. No attempt is made to consider an actual aircraft structure. Instead, highly simplified systems are chosen in order to clarify some of the fundamentals of the problem. Some results are reviewed for free particles and simple oscillators subjected to random forces, considering the transient response in addition to the steady state. An oscillator plus a lever is studied, the fulcrum of the lever corresponding to a nodal point for one mode of an oscillating beam. Two oscillators which are coupled through damping is present. Finally, the equations for response of a uniform slender beam are given. The forcing functions considered are concentrated at a point in space and include a single forcing frequency, a white spectrum and truncated white spectrum. (The response to the white spectrum is the Brownian motion of the system). The damping is external and applied at a point. (Author)

372

Grandpierre, R. and P. Grognot. 1955 EFFETS PHYSIOPATHOLOGIQUES DES VIBRATIONS TRANSMISES PAR L'AIR EN AVIATION: LES MOYENS DE PROTECTION. The physiopathological effects of vibrations transmitted by air in aviation; means of protection.) Med. Aeronaut. 10:309-344.

373

Granick, N. 1959 STATUS REPORT ON RANDOM VIBRATION SIMULATION. (Wright Air Development Center, Wright-Patterson AFB, Dayton, Ohio) WADC Technical Note 58-274, ASTIA AD-203125, March 1959

ABSTRACT: The status of random vibration research as it pertains to problems in simulation is reviewed critically. Areas of experimental research are suggested which eventually may determine the extent to which random vibration should be used in the laboratory. The continued use of sinusoidal vibration techniques for the simulation of noise-induced vibration appears justified on the basis of existing knowledge and economic considerations.

374

Granick, N. 1961 CHOOSING A SUITABLE SWEEP-RATE FOR SINUSOIDAL VIBRATION TESTING. In 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D. C. (Mt. Prospect, Ill.: Institute of Environmental Sciences, P. O. Box 191) pp. 533-554

SUMMARY: Sweep-frequency vibration tests generally are conducted using a sweep-rate that varies directly with test frequency. The idea is to pass through every resonance in the frequency range such that an equal number of seconds is spent in each resonant bandwidth. The underlying assumption is that "average Q" (transmissibility) of resonances may be considered to be the same through the entire frequency range of interest. An argument will be drawn here that "average Q" actually must INCREASE with an increase in resonant frequency, for tests which employ a constant level of acceleration control. Therefore, a suitable sweep-frequency rate must be one which changes with a fractional power of the test frequency, rather than with the first power. (AUTHOR)

375

Granit, R. 1955 RECEPTORS AND SENSORY PERCEPTION (New Haven: Yale Univ. Press. 1955)

376

Grant, W. J. 1961 A STUDY TO CORRELATE FLIGHT MEASURED HELICOPTER VIBRATION DATA AND PILOT COMMENTS. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 61-66; ASTIA AD-269 001; Aug. 1961

ABSTRACT: The results of a study aimed at improving the correlation between recorded helicopter vibration data and pilot comments are presented. Lissajous' patterns of resultant displacement, velocity, and acceleration are constructed and evaluated to define those characteristics which best correlate with the pertinent pilot comments. A new measure of comfort level, Equivalent Vibration Level (Veq) is defined. These quantities are calculated for all Lissajous' figures, and resultant acceleration is seen to be the most meaningful parameter. An improvement in the degree of correlation between measured vibration and pilot comment is shown through the use of Veq for the patterns of resultant acceleration, in lieu of the standard vibration criteria. (AUTHOR)

377

Gray, K.F. 1957 MECHANICAL SYSTEMS SUGGESTED FOR G PROTECTION (Aviation Medical Acceleration Laboratory, Johnsville, Pa.) NADC-MA-5708, July 15, 1957

378

Green, G.S. & J.B. Scott 1956 THE ESTIMATION OF THE OSCILLATORY MOTION OF A DECELERATING MISSILE DESCENDING THROUGH THE ATMOSPHERE (Royal Aircraft Establishment (Gt. Brit.) Dec 1956, Technical note no. GW 440; JSRP Control no. 570353, ASTIA AD-127 646.

379

Grigor'yeva, V. M. 1961 BIOLOGICAL EFFECT OF ULTRASONIC WAVES PROPAGATED IN THE AIR.
(Trans. of Gigiyena Trudy i Professional'nyye Zabolevaniya (USSR) 4(10): 35-40, 1960)
(Office of Technical Services, Washington, D. C.) 61-21335

380

Griswold, H.E., D.M. Cunningham, and G.P. Wilson. 1955 MECHANICAL AMPLITUDE - FREQUENCY RESPONSE OF THE HUMAN BODY. Fed. Proc. 14:64

ABSTRACT: A known horizontal harmonic force was applied to the feet of 9 men and 6 women and the amplitude of body motion at the pelvis recorded. The frequency of the harmonic force was varied from 1 to 24 cps. which covers the range of predominant heart components. Identical tests were made with subjects lying on a very flexible table. Amplitude of table motion was also recorded. All results show that the body does not move as a single unit. A predominant resonant peak occurs at from 3.5 to 5 cps. (with the dorsal structures acting as the spring) on the stiff table and at 1.3 cps. (the loaded table natural frequency) on the low resonance table. Amplitude of body motion diminishes above resonance to a fairly constant value at about 10 cps. On the high frequency table, and at about 6 cps. on the low frequency table, with secondary or tertiary resonances appearing from 6-14 cps., depending on the build of the subject. Since the most important heart excited frequencies are in the range of 4 cps. and higher, the low frequency suspension is more desirable in this region as it yields a flatter response and moves with the body.

381

Grognot, P. A. 1952 REACTIONS SANGUINES ET CIRCULATOIRES PROVOQUEES PAR LES VIBRATIONS ULTRASONORES TRANSMISES DANS L'AIR (Blood and Circulatory Responses to Ultrasonic Vibrations Transmitted in Air.) Journal de Physiologie (Paris) 44(2):255-259

ABSTRACT: Normally dressed healthy test subjects with their faces uncovered were exposed to ultrasonic vibrations of 25 kilchertz (25,000 cycles per second) at a constant intensity of 115 decibels. The earducts were protected by ear stoppers against side noises produced by the apparatus. After one hour of exposure, an increase in eosinophils ranging from 30 to 50%, accompanied by a decrease of arterial tension (1.5 mm. Hg), was observed in 86% of the subjects. Experiments were repeated on persons with pharyngeal and parasitic infections, with similar results. In subsequent experiments it was found that a minimum intensity of 95 decibels was required to effect an increase in eosinophils. In certain cases a lessening of the rate of eosinophil increase was observed when other parts besides the face were subjected to repeated exposures. Supersonic vibrations aimed at the epigastric region did not cause eosinophil increase. The paper concludes with an attempt of presenting a physiological interpretation of the phenomenon.

382

Grognot, P.A. 1952 EFFETS PHYSIO-PATHOLOGIQUES PROVOQUES PAR LES VIBRATIONS ULTRASONORES DE 25,000 HZ TRANSMISES PAR L'AIR (PHYSIOPATHOLOGICAL FFFECTS INDUCED BY ULTRASONIC VIBRATIONS OF 25,000 HERTZ TRANSMITTED THROUGH AIR) Medecine aeronautique (Paris), 7(4):364-370

ABSTRACT: The effects of exposure of human subjects to ultrasonic vibration of 25,000 Hertz (25,000 cycles per second) were studied. Exposure of the entire body, without shielding, resulted in a marked increase of eosinophil cells in the blood and a decrease of arterial pressure. A minimum intensity of 95 decibels was needed to produce a noticeable change in eosinophil number. When only the lower arm or the epigastric region were exposed to the vibration, increase in eosinophil cells occurred in only 50% of the subjects. - It is interesting to note that deaf-mutes or people having hearing disorders did not have any eosinophil increase, no matter what part of the body was exposed to ultrasonic vibration. - Guinea pigs and rats exposed to the same vibration developed celular lesions in the nervous system which resulted in psychomotor disturbances.

383

Gubkin, A.N., V.G. Sergiyenko and N.M. Trofimenko 1961 CONCERNING THE THEORY OF VIBRATION ELEMENTS IN ELECTRETS
(Pribory i Tekhniki Experimenta, Issue Nr. 2, 1961, pp. 166-169) Technical Documents Liaison Office, Wright-Patterson Air Force Base, Ohio, Oct. 17, 1961, MCL-1405/1+2 ASTIA AD 265 741

ABSTRACT: Proposed is the theory of vibration elements, which work with the use of electrets. The results of the theory were verified experimentally on a model of the electret vibration element.

384

Guignard, J. C. 1958 THE PHYSIOLOGICAL EFFECTS OF TRANSIENT MECHANICAL FORCES. (Paper; B.I.S. Space Medicine Symposium, London, 1958.)

385

Guignard, J. C. 1959 THE PHYSIOLOGICAL EFFECTS OF MECHANICAL VIBRATION: A SELECTED BIBLIOGRAPHY. PT. I: BODY RESONANCE PHENOMENA. (Royal Air Force, Inst. of Aviation Med., Farnborough) I.A.M. Rept. No. 124.
See also Proc. R. Soc. Med., 1959.

386

Guignard, J.C. 1959 THE PHYSICAL RESPONSE OF SEATED MEN TO LOW-FREQUENCY VERTICAL VIBRATION: SOME PRELIMINARY STUDIES. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 1062 April 1959. ASTIA AD 229 171

ABSTRACT: Vertical sinusoidal vibration was applied to 10 male subjects in a standardized sitting position, at frequencies from 7 to 60 c/s and accelerations up to 1 g. Transmissibility, which is defined in these experiments as the ratio of the peak vibration acceleration recorded at the part of the body concerned to that recorded from the reference accelerometer, was measured at the hip and at the shoulder. Subjective reactions were also noted.

It was found that a peak in transmissibility (with values exceeding 100 per cent) indicative of resonance, occurred below 10 c/s and that at higher frequencies transmissibility fell off in a characteristic way. Less than 30 per cent of the applied acceleration was transmitted to the shoulder at frequencies above 20 c/s and less than 20 per cent above 40 c/s. Transmissibility to the hip (iliac crest) was less than 60 per cent above 20 c/s and less than 30 per cent above 40 c/s. There was no evidence of a major body resonance above 12 c/s.

Tensing appeared to increase transmissibility at all frequencies. Subjectively, discomfort was greatest at the lower frequencies. Below about 12 c/s, major parts of the body appear to be excited to resonate while at higher frequencies progressively smaller parts are affected.

Six out of 10 subjects experienced some feeling of instability while being vibrated, with difficulty in holding a given posture, but there was no persistence of these sensations after vibration ceased.

Further studies will be necessary, extending over a lower frequency range and including a larger group of subjects, in order to define the response of the seated body to vertical vibration below 10 c/s and to determine whether more than one discrete peak in transmissibility occurs in this region. It will be of practical value to determine the range of individual variation in response to vibration, as well as the factors (such as body size and weight, attitude, posture and muscular tension) which may produce variations in individual resonant frequencies.

387

Guignard, J.C. 1959 SOME EFFECTS OF LOW-FREQUENCY MECHANICAL VIBRATION ON MAN (Paper, 59th Meeting of the Engineering Physics Sub-Committee, Aeronautical Research Council, September 25, 1959, Royal Aeronautical Society, 4 Hamilton Place, London, W.1) I.A.M. Memorandum S. 19 (Scientific) ARC #21

ABSTRACT: This paper presents a brief history of vibration investigation. The physical, physiology, pathology, and physiological psychology reactions of previous research on human reaction to vibration are discussed. The approach, method, and results of current research are another phase of the paper.

388

Guignard, J.C. & P.R. Travers 1959 EFFECT OF VIBRATION OF THE HEAD AND OF THE WHOLE BODY ON THE ELECTROMYOGRAPHIC ACTIVITY OF POSTURAL MUSCLES IN MAN. (RAF, Institute of Aviation Medicine, Farnborough) FPRC Memo 120, April 1959. ASTIA AD 237 769

ABSTRACT: The influence of whole-body, head and limb vibration upon the electromyographic activity of resting and active postural muscles was observed in man. Using the RAF type 3 clinical electromyograph and concentric needle electrodes, a satisfactory trace could be obtained during trunk and limb vibration at frequencies from 2 to 10 c/s and vibrational accelerations exceeding 1.0g.

Vibration of the whole body or of a single limb at frequencies below 10 c/s elicits a periodic synchronous stretch reflex from resting postural muscles in that limb. The amount of activity observed appeared to be related to the intensity of vibration and could be reduced by restraining passive movement of the limb. Inhibition of tendon reflexes was not observed. No change attributable to local mechanical stimulation occurred in the character of maximum volitional response or in the excitability of postural muscles.
Intense vibration of the upper body, including the head, appeared to have a facilitatory effect upon statokinetic, reflex activity, the effect persisting after vibration had ceased. It is tentatively concluded that this effect might be associated with vestibular stimulation by low- frequency vibration but more precise experiments will be required to show whether this is true and whether simple vibratory labyrinthine stimulation has a direct tonic effect upon postural activity.

389

Guignard, J. C. & A. Irving 1959 EFFECT OF WHOLE BODY VIBRATION ON VISION. (RAF, Institute of Aviation Medicine, Farnborough) I.A.M. Scientific Memo. No. 21.

390

Guignard, J. C. & A. Irving 1959 A NOTE ON THE USE OF HIGH SPEED CINEPHOTOGRAPHY IN THE ANALYSIS OF HUMAN RESPONSE TO VIBRATION. (RAF, Inst. Av. Med., Farnborough) I.A.M. Scientific Memo 13.

391

Guinard, J.C., and A. Irwing 1960 EFFECTS OF LOW FREQUENCY VIBRATION ON MAN British Assoc. at Cardiff, September 1960

392

Guignard, J. C., P. Travers & A. Irving 1960 EFFECTS OF LOW FREQUENCY VIBRATION ON MAN. Ergineering 190(4925):364-367.

393

Guignard, J. C. & A. Irving 1960 EFFECT OF NOISE AND VIBRATION ON MAN. Nature 188:533-534.

394

Guignard, J. C. & D. H. Drazin 1960 SOME EFFECTS OF LOW FREQUENCY VIBRATION ON VISION. Proc. 5th European Cong. of Aviation Med., London, 1960.

395

Guignard, J. C. & P. Travers 1960 PHYSIOLOGICAL EFFECTS OF MECHANICAL VIBRATION . Proc. Roy. Soc. Med. 53:92-96, Feb. 1960.

396

Guignard, J. C. 1961 HUMAN FREQUENCY-RESPONSE TO VIBRATION In SPACE MEDICAL SYMPOSIUM. Astronautik (Stockholm) 2(4):227

ABSTRACT: In exposure to infrasonic frequencies of mechanical vibration, a number of physical resonances occur in man, in particular resonance of the shoulder girdle at about 5 c.p.s. Data on the effects of vibration on task performance, visual performance, and on frequency response of eye movements will be given in the full paper.

397

Guignard, J.C. 1961 PHYSIOLOGICAL EFFECTS OF LOW-FREQUENCY VIBRATION (Paper, Symposium on Vibrations, 20 January 1961, at Imperial College, London)

ABSTRACT: This paper described some measurements of the response of the seated human body to vertical vibrations which indicated that at frequencies near 5 cy/sec there was an amplification of vibrations transmitted through the trunk to the head

398

Guignard, J. C. and A. Irving 1961 MEASUREMENTS OF EYE MOVEMENTS DURING LOW-FREQUENCY VIBRATION.
Aerospace Medicine 32(3):233, March 1961

ABSTRACT: Measurements have been made of the frequency-response of compensatory and pursuit eye movements during vertical sinusoidal vibration of: (a) the man, with the target at rest; and (b) the target, with the man at rest. In such measurements it is essential to use a method which in no way impedes movements of the eye. Such a method, in which, by corneal reflection, the image of a wedge-shaped object is viewed through a slit by a photomultiplier tube, is described in this paper. The vibration frequencies investigated ranged from 0.5 to 5 cycles per second. Angular displacement-amplitudes of the target with respect to the eye of up to 2^{o} were used. The importance of normal vestibular function in determining the servo characteristics of the oculomotor system is discussed.

399

Guignard, J. C. & A. Irving 1962 MEASUREMENTS OF EYE MOVEMENTS DURING LOW FREQUENCY VIBRATION.
Aerospace Med. 33(10):1230-1238, Oct. 1962.

ABSTRACT: (1) Measurements have been made of the frequency-response of compensatory and pursuit eye movements during vertical sinusoidal vibration of (a) the man, with the target at rest; and (b) the target, with the man at rest. The angular double amplitude of relative movement between target and eye was 0.8 degree of arc in each case. (2) The eye movement recording system, in which, by corneal reflexion, the image of a triangular object is viewed through a slit by a photo-multiplief tube, is described in this paper. The resolution of the system was 2 minutes of arc. (3) Results suggest that the frequency response of compensatory eye movements fixating a static target during vibration of the man is higher than the frequency response of pursuit movements made by the still subject fixating an oxcillating target. It is tentatively concluded that otolithic stimulation during vibration of the man is mainly responsible for this difference. (4) Consumption of alcohol (1.5 cc. of whisky/kg. of body weight) lowered a subject's frequency response of eye movement in both experimental situations, but the effect was considerable greater during vibration of the man.

400

Guild, E. 1954 NOISE AND VIBRATION IN RC-121D AIRCRAFT. WADC Technical Memorandum Report WCRD 54-118, SECTION VI, pp. 38-48, December 1954

401

Guillemin, J.V., & P. Wechsberg 1953 PHYSIOLOGICAL EFFECTS OF MECHANICAL VIBRATION. Amer. J. Physiol. 171:730-731

ABSTRACT: Albino rats were kept in pens having vibrating floors made of aluminum rods, thus affecting primarily the paws of the animals. The frequency of the vibration was 3600 and 7200 cycles per minute, with accelerations of 8-9 g, for 12 hours daily with a total exposure time of about 1000 hours. Results of the experiment indicated deficient vascular function (engorgement of paw capillaries) measured by the delay in the rewarming of the hind paws after chilling. Forty-five minutes were needed to rewarm the paws of the untreated rats; after 700 hours exposure to vibration, 90 minutes more was needed in 50% of the rats vibrated at 3600 cycles and in 75% of those vibrated at 7200 c.p.s. showed complete recovery after 30 days of rest; when the exposure was renewed, all pathological symptoms promptly reappeared.

402

Guillemin, V., & P. Wechsberg 1953 PHYSIOLOGICAL EFFECTS OF MECHANICAL VIBRATION. (School of Aviation Medicine, Randolph Field, Texas) ASTIA AD-5953, JAN. 1963. See also Amer. J. Physiol. 171:730-731

ABSTRACT: Small groups of rats subjected to mechanical vibration under controlled conditions of duration, intensity, and frequency showed alterations of vascular tonus as expressed in terms of delayed rewarming of vibrated extremities after standard chilling. Frequencies of 3,600 and 7,200 cycles per minute and an acceleration amplitude of 8 to 9 g-units were used. Rewarming times, increased progressively with exposure time of as much as 1,000 hours, returned to normal values after a 30-day rest period, and increased again during a second period of exposure. Alterations of vascular tonus appeared earlier in rats exposed to the higher frequency. Abnormal paw capillaries were observed after prolonged vibration. Preliminary experiments showed that low oxygen tension aggravates vibration-induced vasomotor disturbances.

403

Guillemin, V. and P. Wechsberg. 1953 PHYSIOLOGICAL EFFECTS OF LONG TERM REPETITIVE EXPOSURE TO MECHANICAL VIBRATION. J. Aviation Med. 24(3):208-221.

ABSTRACT: Young albino rats were subjected to long term repetitive exposures

to vibration. One group of 8 rats was kept in a vibrating floor cage operating at 3600 cpm for a schedule of vibration totaling 1000 hours followed by a rest period of 30 days and then subjected to a second exposure of 300 hours. A second group of 10 animals was exposed to vibration at 7200 cpm for 700 hours. The physiological effect of vibration was evaluated in terms of the vascular response of the hind extremities to a standard technique of chilling. The test consisted of chilling the hind paws and legs in still, cold air until skin temperature of 57 F was reached and then rewarmed at room temperature. The normal (control) rewarming times were all under 90 minutes and mostly under 60 minutes after 1000 hours of exposure to vibration at 3600 cpm. In the second group 75% had rewarming times over 90 minutes after 7000 hours of exposure to 7200 cpm. Microscopic examination of rat paw capillaries in vivo indicated that capillaries of vibrated animals showed more tortous forms and greater engorgement than those of the controls.

404

Gullett, C. C. 1961 AEROMEDICAL ASPECTS OF TURBO-JET COMMERCIAL AIRCRAFT. Aerospace Med. 32(9):818-824.

405

Gurevich, M. I. and M. G. Sirotina 1960 ON THE EFFECT OF ULTRASONIC VIBRATIONS ON THE BLOOD
(Trans. of Fiziologichnyy Zhurnal (USSR) 6(1):73-77, 1960)
(Office of Technical Services, Washington, D.C.) 60-11942

406

Gurovskii, N. N. 1959 HYGIENIC ASSESSMENT OFTHE VIBRATION FACTOR ON THE MI-4 HELICOPTER. Gegiena i Sanitariia (Moskova) 24(3):27-33. Translation No. 59-11727.

ABSTRACT: The physiologic effects on animal and human subjects of vibrations (45 cps at an amplitude of 0.3, mm for one hour) approaching the highest frequency limits for helicopter vibrations were investigated. Initial exposure to such vibrations produced considerable changes in conditioned motor reflexes of white rats and in conditioned defense reflexes of dogs. Alterations in conditioned reflexes and lengthening of reaction times were observed in airmen exposed to vibrations on laboratory stand and during flight in the MI-4 helicopter. It was concluded that initial vibratory stimuli evoke a spread of inhibitory processes through the central nervous system of both man and animals. However, adaptation took place quite rapidly upon repeated exposure to such stimuli in all subjects studied. It appears that vibration disturbes the excitatory-inhibitory equilibrium in the cerebral cortex thus enhancing the inhibitory process of the orientating reaction-external inhibition type. The rapid and stable appearance of adaptation to vibration in the human organism indicates that vibrations of the order found in the MI-4 helicopter are permissible.

VIBRATION

H

407

Haack, M. 1955 HUMAN TOLERANCE TO VIBRATION OCCURRING IN TRACTORS AND AGRICULTURAL MACHINERY.
(Translated by Engineering Research Division, John Deere Waterloo Tractor Works, Waterloo, Iowa) ASAE Winter Meeting.

408

Haas, D. L., J. R. Parks and J. F. Eichelberger 1949 VIBRATIONLESS GALVONOMETER SUPPORT. (Mound Laboratory) LC No. AECU-348.

409

Haber, H. 1952 THE CONCEPT OF WEIGHT IN AVIATION
Journal of Aviation Medicine 23(6): 594-596, 1952

ABSTRACT: For purposes of aviation engineering and medicine, the concept of weight is redefined. The principle of d'Alembert states that the sum of the force of gravity, the force of inertia, and the external forces acting upon a body is zero. The weight of the body is then the resultant external force exerted upon the body by a restraining agent in response to forces of gravity and inertia. Six dynamic situations are illustrated, in which the three forces are represented as vectors.

410

Haber, H. ed. 1953 PROCEEDINGS OF A SYMPOSIUM ON FRONTIERS OF MAN-CONTROLLED FLIGHT, INSTITUTE OF TRANSPORTATION AND TRAFFIC ENGINEERING, UNIVERSITY OF CALIFORNIA, LOS ANGELES, 3 APRIL 1953

ABSTRACT: Contents include:
Lippert, S., "Limitations to Noise and Vibration Control"
Haber, H., "The Mechanical Environment in the Future Aircraft"
Roth, H.P., "Impact and Dynamic Response of the Body"
Blockley, W.V., "Combined Physiological Stresses"
All Speakers, Panel Discussion on Frontiers of Man-Controlled Flight.

411

Haber, H. 1959 THE PHYSICAL FACTORS IN THE SPACE ENVIRONMENT. In Seifert, H. S., ed. Space Technology (New York: T. Wiley and Sons, 1959) Chapter 27

412

Hale, E.P. 1953 BEHAVIORAL AND STRESS OF SOUND ON ANIMALS (Wright-Patterson A.F.B., Ohio) WADC Technical Rept. No. 53-283, June 1953 . ASTIA AD 25577

413

Hale, H. B., R. B. Mefferd, Jr., G. Vawter, G. E. Foerster, & D. Criscuolo 1959 INFLUENCE OF LONG-TERM EXPOSURE TO ADVERSE ENVIRONMENTS ON ORGAN WEIGHTS AND HISTOLOGY. (School of Avia. Med., USAF Aerospace Medical Center, (ATC) Brooks AFB Texas) Research Rept. No. 59-13, Jan. 1959

414

Ham, N. D., H. H. Moser, & J. Zvara 1958 INVESTIGATION OF ROTOR RESPONSE TO VIBRATORY AERODYNAMIC INPUTS. PART I. EXPERIMENTAL RESULTS AND CORRELATION WITH THEORY. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 58-87, Pt. I; ASTIA AD-203 389; Oct. 1958

ABSTRACT: The experimentally determined flapping response (1) to harmonic variation in pitch and (2) to vertical shaking of the hub, are compared with theoretical responses calculated for three different two-dimensional, aerodynamic theories The test data indicates that for low blade pitch angles, the returning wake shed by the rotating blade has a marked effect on the blade response at even integers of the frequency ratio $v=\omega/\Omega$, while for high pitch angles the effect of the helical wake is negligible. This agrees with theoretical calculated responses obtained with the aerodynamic theory using a modified lift deficiency function developed by Loewy. The test results indicate that wake interference effects persist for low pitch settings at advance ratios between 0 and 2. Test data obtained with a rotor-rotor type of excitation is a tandem rotor configuration are included. Results indicate that vertical hub shears of the aft rotor are increased. (AUTHOR)

415

Hamme, R. N. 1957 VIBRATION DAMPING. In C. M. Harris, ed. Handbook of Noise Control (New York: McGraw-Hill, 1957), pp14-1 to 14-30.

416

Hansen, A.T. 1949 PRESSURE MEASUREMENT IN THE HUMAN ORGANISM (Copenhagen: Teknish Farlag, 1949)

417

Hardy, H.C. 1947 NOISE AND VIBRATION REDUCTION New Frontier 10: 3-6

418

Hardy, V.S. and K.G. Jahnel 1957 INDEX TO SHOCK AND VIBRATION BULLETINS NOS. 1 THROUGH 24. A SUBJECT INDEX AND AUTHOR INDEX (Assistant Secretary of Defense (Research and Engineering), Washington, D.C.) Oct. 1957, ASTIA AD-320 436

419

Harris, C. M., ed. 1957 HANDBOOK OF NOISE CONTROL (New York: McGraw-Hill, 1957)

420

Harris, J. D. 1953 RECOVERY CURVES AND EQUINOXIOUS EXPOSURES IN REVERSIBLE AUDITORY FATIGUE FOLLOWING STIMULATION UP TO 140 db PLUS. Laryngoscope 63:660-673

421

Harris, W., R.R. Mackie, and C.L. Wilson 1956 PERFORMANCE UNDER STRESS: A REVIEW CRITIQUE OF RECENT STUDIES. (Human Factors Res., Inc., Los Angeles, Calif.) TR VI, July 1956. ASTIA AD 103 779.

422

Harvey, E.N. and A.L. Loomis 1928 HIGH FREQUENCY SOUND WAVES OF SMALL INTENSITY AND THEIR BIOLOGICAL EFFECTS Biol. Abstr. 2:9687
See also: Nature 121:622-624 (1928)

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Harvey, E.N. and A.L. Loomis 1928 HIGH FREQUENCY SOUND WAVES OF SMALL INTENSITY AND THEIR BIOLOGICAL EFFECTS Nature 121:622-624
See also Biol. Abstr. 2; 9687 (1928)

424

Harvey, E.N. 1929 THE EFFECT OF HIGH FREQUENCY SOUND WAVES ON HEART MUSCLE AND OTHER IRRITABLE TISSUES Am J. Physiol. 91:284-290

425

Harvey, E.N. 1929 THE EFFECT OF HIGH FREQUENCY SOUND WAVES ON CELLS AND TISSUES Am J. Physiol 90:379
See also: Biol. Abstr. 4:23928 (1930)

426

Harvey, E.N. 1930 THE EFFECT OF HIGH FREQUENCY SOUND WAVES ON CELLS AND TISSUES
Biol. Abstr. 4:23928
See Also: Am J. Physiol 90:379

427

Harvey, E.N. 1930 BIOLOGICAL ASPECTS OF ULTRASONIC WAVES, A GENERAL SURVEY
Biol. Bull. 59:306-325

428

Harvey, E.N. and A.L. Loomis 1931 HIGH SPEED PHOTOMICROGRAPHY OF LIVING CELLS SUBJECTED TO SUPERSONIC VIBRATIONS J. Gen. Physiol. 15:147-153
See also: Biol. Abstr. 6:24728 (1932)

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Harvey, E.N. and A.L. Loomis 1932 HIGH SPEED PHOTOMICROGRAPHY OF LIVING CELLS SUBJECTED TO SUPERSONIC VIBRATIONS. Biol. Abstr. 6:24728
See also: J. Gen. Physiol. 15:147-153

430

Hasslacher, G.J., III 1959 DEVELOPMENT OF METHOD, EQUIPMENT, INSTRUMENTATION AND TECHNIQUE FOR DETERMINING THE INHERENT FRAGILITY RATINGS OF MILITARY MATERIEL. (Pennsylvania State U., University Park) Progress rept. no. 22, ASTIA AD-235 220

ABSTRACT: The evaluation of the mechanically loaded piezoelectric accelerometer is continuing. An HY 3422 HYGE accelerator and HY 3005 rail system have been installed. Several modifications to the drop tower have been made to facilitate end item testing. Initial results have been obtained on the impact testing of type 1625 electron tubes. Planning for testing of cans under impact conditions is underway. (Author)

431

Hawkes, R. 1956 AEROMEDICINE REINFORCES FRAIL MAN
Aviation Week 65(6): 360-361, 363-365, 6 Aug. 1956

ABSTRACT: An overall view is presented of the basic and applied research carried out by branches of the Aero Medical Laboratory. The current ideas in research and design of oxygen systems, pressure breathing devices, and pressure suits are noted. Studies of the effects of acceleration and deceleration have culminated in the requirement of an escape capsule in all designs capable of supersonic speeds or high-altitude flight. Further, studies in aviation psychology, bioacoustics, vision in an empty visual field, and flight feeding are mentioned.

432

Hayes, W. H., D. A. Hilton et al. 1962 IN-FLIGHT NOISE MEASUREMENTS FOR THE PROJECT MERCURY VEHICLE.
Langley Res. Cen., Va.) NASA TN D-994, Jan. 1962.

ABSTRACT: The main sources of noise are the rocket engines during the launch phase and the noise of aerodynamic origin during the exit phase of the flight. The rocket noise was a maximum at lift-off and decreased rapidly as the vehicle gained altitude and speed. The noise of aerodynamic origin increased generally as the dynamic pressure increased and was also affected significantly by the Mach number and the external contouring of the vehicle. (Author)

433

Heckl, M. A., R. H. Lyon, G. Maidanik, & E. E. Ungar 1962 NEW METHODS FOR UNDERSTANDING AND CONTROLLING VIBRATIONS OF COMPLEX STRUCTURES. (Aeronautical Systems Division, Wright-Patterson AFB, Ohio) ASD-TN-61-122; ASTIA AD-281 798; June 1962

ABSTRACT: New methods are outlined for dealing with the vibration responses of complex flight vehicle structures to local and to diffuse acoustic excitation. Energy absorption at structural joints and acoustic radiation resistance are shown to be important in establishing levels of these responses. Some experimental results pertaining to energy absorption coefficients and radiation resistance are given, and procedures for estimating the latter are discussed.
Feasibility studies of vibration absorbers utilizing viscoelastic spring elements and distributed mass systems and of vibration isolators composed of viscoelastic leaf springs are summarized. Only the latter are found to possess some practical advantages over conventional systems. An analytical investigation is summarized, which shows that generally damping of only the plates of beam-plate systems may be more desirable than damping of only the beams. (AUTHOR)

434

Hedenius, P. 1962 [MEDICOBIOLOGICAL EFFECTS OF MECHANICAL VIBRATIONS AND RADIATION. 8. VIEWS ON THE PRACTICAL CONSEQUENCES OF THE MEDICOBIOLOGICAL EFFECTS OF MECHANICAL VIBRATIONS AND RADIATION.]
Svensk Lakartidn 59:949-951, March 22, 1962 (Sw)

435

Heim, J.W. 1937 A LABORATORY FOR RESEARCH IN AVIATION.
J. Aviation Med. 8(2):75-80

ABSTRACT: Discusses the physiological research laboratory of the Air Corps Materiel Division, Wright Field, Dayton Ohio. Enumerates equipment and apparatus available for research in aviation medicine. Lists projects completed and projects active (in June, 1937). (CARI)

436

Helvey, T.C. 1957 THE DISSIPATION OF VIBRATIONAL ENERGY IN THE HUMAN BODY. J. Aviation Med. 28: 202

ABSTRACT: The major limitation for a human operator in a man-machine system is caused by multiple stresses which are non-additive parameters. In a broad program on stress physiology, studies were carried out with low frequency vibration with a range of 3 to 30 cps which is frequent in high performance airplanes. Longitudinal and transverse measurements were made on the extremeties chest and torso Significant resonant frequencies were noted for various organs and parts of the body. Some of the transverse resonance energies must be considered as deleterious for pilot performance. The longitudinal dissipation of vibrational energy in the limbs in very favorable (except at frequencies below 5 cps with peak G above 2.5), if only a vertical component with one degree of freedom is applied to the flexed limb. The measurements were made with one degree of fredom is applied to the flexed limb. The measurements were made with small accelerometers placed on biokinetically significant points and their outputs recorded with a multichannel galvanometer.

437

Helvey, T.C. 1960 STUDY IN BIOSEISMOLOGY: DISSIPATION OF VIBRATIONAL ENERGY IN THE HUMAN BODY. Astronautik (Stockholm), 2(2): 89-102

ABSTRACT: Experiments have been performed to study the dissipation of transverse and longitudinal vibrational energy in various parts of the human body. The results show that in the susonic, low-frequency range, body parts exhibit distinct resonance frequencies which in many cases can be detrimental to human performance. It has been found that there is no direct proportionality between performance decrement and discomfort caused by the vibration. A new type of human oscillator is described briefly. The equipment provides low-frequency,

high-amplitude random motion with three degrees of freedom. Although the equipment can be used for the study of the propagation of vibrational energy in the human body, its prime purpose is the study of the mechanism of the onset of disorientation and motion sickness

438

Hendler, E. & L. J. Santa Maria Feb. 1961 RESPONSE OF SUBJECTS TO SOME CONDITIONS OF A SIMULATED ORBITAL FLIGHT PATTERN. Aerospace Medicine 32(2):126-133.

SUMMARY: Some of the physiological responses of subjects wearing ventilated full pressure suits and exposed to pressure and thermal profiles characteristic of extreme conditions of orbital flight patterns were presented. No significant physiological stress was evidenced in subjects exposed to a modified thermal profile, except for the sweating response of one subject. Exposure of experienced subjects to long duration thermal loads simulating relatively severe post-landing and full thermal profiles resulted in premature test termination when ventilating air temperature was more than a few degrees above initial mean skin temperature. (Author)

439

Hercik, F., M. Hrdlicka, and J. Sprindrich 1942 [BIOLOGICAL EFFECTS OF ULTRASONICS] Shorn. lék 44:15

440

Hercules, W.L. 1962 SHOCK AND VIBRATION ENVIRONMENT . AN ASTIA REPORT BIBLIOGRAPHY (Armed Services Technical Information Agency, Arlington, Va.) 15 Aug. 1962, ASTIA AD-329 865

ABSTRACT: This bibliography was prepared by ASTIA in response to requests for information concerning shock and vibration environment. Citations are included for classified reports cataloged by ASTIA from 1953 through 1 July 1962. Entrie are arranged alphabetically by subject area. In general, the references fall within the following broad topic areas: mechanical shock and vibration; applications to particular fields such as space technology, naval engineering, military equipment, test facilities; and associated environments. An unclassified volume of the bibliography is issued separately as AD-277 392. (U)

441

Herrick, J.F. 1949 SOME BIOLOGIC ASPECTS OF ULTRASONICS Arch. Phys. Med. 30; 145-149

442

Hersey, I. 1959 SOVIET BIOLOGICAL EXPERIMENTS
Astronautics, 4(2): 31, 80-81 Feb., 1959
See also: J. Aviation Med., 29: 781-84, 1958

ABSTRACT: A discussion is presented of Russian biological experimentation in space flight, as reviewed by A.G. Kousnetzov, chief of the physiology department of the Soviet Air Force Scientific Research Experimental Institute of Aviation Medicine in Moscow, in a paper delivered at the Third European Congress of Aviation Medicine, Louvain, Belgium, in September 1958. Soviety investigations of the effects of space flight on the human organism have been in progress since 1949. In the initial phase, animals encapsulated in hermetically sealed cabins were rocket-flown to heights of 100-210 km. and then elected for return to earth by parachute. In the second phase, the capsule was eliminated, and the animal (in a special high-altitude suit) was separated by catapult from the descending rocket (at heights of 75-85 km. and of 39-46 km.) and parachuted to earth. The third phase of the experiments culminated in animal-rocket launchings to a height of 473 km. No major physiologic changes that could be regarded as resulting from acceleration, catapult launchings, or parachute descent from any of the altitudes studied were observed in the animals. A biological experiment which met all the conditions of space flight was realized with the launching of Sputnik II carrying the dog, Laika. During the crucial period between launching and the time the satellite was placed in orbit, the animal was in such a position as to sustain transverse acceleration. Data about the condition and behavior of the animal were successfully transmitted and received. Included was information on the effects of acceleration upon the frequency of heart contractions; the effects of zero-G conditions and weightlessness; the position of the dog's body in space; changes in the functional state of the nervous system; and changes in blood circulation and breathing. No physiologic manifestations of the effects of cosmic radiation on the animal were discovered.

443

Hettinger, T. 1956 DER EINFLUSS SINUSFÖRMIGER SCHWINGUNGEN AUF DIE SKELETMUSKULATUR. (Influence of sinusoidal vibrations on skeletal musculature.) Internat. Ztschr. angew. Physiol. 16:192-197.

444

Hettinger, T. 1957 THE EFFECT OF VIBRATIONS ON MUSCULAR EFFICIENCY
(Die Beeinflussung der muskularen Leistungsfahigkeit durch Erschutterungen) Internationale Zeitschrift fur angewandte Physiologie (Berlin) 16(6): 500-511

ABSTRACT: It was shown in experiments with a vibratory device and hand ergometer that: (1) work on the vibratory apparatus results in a vascular reaction which affects subsequent performance on the ergometer; (2) the duration of vibratory work does not affect the intensity of the vascular reactions; (3) adaptation occurs; (4) this adaptation is seen as resulting from increased vascularization during work on the apparatus; (5) there are considerable individual differences in performance after vibration; (6) it is possible to estimate ergometric performance on basis of skin temperature on

the back of the mind after vibration; (7) people with less reactive vascular systems are predisposed to development of pathological symptoms during work subjecting them to vibration; also their performance is lowered.

445

Heuter, T. F. 1958 VISCO-ELASTIC LOSSES IN TISSUES IN THE ULTRASONIC RANGE (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 57 706; ASTIA AD-142 171; Aug. 1958

ABSTRACT: The propagation of ultrasonic waves is accompanied by a loss of vibrational energy whose frequency dependence is characteristic of the structural properties of the medium. A review of the various loss mechanisms that may occur in animal tissues or in other live colloids reveals that the different organizational levels of these structures---from the protein molecule to the gross-tissue matrix, may contribute to the losses in many different ways. A transition of low-to high-frequency absorption indicative of visco-elastic relaxation processes is observed. On the basis of new data, the hypothesis is advanced that low-frequency absorption is due mainly to gross-tissue properties, whereas the seat of high-frequency absorption is mainly in the molecular constituents of the tissues, i.e., in the protein molecules.

446

Hines, M. 1958 EFFECTS OF INTENSE VIBRATION, II. PHYSIOLOGY AND PATHOLOGY. (U.S. Army Medical Research Lab., Fort Knox, Ky.) Rept. No. 358.

ABSTRACT: A detailed histo-pathological study of monkeys exposed to 10 cps at 0.25 and 0.150 inches peak to peak displacements for 8 hours.

447

Noell, L. O and F. J. Leech 1958 NOISE AND VIBRATION ENVIRONMENTS CONNECTED WITH MISSILES AND SPACE VEHICLE OPERATIONS
Proceedings of the ARDC Science and Engineering Symposium, September 1958
See also (Wright Air Development Center, Wright-Patterson AFB, Ohio) July 1958. Rept. No. 3487.

ABSTRACT: The following conclusions are made: (1) Noise from space vehicle operation may be predicted with sufficient accuracy for human factor analysis with the exception of the re-entry phase. More measurements are needed for this phase. (2) Larger rocket motors will produce more energy at the very low frequencies because of their larger nozzle diameters. (3) Noise environment should not create a barrier to manned space travel. (4) Air damping will not exist at high altitudes, therefore, resonsance should be damped by other means. (5) For vibration the frequency range of interest is from 1/2 to 20 cps. (6) There is no preduction scheme for vibration such as we have for noise. (7) As with noise, we know practically nothing about vibration during re-entry. This phase of space flight is expected to present a major vibration problem.

Hoffmann, H. & H. Kotrenhoff 1962 DER EINFLUSS VON VIBRATIONEN AUF LEISTUNGSFUNK TIONEN UND EMOTIONALES VERHALTEN (THE EFFECT OF VIBRATIONS ON PERFORMANCE AND EMOTIONAL BEHAVIOR)
Internationale Zeitschrift fur angewandte Physiologie (Berlin), 19 (3): 149-167. 1962. In German.

ABSTRACT: Twenty students in the age range of 21-37 years were subjected to 30 minutes of vibration at 32 c.p.s. with an amplitude of ± 1 mm. The effects of vibration on performance were investigated before, during, and after the exposure with the following tests: (1) skill tests (Mirror drawing, figure completion, and the spiral after-effect); (2) tests of personality or emotionality (subjective emotional rating scale, continuous registration of pulse rate, Brengelmann's questionnaire, and a tachistoscopic reading test); and (3) measurement of psychomotor tone variables (writing pressure). The skill tests showed an inhibition of the retino-cortical excitability (spiral after-effect) by vibration as contrasted to a compensatory or reactive increase in efficiency on the figure-completion and mirror-drawing tests. The pulse rate rose at the beginning of vibration exposure and fell slightly at the end of the exposure period. Negative emotional states expressed on the emotional scale during vibration were reversed only 1½ hours after the end of the exposure in contrast to the quickly reversible changes of the spiral after-effect. Psychomotor tone measurements showed a state of excitation and disinhibition at the beginning of vibration, followed by cortical inhibition after vibration. These data correlated with the findings on the spiral after-effect test.

449

Honig, C. R., & S. M. Tenney 1956 GENESIS OF LATE SYSTOLIC AND DIASTOLIC BALLISTIC VIBRATIONS. (Rochester University of School of Medicine and Dentistry, New York) Contract AF 33(616)2485; ASTIA AD-140 484; 20 July 1956
See also Reprint American Heart Journal (St. Louis) Pp. 655-664, May 1957

ABSTRACT: The end-systolic ballistic deflection is dependent upon deceleration of the arterial column during reduced ejection and represents a balance between headward and footward force vectors. Aortic obstruction attenuates footward force by disturbing this balance. Pulse wave reflection may modulate end-systolic force but is not essential to its genesis. The initial diastolic vibrations are related to the magnitude and rate of change of force with aortic valve closure. The pulmonary valve contributes only under conditions of hypertension or increased flow in the lesser circuit. Vibrations subsequent to value closure vary with aortic pressure, volume, elasticity, length, and coupling and disappear when arterial resonance is abolished. The aortic standing wave therefore seems responsible for their production. Study of limbless subjects indicates that the arch vessels, iliacs, and femorals are part of the resonator in which the standing wave oscillates. Venous blood flow and ventricular relaxation do not contribute to the diastolic complex, and cardiac filling generates small vibrations unless venous return is augmented or ventricular expansion is abnormally limited. (AUTHOR)

450

Hoover, G.N., W.F. Ashe, & L.B. Roberts 1960 GROWTH AND METABOLIC RESPONSES OF RATS EXPOSED TO WHOLE-BODY VIBRATION
Paper, American Physiological Society Fall Meeting, Stanford, Calif August 23, 1960.

451

Hoover, G.N. & F.R. Johanson 1960 PROBLEMS IN INSTRUMENTATION FOR DYNAMIC SUBJECTS. Proc. National Electronics Conf. 16: 659-671

452

Hoover, G. N., W. F. Ashe, J. H. Dines, & T. M. Fraser 1961 VIBRATION STUDIES, III. BLOOD PRESSURE RESPONSES TO WHOLE BODY VIBRATION IN ANESTHETIZED DOGS. Arch. Environmental Health, 3: 426-432, Oct. 1961.

ABSTRACT: A system for the direct measurement of blood pressure in dogs exposed to whole body vibration is described. Vibration forces seem to be algebraically added to the blood pressure pulse in such a manner that beat frequencies are established. In addition, integration of the pulse pressure curves indicate that regulatory mechanisms bring about a small decrease in blood pressure during vibration exposure.

453

Hoover, G.N. 1962 THE BIOLOGY OF THE WHOLE BODY MECHANICAL VIBRATION: AN ANNOTATED BIBLIOGRAPHY (Ohio State Univ. Research Foundation, Columbus) NIH grant RG-5348 and OH-6, June 1962

ABSTRACT: The papers are, in general, limited to those dealing with whole body exposures. Many papers have been omitted because of their inavailability at this time. Also, some contributions probably, and most likely, have been overlooked. The papers have been arranged in alphabetical order according to the senior author. In most cases the author's summary or abstract is used. To aid in selecting papers, an author and subject index is appended. The literature search for this work was closed in May 1962. (Author)

454

Hoover, G. N., & W. F. Ashe 1962 RESPIRATORY RESPONSE TO WHOLE BODY VERTICAL VIBRATION. Aerospace Medicine 33(8):980-984, Aug. 1962

SUMMARY: Data are presented which indicate that respiratory minute volume changes observed in subjects exposed to extended vertical vibration are a function of both respiratory rate and tidal volume. At a vibration amplitude of .062 inches,

the response is predominantly through rate, while at .125 inch it is mainly through tidal volume. The former situation seems to be correcting ventilation for a tendency to decrease tidal volume at the lower amplitude.
Post vibration data show a trend toward lower respiratory rates and tidal volumes. Pneumotachographs indicate that air flow oscillates during vibration exposures. A limited number of estimations of this volume show it to be less than the physiological dead space. (AUTHOR)

455

Hoover,, George N. & W.F. Ashe 1962 RESPIRATORY RESPONSE TO WHOLE-BODY VERTICAL VIBRATION
Paper: 33rd Annual Meeting of the Aerospace Medical Association, Chalfonte-Haddon Hall, Atlantic City, N.J., April 9-12, 1962
Reprinted: Aerospace Medicine, 33 (8): 980-984

ABSTRACT: Human subjects were exposed to whole-body vertical vibration in the seated position. The vibration frequencies were 2, 4, 6, 8, 11 and 15 cps at amplitudes of .0625 and .125 inch. The peak accelerations of vibration were from ±0.03 to ±2.88 G. Respiratory frequency was not altered significantly by these levels of vibration. Tidal volumes were increased in all but the three lowest vibration intensities. At the lower amplitude respiratory minute volume was not drastically altered. At 8, 11 and 15 cps in the higher amplitude vibrations considerable increase in was noted. The greatest increase in was seen at 11 cps, the postulated resonant frequency of the lung-thorax system. Oscillations of pneumotachograph tracings were found to coincide with the vibration frequency and in the higher frequencies appear to be greater than the amplitude of the respiratory flow itself. It is suggested that much of the increase in ventilation is a result of a forced hyperventilation and is most significant at the resonant frequencies of the chest-lung system.

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Hoover, G. W. 1957 INSTRUMENTATION FOR SPACE FLIGHT.
In Campbell, P. A., K. Dannenberg, W. O. Roberts, H. Haber, A. S. Crossfield, G. W. Hoover, A. M. Mayo, J. P. Hagen, & H. Strughold, SPACE TRAVEL: A SYMPOSIUM. J. Avia. Med. 28:495-498

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Hoover, G. W., 1957 PREDICTIONS FOR THE FUTURE. (PROBLEMS OF ESCAPE FROM HIGH PERFORMANCE AIRCRAFT: A SYMPOSIUM). J. Aviat. Med. 28(1):95-100.

ABSTRACT: With due consideration for all other parameters, man's psychophysiologic limitation is the constant around which any man-machine system must be designed. In the area of geophysical problems, we must protect

the man against solar radiation and its effects and materials and against cosmic radiation and its effects. The problems of escape, although far from being a monor consideration must be solved if man is to continue his climb up the speed and altitude curve.

Any aircraft of the future must meet the following requirements:

1. It must be efficient in operation.
2. It must have wide mission capability.
3. It must provide means for adeqate escape and survival.
4. It must be reliable.
5. It must be economical.

458

Hoover, George W. 1958 A PROGRAM FOR SPACE BIOLOGICAL EXPERIMENTS (American Rocket Society, 500 Fifth Avenue, N.Y. 36, N.Y.)

459

Hornick, R.J. 1961 THE RELATIVE EFFECTS OF NOISE AND VIBRATION UPON SIMPLE REACTION TIME. (Bostrom Res. Labs. Rept. No. 132, Milwaukee, Wis., January 1961)

ABSTRACT: Eight subjects served in noise and vibration conditions to determine the relative effects of these variables upon simple reaction time (RT). No significant differences were found between (a) no stimulation, (b) noise, (c) vibration, and (d) noise plus vibration conditions. Noise level was measured at 87 db and the vertical vibration was 3.5 cps with g acceleration intensity of 0.30. It was also determined that there were no trends in RT during any of the conditions.

460

Hornick, R. J. 1961 RESEARCH INTO THE EFFECTS OF VIBRATION ON MAN (Paper Symposium of the Midwest Human Factors Society, May 19, 1961) (Bostrom Research Laboratories, Milwaukee, Wisc.) BRL Rep. 136, May 1961.

ABSTRACT: This article describes the environmental problem of whole-body vibration and its importance in understanding the human component in a dynamic system. A research program concerned with this problem is described; equipment, methodology, and findings to date are summarized. Future investigations are noted. (Tufts)

461

Hornick, R.J., C.A. Boettcher, and A.K. Simons 1961 THE EFFECT OF LOW FREQUENCY, HIGH AMPLITUDE, WHOLE BODY VIBRATION UPON HUMAN PERFORMANCE (Bostrom Research Labs, Milwaukee, Wisconsin) BRL Report No. E-123, July 1961

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Hornick, R. J., C. A. Boettcher & A. K. Simons 1961 THE EFFECT OF LOW FREQUENCY, HIGH AMPLITUDE, WHOLE BODY, LONGITUDINAL AND TRANSVERSE VIBRATION UPON HUMAN PERFORMANCE. FINAL REPORT. (Bostrom Research Laboratories, Bostrom Corporation, Milwaukee, Wisc.) Contract DA 11 022 509 ORD 3300, Proj. TE1 1000, July 1961

ABSTRACT: Two experiments were conducted to determine the effects of horizontal (transverse and longitudinal) vibration upon the seated human being. Such vibration is typically found in ground vehicles. For transverse vibration frequencies from 1.5 to 5.5 cps with intensities of 0.15, 0.25, and 0.35 g were used; for longitudinal vibration the same frequencies with intensities of 0.15, 0.25, and 0.30 g were used. Measures of compensatory

463

Hornick, R.J. 1961 EFFECTS OF TRACTOR VIBRATION ON OPERATORS, A CONSIDERATION OF HUMAN FACTORS. Agricultural Engineering 42: 674-675; 696-697

ABSTRACT: The experiments revealed that man's ability to steer or track can be significantly affected by the direction and frequency of vibration. Man's reaction time is significantly slowed following exposure to vertical and transverse vibration. Visual acuity was found not to be affected. It is believed t that vibration must be of a higher frequency for visual acuity to be impaired. Transverse vibration below 2.5 cps causes a significant loss in the effective visual field (peripheral vision) during the initial 15 min. exposure. The ability to maintain a constant foot pressure was seen to be affected adversely by vertical and transverse vibration. Impairment in foot pressure constancy seems to be a mechanical function of the frequency (error increases as frequency in vertical vibration; greatest error for below 2.5 cps in transverse vibration) and the intensity of vibration. Recovery of this ability was immediate following exposure to either vertical or transverse vibration.

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Hornick, R.J. 1961 THE EFFECTS OF TRACTOR VIBRATION ON WORK PERFORMANCE (Bostrom Research Lab., Milwaukee, Wisconsin) BRL Report No. 131, June 1961

465

Hornick, R.J. 1961 HUMAN EXPOSURE TO HELICOPTER VIBRATION. A LITERATURE REVIEW. (Bostrom Research Laboratories, Milwaukee Wis.) BRL Rept. no. 133, February 1961

ABSTRACT: This review consists of four logically related sections. The first defines the type of vibration found in helicopters during flight. The second section explores the subjective effects of the helicopter flight environment as gleaned from pilot observations and complaints. The third contains analyses of more objective research studies regarding the effects of vibration on man similar to helicopter vibrations. The fourth section is a brief mention of suggested efforts desirable in helicopter vibration research.

466

Hornick, R. J. 1962 PROBLEMS IN VIBRATION RESEARCH.
Hum. Factors 4:325-330, Oct. 1962

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Hornick, R.J. 1962 EFFECTS OF WHOLE-BODY VIBRATION IN THREE DIRECTIONS UPON HUMAN PERFORMANCE
Journal of Engineering Psychol. 1(3): 93-101, July 1962

ABSTRACT: The possible influence exerted by whole-body vibration on human performance was investigated experimentally using three planes of vibration at five frequencies and three intensity levels. Body equilibrium was measured before and after each vibration condition. Low-frequency vibration similar to that encountered in vehicles significantly impaired human performance related to control of the vehicle, i.e., compensatory tracking ability, choice reaction time, foot pressure constancy, and peripheral vision may be significantly impaired during and/or following vibration exposure. A certain relationship is indicated between body resonance frequencies for vertical motion (4.5 to 5.5 c.p.s.) and transverse motion (1.5 c.p.s.) and the occurrence of performance decrements as a result of vibration at the same frequencies.

468

Hornick, R. J. & R. W. Costin 1962 EFFECTS OF SPACE VEHICLE VIBRATION UPON HUMAN OCCUPANTS
Paper: 33rd Annual Meeting of the Aerospace Medical Association, Chalfonte Haddon Hall, Atlantic City, N. J., April 9-12, 1962.

ABSTRACT: It is known that various space vehicles vibrate, especially during periods of launch and re-entry. The characteristics of such vibration are mentioned. Possible effects of this vibration on man's performance and physiological functions are discussed based upon research conducted on humans. Effects on performance include those of compensatory tracking ability, vision, reaction time, and body equilibrium. Physiological measures include oxygen consumption, breathing rate, and total ventilation.

Attention is also given to combinations of motion, body support positions, and the relationships of performance, physiological responses, and mechanical response of the human body.

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Hornick, R. J. 1962 VIBRATION ISOLATION IN THE HUMAN LEG. Hum. Factors 4:301-303, Oct. 1962

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Howell, W. C., & G. E. Briggs 1959 AN INITIAL EVALUATION OF A VIBROTACTILE DISPLAY IN COMPLEX CONTROL TASKS. (Ohio State Univ. Research Foundation, Columbus, Ohio) Contr. AF 33(616)-5524, Proj. RF-813, Rept. No. 813-5, ASTIA AD-230 472, 31 Oct. 1959

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Hueter, T. F. 1958 VISCO-ELASTIC LOSSES IN TISSUES IN THE ULTRASONIC RANGE. (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC Technical Report 57-706, August 1958. ASTIA AD 142 171.

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Hugony, A. 1935 ÜBER DIE EMPFINDUNG VON SCHWINGUNGEN MITTELS DES TASTSINNES (The Sensation of Vibration by Means of the Touch-Sense, Zeitschrift für Biologie (Munich) 96: 548-553

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Hunsaker, J. C. and E. E. Wilson 1915 THE BEHAVIOR OF AEROPLANES IN GUSTS. (National Advisory Commitee for Aeronautics, Washington, D. C.) NACA Rept. No. 1.

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Hunter, H.N. & M. Weiss 1953 PILOT'S ABILITY TO SIMULATE AN EMERGENCY ESCAPE WITH VARIOUS TYPES OF EJECTION SEATS WHILE SUBJECTED TO A FLUCTUATING ACCELERATION (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR1, Nov. 3, 1953 Proj. No. TED ADC AE 6303. ASTIA AD 54 281

ABSTRACT: To determine some of the difficulties a pilot experiences in operating

an ejection seat under emergency conditions, three types of ejection seats, i.e., Air Force "arm rest" upward, Air Force "D-Ring" downward, and Navy "face curtain" upward were installed, respectively, in the AMAL centrifuge and tests were conducted wherein pilots were requested to execute ejection procedures under fluctuating G conditions. To simulate an aircraft in an uncontrolled condition, positive G was varied from 1.5 to 6.5 G at a rate of 8 G per second while the subject pitched and/or rolled through a maximum angle of 36°. One of the major faults found in all seats was the difficulty subjects had in retracting their feet into the stirrups. Other problems encountered were the failure to properly operate the face curtain, fouling of the arm rest, and the straining to reach the "D-Ring". Factors affecting the efficient use of the equipment were the clothing worn and training and practice effects

475

Hunter, H.N. & H.S. Weiss 1954 PILOT'S ABILITY TO ACTUATE F9F-6 EJECTION SEAT CONTROLS UNDER FLUCTUATING G CONDITIONS
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR3 Sept. 16, 1954 ASTIA AD 70 757

ABSTRACT: The pilots were requested to execute the maneuvers required in an F9F-6 ejection sequence upon receipt of a signal during an acceleration stress pattern. All parts of the seat that were involved with the ejection sequence and the pre-ejection lever were fitted with microswitches and wired to recoders so that the time required to complete all maneuvers could be determined. The acceleration pattern fluctuated the positive G from 1.5 to 7.0 at 5 G/sec while the subject pitched or rolled to a maximum of 70°. The maximum acceleration rate of change of roll was 5.8 rad/sec^2 and the maximum acceleration rate of change of pitch was 4.5 rad/sec^2. The average time for each maneuver under conditions which included all test conditions of an emergency escape were: 3.22 sec-feet retraction: 1.77 sec pre-ejection movement, and 1.71 sec face curtain activation.

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Hunter, H. 1955 PILOT'S ABILITY TO ACTUATE F9F-6 EJECTION SEAT CONTROLS UNDER FLUCTUATING G CONDITIONS
(Naval Air Development Center, Johnsville, Pa.) Project TED ADC AE-6303.1, 31 Dec. 1955

ABSTRACT: All available ejection systems (Navy, face curtain, upward; Air Force, arm rest, upward; and Air Force, "D" ring, downward) were evaluated by exposing Air and Navy pilots in full flihgt gear to fluctuating G. For upward ejections both the arm rests and face curtains were accessible to the pilot and the time required to actuate each under simulated uncontrolled flight conditions was approximately the same. In each system the most time-consuming maneuver was placing the feet on the stirrups. For downward ejections the "D" ring was easily accessible. However, the supports to hold the feet down during ejection never operated properly.

477

Hunter, P.A. & M.W. Fetner 1963 MANEUVER ACCELERATIONS EXPERIENCED DURING ROUTINE OPERATIONS OF A COMMERCIAL TURBOJET TRANSPORT AIRPLANE. (National Aeronautics and Space Administration, Washington, D.C.) NASA TN D-1801, May 1963.

ABSTRACT: The incremental maneuver normal accelerations collected during routine commercial operations of a four-engine turbojet transport have been evaluated. Frequency distributions of positive and negative accelerations by flight condition are presented.

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Hurt, G.J., Jr. 1963 ROUGH-AIR EFFECT ON CREW PERFORMANCE DURING A SIMULATED LOW-ALTITUDE HIGH-SPEED SURVEILLANCE MISSION. (National Aeronautics and Space Administration, Washington, D.C.) NASA TN D-1924, August 1963.

ABSTRACT: Test subjects were exposed to several levels of simulated gust intensity. The root mean square of the normal acceleration ranged from 0.16g for the lowest level to 0.95g for the highest level of response simulated. The simulated gust intensities and vehicle response levels were in excess of the accepted human comfort level. It was found that the observer would be disrupted but not stopped in the performance of the assigned tasks.

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Huter, T. 1948 MEASUREMENT OF ULTRASOUND ABSORPTION IN ANIMAL TISSUES AND RELATION TO FREQUENCY. Naturwissenschaften 35:285-287
See Also: Chem. Abstr. 44:3052C (1950)
Phys. Abstr. 52:6045 (1949)

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Huter, T. 1949 MEASUREMENT OF ULTRASOUND ABSORPTION IN ANIMAL TISSUES AND RELATION TO FREQUENCY Phys. Abstr. 52:6045
Naturwissenschaften 35:285-287 (1948)
Chem. Abstr. 44:3052c (1950)

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Huter, T. 1950 MEASUREMENT OF ULTRASOUND ABSORPTION IN ANIMAL TISSUES AND RELATION TO FREQUENCY Chem. Abstr. 44:3052c
See Also Naturwissenschaften 35:285-287(1948)
Phys. Abstr. 52:6045 (1949)

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Il'in, N. 1960 THE SHIP-SATELLITE SPEAKS
Krasnaya zvezda P. 3; 18 May 1960

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Industrial Lab., 1958 SHIPBOARD VIBRATION PROBLEMS DURING 1957.
(Industrial Lab., Mare Island Naval Shipyard, Vallejo, Calif.)
ASTIA AD- 217 665,

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Industrial Lab., 1959 SHIPBOARD VIBRATION PROBLEMS DURING 1958.
(Industrial Lab., Mare Island Naval Shipyard, Vallejo, Calif.)
ASTIA AD-217 666

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Irving, I. B., & J. S. Milne, Jr. 1961 A VIBRATION AMPLITUDE RECORDING SYSTEM FOR AEROSPACE DESIGN EVALUATION STUDIES. In 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D. C. (Mt. Prospect, Ill.: Institute of Environmental Sciences, P. O. Box 191) pp. 555-563

SUMMARY: In making vibration studies of missile and satellite components and component parts, it is very helpful to the design engineer to know resonant frequencies and mechanical gains on various parts of the components. Where the "quick fix" design technique is employed, it is desirable to have this information available immediately without the use of complex and time consuming data reduction systems. The system described is a four-channel recorder system where vibration amplitudes from four selected positions can be compared to each other at any vibration frequency between 10 and 2000 cycles per second. The data is presented as four continuous records of amplitude against a frequency mark on the edge of the record which is coded against a printed tape record of frequency. The system is composed of commercially available equipment and has an overall calibrated accuracy of ± 10%. (AUTHOR)

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Isakov, P. 1960 ASSAULT ON SPACE
Trud P. 4; 21 May 1960

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Jacklin, H.M. 1936 HUMAN REACTIONS TO VIBRATION.
Soc. Automotive Eng. Jour. 39: 401-407, Oct. 1936

ABSTRACT: This paper deals with the range of 0 to 215 inches amplitude and 1 to 17 cps. The subjective reactions were rated as I, perceptible; one feels motion or that distant objects are moving slightly. II, Disturbing; one notes that certain organs or parts of the body have greater vibration than the total body and attempts are made to prevent the motion. III, Uncomfortable; one wants very little of this treatment. The resulting curves show great similarity of slope, and on semi-log coordinates fits the equation $K = Ae^{0.61}$ where; K is a constant, A is max. acceleration in ft/sec^2, f is frequency in cps. Values for K are derived for several hundred subjects on a hard seat.

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Jacklin, H. M. 1948 HUMAN REACTIONS TO VIBRATION.
S.A.E. Journal 56:49.

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Jackson, M. M. 1939 THE FREQUENCY FUNCTION OF VIBRATORY SENSITIVITY.
(Unpublished master's thesis, University of Virginia)

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Jacobs, H.I. 1960 A REVIEW OF AVAILABLE INFORMATION ON THE ACOUSTICAL AND VIBRATIONAL ASPECTS OF MANNED SPACE FLIGHT
Aerospace Medicine 31 (6): 468-477, June 1960

ABSTRACT: This paper is a review of the problem of noise and vibration with respect to manned space flight. Acoustic environment can be predicted for future space vehicles with sufficient accuracy for human factor analyses. The noise environment should not create a barrier to manned space travel. Vibration, as limited by the structural requirements of current space vehicle design, is within human tolerance limits.

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Jacobsen, L. S., & R. S. Ayre 1958 ENGINEERING VIBRATIONS.
(New York: McGraw-Hill, 1958)

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Jacobson, R.H. 1959 ANALOG STUDY OF RESPONSE TO JET AIRCRAFT VIBRATIONS
(Wright Air Development Center, Wright-Patterson Air Force Base, Ohio)
WADC TN 50-179, February 1959, ASTIA AD 216711, Contract No. AF33(616)-5033, Task No. 61966

ABSTRACT: An analog investigation was performed to determine differences in vibration responses between actual aircraft random vibration inputs and "equivalent" sinusoidal vibrations. The random vibration inputs consisted of 36 magnetic tape recordings made at four measurement locations on B-52 aircraft. Analog responses were determined for linear single-degree-of-freedom systems at 17 values of natural frequency between 13 and 500 cps, and with damping characterized by resonant transmissibilities (Q) of 5, 10, and 25.

It was found that, for one of the measurement locations, the response to the aircraft random vibrations was smaller than the response to an "equivalent" sinusoidal vibration. For the remaining three locations, no significant difference was observed between responses to the two types of input. It is concluded that, for values of Q considered, specification vibration levels should not be modified to account for differences between responses to random vibrations occurring in aircraft and responses to sinusoidal vibrations employed in laboratory evaluations.

493

Jacobson, R.H. 1959 STUDY OF VIBRATION AND SHOCK IN AIRCRAFT AND DEVELOPMENT OF INSTRUMENT MOUNTINGS
(Flight Control Laboratory, Wright Air Development Center, Wright-Patterson Air Force Base, Ohio) WADC TR 58-148, March 1959, Contract No. AF 33(616)-5033, Task No. 61966, ASTIA AD 228510

ABSTRACT: A study of instrument requirements revealed that the ability of gyroscopically stabilized flight control instruments to withstand shock and vibration varied widely, and for many such instruemnts protective mounting bases were not required. However, to define the mounting base objectives clearly, it was decided to design the mounting base for the Lear Two-Gyro Master Reference.

Of a large number of requirements to be met by the mounting base, the most important were those of freedom of translational motion in the three principal directions coupled with severe constraint against any form of rotational motion. Further, a resonant frequency of 15 to 20 cps and a maximum resonant magnification factor (Q) of 4 were established for the mounting base.

The developed mounting base incorporated three sets of thin leaf springs (flexures) which allow the required three-degree-of-freedom translational motion. To control the resonant transmissibility, damper elements were incorporated into the mounting base with a pair of these elements in parallel with each set of flexures. The damper elements consisted of 3/4 in. cubes of Silastic 6508 silicone rubber in which small pieces of 0.085 in. diameter Teflon tubing were randomly embedded. The report discusses the design and evaluation of the mounting base and the development of the damper elements.

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Janeway, R. N. 1945 VEHICLE VIBRATION LIMITS TO FIT THE PASSENGER. (Report presented at the S.A.E., Nat. Car and Production Meeting, Mar. 1945) S.A.E. Preprint 160.

ABSTRACT: This paper is a report on an analytical study of all available experimental data relating to human tolerance of vertical sinusoidal vibration. The practical objective was to derive the safe limits of vibration intensity for passenger comfort over the complete range of frequencies encountered in vehicles.

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Janeway, R. N. 1949 PASSENGER VIBRATION LIMITS. S.A.E. Journal 56(4):48-49.

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Janeway, R. N. 1950 RIDE AND VIBRATION DATA, SAE Publication, 1950.

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Jeffcoate, G. O. 1951 THE EFFECTS OF NOISE AND VIBRATION ON PEOPLE. (D.S.I.R., Road Research Lab., Harmondsworth) Note No. RN/1643/GOJ

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Johnson, E. E. 1952 A SURVEY OF TANK CREW PROBLEMS. (Army Medical Research Lab., Fort Knox, Ky.) Proj. 6 95 20 001, MEDEA, Rept. 93, Aug. 1952

ABSTRACT: To point up problems of the tank crew which may be alleviated by human engineering research, 894 tank crewmen attending the Armored School, Fort Knox, Kentucky, were oriented as to kinds of problems the human engineer is interested in and then asked to relate some relevant incident that they had either observed or participated in. A total of 623 incidents were found to concern general problems of human engineering and 521 of these concerned the tank crew. These incidents were categorized as they applied to the commander, gunner, loader, driver and crew in general. Recommendations are made for improved survey techniques.

499

Joint Publications Research Service 1963 VIBRATION DISEASE AND THERMAL DEHYDRATION (SELECTED) TRANSLATIONS. (Joint Publication Research Service, Washington, D.C.) 5 Apr. 1963. ASTIA AD 405 210 Trans. of Gigiena Truda i Professional'nye Zabolevaniya (USSR) 7(1):4-13, 36-41, 1963.

CONTENTS:

Materials on the pathogenesis of vibration disease, by Ye Ts. Andreyava-Galanina and N.I. Karpova

Application of vibration stimulator for detecting certain functional shifts in workers experiencing vibration effects under industrial conditions, by Z.M. Butkovskaya and Yu. S. Koryukaev

Water and salt exchange in thermal dehydration, by L. Gets.

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Jones, C.D., J.H. Shaw, et al 1961 PRELIMINARY INVESTIGATION OF INTERPLANETARY LUNAR AND NEAR PLANET ENVIRONMENTS AND METHODS OF SIMULATION (Aeronautical Systems Division, Wright-Patterson AFB, Ohio) ASD TR 61-267 July 1961 ACTIA AD 268 791

ABSTRACT: Summaries of the natural environments of Mars, Venus, the Moon and interplanetary space are presented. The primary induced environmental stresses associated with thermal radiation, cosmic atomic and subatomic radiation, meteoroid particles, vibration, shock, acceleration, and low pressure are described for operation near the above bodies including range of anticipated values and methods of simulation. Additional simulation techniques associated with temperature, heat flux and atmospheric composition are discussed. An environmental test philosophy and a summary of heat transfer characteristics of high speed vehicles are included. Important areas not covered in this report are combined, induced environments associated with atmospheric entry and biological effects and nuclear reaction radiations. (Author)

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Rivista di Medicina Aeronautica e Spaziale (Roma) 24(1):29-43 Jan. - Mar. 1961. (In French, with English summary)

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Lek. Woj. 38:1080-1089, 1962 (Pol)

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(Westinghouse Electric Corporation, Baltimore, Md.)
Human Factors Data Bull. 47, Feb. 1960

ABSTRACT: To determine the transmitting characteristics of the living human body for low frequency vertical vibration, data were obtained from ten seated Ss. The chair was attached to a vibration generator and traveling gantry which could provide a continuous variable frequency from 6 to 150 cps. In this experiment a peak vibrational acceleration of one g (measured at seat) was not exceeded. Accelerometers were mounted at the hip, shoulder, and seat (reference). Transmissibility (ratio of peak vibrational acceleration at a particular part of the body to the peak recorded at the seat) for hip and shoulder were given. (Tufts)

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Kampik, A. 1930 EXPERIMENTELLE UNTERSUCHUNGEN ÜBER DIE PRAKTISCHE LEISTUNGSFÄHIGKEIT DER VIBRATIONSEMPFINDUNGEN (Experimental Examinations Concerning the Practical Conductivity of the Vibration Sensation)
Archiv für die gesamte Psychologie (Leipzig) 76: 3-70

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Keidel, W. D. 1956 VIBRATIONS RECEPTION: DER ERSCHUTTERUNGSSINN DES MENSCHEN.
(Vibration Perception: The Vibration Sense of Man)
Erlanger Forschungen, Reihe B. (Erlangen: Universitatsbund Erlangen, 1956) Vol. 2.

ABSTRACT: Research in the field of vibration sensations is reviewed. The following aspects are considered: physical characteristics of body as conveyor of stimuli, anatomy of receptors, regulation of receptor-neural fiber unity, thresholds as indices of sensitivity, and central transformation and evaluation. Of interest to aviation medicine is a chapter dealing with research and clinical data on vibration damage to the human organism (p. 116-117). The author concludes that there is no specific vibration receptor, rather, information about vibration is transmitted through three different sensory organ systems: mechanoreceptors (skin and tendon and organs), the ear, and the periosteal pain receptors. Approximately 288 references.

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Kelleher, J.F. 1960 A PROPOSED QUALIFICATION TEST PROCEDURE FOR SYSTEM COMPATIBILITY DURING VIBRATION. (1960 Proceedings of the Institute of Environmental Sciences, 91-96).

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Aero Digest 64(1): 72-80, 82, 90. Jan. 1952

ABSTRACT: The physiological problems resulting from the advances of modern aviation in high-altitude and high-speed flying are briefly discussed. New methods and techniques in meeting problems such as temperature and pressure changes, anoxia, bio-acoustic effects, bailing out from high altitudes, and instrument control (human engineering) are summarized. In conclusion, the requirements for and the functions and duties of the flight surgeon are outlined.

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Komsomol'skaya pravda P. 2; 2 December 1960.

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Klimets, I. I. 1958 O VLIIANII OBSHCHEI VIBRATSII NA DETORODNUIU FUNKTSIIU. (Effect of general vibration on genital function.) Tr. Leningradsk. sanit. gig. med. inst. 44:196-207

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Klinicheskaia Meditsina (Moscow) 21(3): 47-50

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Jahreskurze Arztliche Fortbildung, 26:1-13.

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Konecci, E.B. 1957 PHYSICAL AND PHYSIOLOGICAL FACTORS IN MAJOR AIRCRAFT ACCIDENTS
Directorate of Flight Safety Research, USAF, Norton AFB, California
AFCFS-G-2, M-4-57, 13 February 1957.

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Konecci, E.B. 1957 PHYSIOLOGICAL FACTORS IN USAF AIRCRAFT ACCIDENTS
Paper: Aero Medical Association, 28th Annual Meeting, Denver, Colo. May 1957
See also: Journal of Aviation Medicine 28(6): 553-558

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Konecci, E.B. 1957 PHYSIOLOGIC FACTORS IN AIRCRAFT ACCIDENTS IN THE U.S. AIR FORCE
Journal of Aviation Medicine 28(6): 553-558

ABSTRACT: In conclusion, we can say that factors affecting the normal physiologic state of the pilot (or crew) are contributing causes rather than primary causes of major aircraft accidents. A few physiologic conditions like hypoxia and vertigo/disorientation were primary causes. Fatigue appeared as a contributing factor in a number of accidents but the incidence appears to be decreasing i.e., thirty-four cases in 1955 to thirteen in 1956. G forces and vibrations appeared as contributing factors in a large number of accidents; however, their significance could not be fully evaluated from the available data. The adversities of decompression, physical disturbances, hyperventilation, hypoglycemia, carbon monoxide poisoning, and air sickness do not seem to be primary problem areas.

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Konstantinov, A. 1960 MAN GOES OUT INTO SPACE
Trud P. 2; 17 May 1960.

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Kopyt, N. I. 1961 EXPERIENCE WITH THE APPLICATION OF OXYHEMOMETRY IN THE STUDY OF THE EFFECT OF GENERAL VIBRATIONS ON THE HUMAN ORGANISM. In Tr. Leningrad Sanitarnogig Med. Inst. 71:16-22, 1961 (Russian)

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Kozachenko, B. 1960 DREAM BECOMES FACT
Gudok P. 4; 20 May 1960

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Kramer, S.B. & R.A. Byers 1960 A MODULAR CONCEPT FOR A MULTI-MANNED SPACE STATION
(In: Proceedings of the Manned Space Stations Symposium, Inst. Aeronautical Sciences, New York, 1960, pp. 3[illegible]-73)

ABSTRACT: Contains a section on the Micro-Encology which is broken down into the following subsections: Biochemical (Respiratory, Nutritional, Waste); Psychological (Termal, Vibratory and Aurol, Gravitational); External Phenomena (Radiation, Meteors); and Hardware (Micro-Atmosphere System, Equipment Weights plus Power).

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Krimshteyn, A. Ye. 1960 ELECTROCARDIOGRAPHIC CHANGES IN FLIGHT PERSONNEL UNDER THE INFLUENCE OF FLIGHT STRAIN
Voyenno-meditsinskiy Zhurnal 5: 224-227
See also: JPRS Trans No 5592

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Kublanova, P.S. 1960 ON THE PROBLEM OF THE EFFECT OF VIBRATION ON THE STATE OF HEARING AND ON THE VESTIBULAR APPARATUS. Vestn Otorinolaring 22:15-21, May-June 1960

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In Acta Physiol. Pol. 12:821-832, Nov.-Dec. 1961, (Polland)

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Kuznetsov et al. 1959 THE EFFECT OF VIBRATION ON THE METABOLISM OF CERTAIN VITAMINS IN THE HUMAN BODY.
Voprosy Pitaniya (USSR) 18(3):14-17 LC Trans. no. 59-13775

ABSTRACT:

The effect of the stress of vibration in an industrial situation upon the metabolism of various vitamins is examined. The results of tests involving 9 individuals indicate that the diet of persons exposed to intense vibration should include additional vitamins, especially vitamin B_6.

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Kylstra, J. 1956 REGISTRATION OF ACCELERATION BY MEANS OF U-EFFECT
Nederl. tijdschr. geneesk. 100: 911-914, March 31, 1956

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Lange, K. O. & R. R. Coermann 1962 VISUAL ACUITY UNDER VIBRATION. Hum. Factors 4:291-300, Oct. 1962.

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Langer, E. and W. Vethacke. 1957 GEFÄSSVERÄNDERUNGEN NACH RHYTHMISCHEN ERSCHUTTERUNGEN. (Vascular changes caused by rhythmic vibrations.) Monatsschr. Unfallh. 60:129-137

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Lanz, K. 1961 EQUIPMENT AND TECHNIQUES USED IN CALIBRATING VIBRATION MEASURING TRANSDUCERS TO 10,000 CYCLES PER SECOND In 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D. C. (Mt. Prospect, Ill.: Institute of Environmental Sciences, P. O. Box 191) pp. 109-114

ABSTRACT: In recent years, there has been a widespread increase in research, development and testing programs in which vibration measuring transducers play an important role. Calibrating these transducers to the standards set by the National Bureau of Standards is a problem which concerns both the calibration laboratories and the user of transducers. This paper discusses a method of calibrating vibration measuring transducers which provides traceability to NBS. The calibration factor obtained is considered correct within ± 1% to 100 cps and ± 2% to 2000 cps. Calibrations from 2000 to 10,000 cps, traceable to NBS certified standards, are expected to be accurate within 5 per cent. The calibration method and its accuracy are discussed in detail. (AUTHOR)

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Lawton, Alfred H. 1952 HUMAN FACTORS IN THE OPERATIONS AND DESIGN OF AIRCRAFT Journal of Aviation Medicine 23: 254-258 & 306

ABSTRACT: Human factors in aviation embrace three broad divisions: (1) aviation medicine, which familizrizes pilots with their equipment, safety measures, and preventive medical aspects; (2) human engineering, which analyses limitations of human response to the aircraft and its equipment; and (3) human resources which relate to selection, classification, aptitude measurement, training, and

human relations, taking into account the diversified nature of human beings. Psychophysiological aspects of noise, vibration, use of pressurized cabins, use of ejection seats and all kinds of protective equipment, and the impact of speed are discussed. Animal experiments have a great value in furthering research but ultimately each device, method, and principle has to be tested by "human guinea pigs."

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Lazzaroni, A. 1962 EFFECTS OF VIBRATIONS AND LOW FREQUENCY WAVES ON PERSONS LIVING IN THE VICINITY OF AIRPORTS.
Riv. Pat. Clin. 17:1099-1109, Dec. 1962 (Italy)

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Lebedeva, A. F. and C. H. Ch'u 1960 EFFECT OF GENERAL VERTICAL VIBRATIONS ON ARTERIAL BLOOD PRESSURE AND PULSE.
In Tr. Leningrad Sanitarnogig Med. Inst. 61:85-90, 1960 (Russian)

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Lederer, L.G. 1956 THE AEROMEDICAL ASPECTS OF TURBO-PROP COMMERCIAL AIRCRAFT. A STUDY OF VISCOUNT PASSENGER OPERATIONS IN THE UNITED STATES.
J. Aviation Med. 27(4):287-300

SUMMARY: The aeromedical characteristics of the VISCOUNT turbo-prop airliner have been discussed as related to operation in commercial avaition in the United States. The differences between turbo-prop and conventional piston powered aircraft have been demonstrated particularly in the field of noise and vibration. The level of cabin pressurization has been discussed and shown to be more physiologically acceptable than other commercial aircraft operating in the United States.

Pilot transition training has been discussed and a new type of flying in commercial operation, have been cited, such as "hull life," and metal fatigue." It is hoped that as new better commercial aircraft are developed, the aeromedical aspects such as have been covered in the presentation will also be reported.

534

Lederer, P.S. 1955 A TORSIONAL VIBRATION CALIBRATOR (National Bureau of Standards, U.S.A.)

ABSTRACT: Describes a small torsional vibration calibrator which generates steady state vibrations to be used for the dynamic calibration of angular motion

transducers over a frequency range from 0.57 cps to 30 cps. The maximum angular accelerations obtained between 3 cps and 30 cps range from 20 to 40 peak radians per second per second (for table loads between 0 to 20 lb in^2). A condition of resonance at 2 cps raises the output to 79 radians per second per second. At 0.57 cps., a maximum acceleration of 2.5 peak radians per second per second can be obtained.

535

Lehmann, G., & D Dieckmann 1956 DIE WIRKUNG MECHANISCHER SCHWINGUNGEN (0.5 BIS 100 HERTZ) AUF DEN MENSCHEN. (THE EFFECT OF MECHANICAL OSCILLATIONS (0.5 TO 100 C.P.S.) ON MAN) Forschungsberichte des Wirtschafts- und Verkehrsministeriums Nordrhein-Westfalen (Köln und Opladen) 362:92

ABSTRACT: Subjects were stimulated with vertical, horizontal, and transverse sinusoidal vibrations, in the frequency range of 1-70 c.p.s. in sitting and standing positions. Physical measurements of acceleration and direction of vertical vibration showed differential resonance of various body parts. The trunk resonates at frequencies around 5 c.p.s., the head at 20 to 30 c.p.s. Transverse vibration was perceived by subjects as the most unpleasant. Amplitudes of head movements at the above vibrations were large and ellyptical. Nausea and gastric complaints which accompanied transversal vibrations suggest a relation between ellyptical head movements and kinetoses by the way of endolymph movement in labyrinths. Considering vibration stresses on man, from the standpoint of vibration-mechanics man should be regarded as a damped-mass-spring system rather than pure mass. His elastic properties are to be considered also.

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Lepor, M., & W. F. Rector 1961 ACOUSTICS IN MANNED SPACE VEHICLES (Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D. C.; Paper not available at publication)

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Letavet, A. A. and Z. V. Gordon, eds. 1962 BIOLOGICAL ACTION OF ULTRAHIGH FREQUENCIES
(Trans. of mono. O Biologicheskom Vozdeistvii Sverkhvysokikh Chastot, Moscow, 1960)
(Office of Technical Services, Washington, D.C.) 62-19175

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Lewis, D. 1943 THE EFFECTS OF NOISE AND VIBRATION ON CERTAIN PSYCHOMOTOR RESPONSES (C.A.A. Div. of Research, U.S. Dept. Commerce Report No. 8, Washington, D.C.) ATI 75937

ABSTRACT: The noise and vibration of airplanes are widely thought to reduce the efficiency of aviators. Service personnel often report annoyance and feel that their work suffers. The present experiments were undertaken to learn if there is actually a decrement in work under noise and vibration conditions similar to those characterizing military aircraft. The experiments were performed at the University of Iowa with 80 male college students, C.P.T. applicants, and trainees as subjects. The subjects performed on a Mashburn apparatus. The Mashburn involves a control stick and rudder bar which are manipulated by the subject in response to changes in three banks of stimulus lights. As soon as the subject has responded to one set of lights, a new combination appears. For the present study the Mashburn apparatus was modified so that the platform could be made to vibrate. Effects of noise and vibration, respectively, on heart rate, breathing, tilt perception, brain waves, and hearing acuity were also studied. On the whole, the results were negative in the sense that they revealed no consistently significant differences between reactions when noise, vibration, or both were present and when these supposedly disturbing factors were absent.

540

Lewis, H.O. 1961 SHOCK TESTING WITH ELECTRODYNAMIC SHAKERS
In 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5,6,7, 1961, Washington, D.C. (Mt. Prospect, Ill. : Institute of Environmental Sciences) Pp. 267-276

SUMMARY: This report should be considered solely as a preliminary description of shock tests conducted with electrodynamic shakers. Because of the marked limitations in time, this technique has been developed only to the point of making testing possible.

In the Polaris Missile System Test Services Laboratory, shakers are employed extensively to shock-test articles weighing from 200 to 1000 pounds within the pulse durations described above. Plans are currently underway to extend the use of this technique to all items requiring pulse durations up to 14 milliseconds. There are several areas which need further development before the technique can be considered " of age". First, an effective and repeatable method of producing the desired pulses must be developed. Then, if this technique receives sufficient acceptance, the shaker manufacturers should market the exciters with longer stroke capabilities. This would permit the particular method of conducting a shock test to be extended over a wider range of pulse

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Liddell, G. & Jacklin, H. M., 1933 RIDING COMFORT ANALYSIS
Engineering Bulletin, No. 3, Purdue University, May 1933

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Linder, G.S., 1961 EFFECTS OF MECHANICAL VIBRATION ON HUMANS. (North American Aviation, Los Angeles, Calif.) Rept. No. NA-59-1420, March 1961

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Linder, G. S. 1962 MECHANICAL VIBRATION EFFECTS ON HUMAN BEINGS. Aerospace Medicine 33(8):939-949, Aug. 1962

ABSTRACT: This paper is a review of the literature regarding the effects of mechanical vibration on humans. It is intended to provide a readily accessible compilation of vibration information for those persons concerned with aerospace vehicle design and operation.

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Lippert, S. and E.P. Wheaton 1945 HUMAN RESPONSE TO VERTICAL VIBRATION (Douglas Aircraft Co., Inc., Santa Monica, Calif.) Rept. No. SM-20021; ASTIA AD-61 619; (Oct. 18, 1945, rev. April 26, 1955) ASTIA AD-61 619

ABSTRACT: Simplified graphs showing human responses to vertical vibration were prepared from an analysis of the literature on the subject. The graphs extend over a range of double amplitudes from .000029 inches to 100 inches, and over a range of frequencies from .1 to 256 cycles per second. These ranges include the regions of interest in aircraft--namely, the low frequency vibrations due to gusts and buffeting, the transient vibrations encountered in the seats after an initial displacement, and the steady state vibrations due to engines and propellers.

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Lippert, S. 1947 HUMAN RESPONSE TO VERTICAL VIBRATION J. Soc. Automotive Engrs 55:32-34

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Lippert, S. 1948 COMPREHENSIVE GRAPH FOR THE COLLECTION OF NOISE AND VIBRATION DATA. J. Aviation Med. 19:279-286

ABSTRACT: It has been common practice in the aircraft industry in the past to consider the effects of noise and vibration on the passenger as separate disturbances. With the advent of jet and rocket engines, higher intensities and

higher frequencies are encountered than ever before. New techniques and new instruments are required to measure the noise and vibration and to assess their effects on the human body.

The graph described in this paper makes it possible to spot in data in one set of units, and permits its immediate interpretation in other units. The grid work can be readily extended to include any magnitudes of noise or vibration disturbance.

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Lippert, Stanley 1953 LIMITATIONS TO NOISE AND VIBRATION CONTROL. In Proceedings of Symposium on Frontiers of Man-Controlled Flight, Institute of Transportation and Traffic Engineers, Univ. of Calif., Los Angeles, April 1953.

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Lockheed Electronics Co. 1961 LOW-LEVEL VIBRATION-MEASUREMENT FEASIBILITY STUDY. (Lockheed Electronics Co., Plainsfield, N.J.) Final Rept. ASTIA AD-257 180, 31 December 1960

ABSTRACT: Research was conducted to determine the feasibility of using piezoelectric type accelerometers, coupled to electronic integrating networks, for Measurement of vibration velocities corresponding to minimum accelerations of 0.0002 g over a frequency range of 10 c to 10 kc. Tests were conducted with a commercial accelerometer operating in conjunction with a new design of amplifier having the lowest noise level presently achievable in the state-of-the-art. The spectrum of the noise was measured, and the sensitivity of the accelerometer-amplifier combination was determined. It was found that accelerations of 0.0002 g could be measured with good S/N ratio over the entire frequency range of interest. However, integration of the output to obtain velocities yielded useable S/N's only at the lower end of the spectrum. This resulted from the low-frequency peak in the noise spectrum combined with the -6 db per octave slope of the integrating network. It is concluded that peizoelectric accelerometers are not feasible for measurement of vibration velocities down to the minimum levels of interest. (Author)

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Loeb, M. 1954 A PRELIMINARY INVESTIGATION OF THE EFFECTS OF WHOLE-BODY VIBRATION AND NOISE.
(U.S. Army, Med. Res. Lab., Ft. Knox, Ky.) Proj. 6-95-20-001, Rept. No. 145, Nov. 12, 1954. ASTIA AD 47142.

ABSTRACT: An investigation was conducted to test several measures as indices of possible nonauditory impairment arising from moderately intense noise and

vibration. Psychomotor, sensory, and simple physiological tests were presented to 16 subjects before, during, and after control periods and periods of exposure to light vibration, heavy vibration, and noise. Among these tests were measures of mirror tracing performance, speed of trapping, different types of reaction time, manual steadiness, strength of grip, visual acuity, systolic and diastolic blood pressure, pulse rate, urine albumin, and urinary potassium excretion. Analysis of the data revealed temporal (practice or adaptation) effects of mirror tracing, pulse rate, and systolic blood pressure. No variation under control, noise, and vibration conditions occurred except in the cases of the visual acuity and manual steadiness measures. Tremor was relatively unchanged under light vibration and showed a significant increase under heavy vibration and more under heavy vibration, but was not affected by noise.

550

Loeb, M. Oct. 1954 A FURTHER INVESTIGATION OF THE INFLUENCE OF WHOLE BODY VIBRATION AND NOISE ON TREMOR AND VISUAL ACUITY. (Army Medical Research Lab.) Project No. 6-95-20-001, Rept. No. 165, 22 Oct. 1954. (24 Jan. 1955)

ABSTRACT: Differential effects on visual acuity, tremor in a supported hand, and aiming tremor were obtained during exposure to different intensities and frequencies of vibration. Measurements were obtained before, during, and after exposure to 2 amplitudes of bibration at 3 different frequencies and a 115-db broadband noise. Mean annoyance and tolerability thres olds were also determined under vibration. Generally during vibration, visual acuity was impaired and manual and aiming tremor were increased while noise had no effect. Effects were more pronounced at 15 c than at higher frequencies, while distinct differential effects between light and heavy vibration were present only at lower frequencies. (See also AD-47 142)

551

W.E. Loeckle 1940 THE EFFECT OF VIBRATION ON THE AUTONOMIC NERVOUS SYSTEM AND TENDON REFLEXES
(Forschungsbericht D.V.L. (ZWB) No. 1283, Sept. 1940)
R.A.E. Translation No. 183

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Loeckle, W.E. 1941 EFFECT OF VIBRATION ON VEGETATIVE NERVOUS SYSTEM AND TENDON REFLEXES. (Ueber die Wirkung von Schwingungen auf das vegetative Nervensystem und die Sehnenreflexe) ASTIA ATI-8773

ABSTRACT: Organic processes which cause weakening or disappearance of reflexes were investigated on human beings and animals. A jolting machine, producing vertical vibrations of nearly sinusoidal form, was used in experiments. Factors contributing to change in muscle tone and reflexes, such as frequency, amplitude and duration of vibrational stimuli are discussed. Absence of patellar reflexes is traced to changes in blood vessels and muscle fibers connected with the sympathetic nervous system. Physiological and technical significance of results is stressed.

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Loeckle, W.E. 1941 CONCERNING THE EFFECT OF VIBRATION ON THE AUTONOMIC NERVOUS SYSTEM AND THE VISUAL REFLEXES. Jahrbuch 1941 der deutschen Luftahrtforschung. 103-108
See also Luftfahrtmedizin 5:305-316,1941.

ABSTRACT: Mechanical vibration of a shake-table affected the entire organism or individual points of the flesh of men and animals. In this connection the failure of the patellar reflex observed by Coermann was found as a result of an autonomic response to vibration, and certainly the vibration of the blood vessels and other organs with smooth musculature caused a regional disorder of normal sympathetic tone which manifested itself particularly in the visual reflex center. The investigation was related to the patellar, Achilles-, and forearm reflex. Degrees and rate of reflex reduction depend upon frequency, amplitude and duration of vibration as well as on the subject a and his condition at the time. The significance of the results is seen in the following connotation: 1) New viewpoints for use in teaching about the visual reflex and autonomic nervous system. 2) Clear explanation of the physiological effect of mechanical vibration. 3) Consideration of more possible detrimental effects of vibration. And 4) importance of the investigation of technically decisive factors of an injurious vibration.

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Loeckle, W. E. 1950 THE PHYSIOLOGICAL EFFECTS OF MECHANICAL VIBRATION.
In: German Aviation Medicine in World War II, Chapt. VII-C, 2:716-722
(Washington, D.C.: Government Printing Office)

ABSTRACT: This chapter describes the data collected in Germany before and during World War II. Methods for subjectively measuring vibration effects are described. The "shake-table" of the Deutsche Reichsban is also described, which has a capability of 20 cps at 1.6 cm amplitude. A detailed list of subjective sensations is given.

Resonant frequencies of the body were found to lie between 4 and 10 cps. Above the resonant range, the transmission of vibration seems inversely proportional to frequency, and above 140 cps body damping is complete with little or no vibration reaching the head. Tolerance is not related to resonant frequency, but to the damping factor.

A whistled note is modulated, and exhaled smoke is emitted in pressure waves. The vibrations are superimposed on respiratory movements. X-ray studies show that the liver controls diaphragmatic movement with resonance occurring between 6 and 10 cps. An increase in pulmonary ventilation has been observed, but after subjects become accustomed to the vibration, the values return to normal.

Vision impairment is related to the transmission of vibration to the head. Above 16 cps transmission is fairly constant and diplopia is present.

The tendon reflex is inhibited and it seems to require involvement of some smooth muscle tissue. The inhibition is greater when the vascular area in the femoral region is vibrated than when skeletal muscle (Gastrocnemius) is vibrated alone.

There were no constant changes seen in pulse and blood pressure.

555

Lombard, C. F., E. L. Beckman, R. F. Rushmer, D. R. Drury, J. Goodman, Hugh Edmonson, J. P. Henry, & Aaron Klein Nov. 1948 THE EFFECT OF NEGATIVE RADIAL ACCELERATION ON LARGE EXPERIMENTAL ANIMALS (GOATS). I. PATHOLOGY. (Dept. of Avia. Med., University of Southern Calif., Los Angeles, Calif.) Office of Naval Research Contract N6ori77, Task 1, Project NR 161-014, 30 Nov. 1948.

ABSTRACT:

1. The effects of negative radial acceleration (centrifugal force from tail to head) upon 11 goats were studied on the human centrifuge at the University of Southern California, at levels of -5G and -8G.

2. Autopsies were conducted on all animals, and specimens taken for histopathologic study.

3. Routing gross pathological examinations were made. In selected cases, opthalmological examinations were made, electrocardiograms recorded, chest x-rays taken and blood samples collected and analyzed for plasma protein, hematocrit, oxygen and carbon dioxide saturation and hemoglobin content.

4. These experiments indicate that repeated exposures to negative G produce considerable edema and numberous hemorrages, both petechial.

5. Negative G seems to offer greater danger of strangulation by edema of the glottis and surrounding tissues and cardio vascular damage than by cerebral hemorrhage.

6. A motion picture was prepared which records both gross and microscopic pathologic findings as well as typical experimental procedures.

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LoMonaco, G. 1935 BIOLOGICAL ACTION OF ULTRASONICS
Riforma med. 51:1608.

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Lonborg, J. O. 1963 A SLINGSHOT SHOCK TESTER
(Jet Propulsion Lab. Calif. Inst. of Tech., Pasadena, Calif.)
April 1963.

ABSTRACT: This paper describes the design, development and operation of a shock tester capable of subjecting small specimens to accelerations up to approximately 40,000 g, with impact velocities to 200 fps. The test specimen is mounted on a rail-guided carriage. Elastic shock-absorber cord (bungee) is used to impart the desired impact velocity

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Loring, J.C.G. 1954 SELECTED BIBLIOGRAPHY ON THE EFFECTS OF HIGH INTENSITY NOISE ON MAN (Psycho-Acoustic Lab., Harvard U. Cambridge, Mass.) Rept. No PNR-140, Jan. 1954

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Lotis, V. M., I. P. Solov'eva & LIa. Tartakovskaia 1962 THE EFFECT OF GENERAL VIBRATIONS ON THE SEXUAL APPARATUS IN WOMEN. Vop. Okhr. Materin. Dets. 7:62-66, Oct. 1962 (Rus)

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Lotze, H.R. 1958 POWER SPECTRAL ANALYSIS OF SLED VIBRATION DATA (Air Force Missile Development Center, Holloman Air Force Base, N. Mex.) AFMDC TN-58-12, Sept. 1958; ASTIA AD-154 106

ABSTRACT: A description is given of the analysis and processing of vibration data which originated from a sled run on the AFMDC Track. Different procedures of analysis are explained and compared with respect to applicability. Practical results were validated by the fact that the spectral densities obtained from analog and digital analysis show a very similar frequency characteristic. (Author)

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Lovelace, W.R. 1939 ON GERMAN VIBRATING MACHINE, GERMAN FATIGUE TESTS AND US FATIGUE TESTS. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 57, Sept. 1939.

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Lowry, R.D. and Wolff, W.M. 1961 DESCRIPTION AND PERFORMANCE EVALUATION OF THE AEROSPACE MEDICAL RESEARCH LABORATORIES' VERTICAL ACCELERATOR (United States Air Force, Wright-Patterson Air Force Base, Ohio) USAF ASD Technical Report 61-743 Dec. 1961

ABSTRACT: The Aerospace Medical Research Laboratories' Vertical Accelerator was developed for bioastronautics research to simulate vibration and buffeting encountered in aerospace operations. The design, motion capabilities, control and safety features are described. This Vertical Accelerator can be programmed with periodic or random acceleration patterns obtained from actual environmental measurements. It is a complex electromechanical device employing a unique type of friction drive to move a test platform with a 200-lb. load capacity. The accelerator, for continuous operation, can produce peak to peak amplitudes of $\pm$ 5 ft. over the frequency range from 0.5 cps to 10 cps. The maximum acceleration output is from 2.5 to 3 G depending on load and permissible distortion.

563

Lucassen, L. R. 1954 HELICOPTER GROUND RESONANCE, IN THEORY AND EXPERIMENT. (National Aeronautical Research Institute, Amsterdam) Report V.1748; ASTIA AD-108 973; Oct. 1954

SUMMARY: The principle of ground resonance is discussed by investigation of the frequency graph and its physical background. Therefore, it is indicated what may cause ground resonance, in spite of extensive calculation made in the design stage. Attention is called to the influence on ground resonance of combined blade torsion and flapping and the influence of slipping of the friction damper in the control system. Conclusions are given relating to factors which should be taken into consideration during design, as well as to the program of tie-down tests. (AUTHOR)

564

Lukasik, S. J., A. W. Nolle, eds. 1955 HANDBOOK OF ACOUSTIC NOISE CONTROL VOLUME I. PHYSICAL ACOUSTICS SUPPLEMENT 1. (Air Research and Dev. Command, Wright-Patterson AFB, Ohio) WADC TR-52-204, April 1955. ASTIA AD 66250.

ABSTRACT: The Handbook of Acoustic Noise Control is intended to provide an overall view of the problem of the control of acoustic noise. Since the publication of the first two volumes, the need for their revision has become apparent. In some cases, material has been added to enlarge the coverage of original sections. In others sections have been completely re-written to present the latest experimental or theoretical information available. With ever-increasing interest and activity in acoustic noise control, published procedures must, of necessity, lag behind the newest thinking in the field. There are few areas of the noise control problem where the present answers are the "best". As the operational requirements for noise control devices change and as new or more powerful sound sources appear in our advancing technology, better answers will have to be found. In presenting these revised sections, an attempt is being made to keep up with our expanding knowledge.

This supplement contains additions and revisions to Volume I which treated the generation and control of various types of noise sources. Similarly, Volume II, which analyzed the interaction between noise and man, is being supplemented. These supplements, together with the unchanged sections of Volumes I and II, provide a unified view of noise control problems.

565

Lyubomudrov 1959 VIBRATION AND ITS SIGNIFICANCE IN INDUSTRIAL HYGIENE, YE. TS. ANDREYEVAGALANINA, MEDGIZ, 1986 (BOOK REVIEW) Sovetskaya Medisina (USSR) 23(1):152-153 LC Trans. no. 59- 11715

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McClements, A., 1951 OPERATIONAL ASPECTS OF HELICOPTER VIBRATION (Paper, Royal Academy of Science Symposium, London, England, January 1951)

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McClements, A., F.S. Shapiro, G.E. Bennett, and R.H. Warde 1951 VIBRATIONS IN HELICOPTERS. (A symposium at the Royal Aeronautical Society.) Flight, 1: 138-141

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McCloskey, K., & C. C. Clark 1963 A CHRONOLOGICAL BIBLIOGRAPHY OF THE BIOLOGICAL EFFECTS OF VIBRATION. (Martin Company, Baltimore, Maryland) Engineering Report 12576, Feb. 1963

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McCollom, I.N. 1956 FINAL REPT.
(San Diego State College, San Diego, Calif.) Contract Nonr-126801 1 Dec. 1956
ASTIA AD 118 905

ABSTRACT: Work involved in compiling a human-engineering guide for equipment design is outlined. Bibliographies, abstracts, translations, experimental studies, and special reports were prepared in the following areas: (1) comparison and interaction among sensory input channels (AD 95 131); (2) disorientation; (3) effect on human performance of acceleration, motion, and vibration; (4) effect on human performance of ventilation, temperature, and humidity; (5) man-machine integration (AD 106 677); (6) motion sickness (AD 95 139) and therapeutic drugs; (7) simulators and proficiency measuring devices; (8) speech communication; (9) systems considerations; and (10) work and fatigue (AD 95 133, AD 95 137). A special human-engineering bibliography of 5600 entries was assembled and published. (ASTIA)

570

McFarland, R.A. 1941 FATIGUE IN AIRCRAFT PILOTS. New Engl. J. Med., 225:845-855

ABSTRACT: Fatigue is discussed generally as being due to emotional stress, lack of exercise, reduced oxygen tension, etc.

The noise and vibration in an airplane are contributing factors to pilot fatigue. To ameliorate these conditions, the pilot's seats should be vibration free and located conveniently near controls and instruments, the navigating tables should be cushioned to prevent vibration, the cockpit should be well illuminated, static in earphones, and glare from metal surfaces should be eliminated. Ventilation and temperature should be controlled.

Most of these adverse conditions in the cockpit can be corrected by engineering.

571

McGoldrick, R.T. 1960 SHIP VIBRATION. (David Taylor Model Basin, Wash. D.C.) Report no. 1451; ASTIA AD- 259 466

ABSTRACT: Details are given on the general subject of ship vibration, including both the structural and hydrodynamic phases of the subject. Brief mention is also made of vibration in the propulsion system. Procedures for dealing with the problem of ship vibration in the design stage are suggested. An introduction to hydroelasticity is included. (Author)

572

McKenzie, A.A. and F. Rockett 1947 APPLICATIONS OF SONIC AND ULTRASONIC VIBRATION: TABULATION. Electronics 20:140-141, June 1947

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MacKinnon, M., & J. M. Taylor 1961 AN ANALYTIC STUDY OF VIBRATION TRANSMISSION IN TYPICAL SHIPBOARD INSTALLATIONS. (Master's Thesis: Massachusetts Institute of Technology, 1961) (U. S. Naval Postgraduate School, Monterey, Calif., Rept. No. M2295

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Macduff, J. N., & J. R. Carreri 1958 VIBRATION CONTROL. (New York: McGraw-Hill Book Co., 1958)

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Mach, E. 1875 GRUNDLINIEN DER LEHRE VON DEN BEWEGUNGSEMPFINDUNGEN. (Outlines of the Theory of Motor Sensations)
(Leipzig: Verlag von Wilhelm Engelmann, 1875)

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Mach, E. 1959 THE ANALYSIS OF SENSATIONS (English Translation)
(Dover Publications Inc., New York, 1959)

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Mackworth, N.H. 1950 RESEARCHES ON THE MEASUREMENT OF HUMAN PERFORMANCE
(His Majesty's Stationery Office, London) Med. Res. Council, Special Report Serial No. 268

578

Magid, E. B. & R. R. Coermann April 1960 THE REACTION OF THE HUMAN BODY TO EXTREME VIBRATION (1960 Proceedings of the Institute of Environmental Sciences, 135-154)

ABSTRACT: These studies show that the combination of mechanical measurements and analysis of subjective responses can lead to a greater understanding of the effects of extrinsically applied dynamic forces to the body. Harmful effects of vibrations to body organs with high mobility must be expected at the low frequencies. The body organs that are more restrained and therefore have little mobility are affected at higher frequencies. Protective devices applied to the human body must suppress the resonance peaks of these organs. Damping structures on the seats of passenger vehicles should have a natural frequency below 3 cps with suitable damping characteristics. The exposure time is a very important factor for the tolerance limit to steady state vibrations. To investigate tolerance to random vibration the relative influence of power spectrum, peak factor, and time integral must be investigated. Since body size, position and attitude will affect mechanical and therefore physiological responses, future studies by various groups should include complete descriptions of experimental test procedure with particular emphasis on the time periods.

579

Magid, E.B., R.R. Coermann, and G.H. Ziegenruecker 1960 HUMAN TOLERANCE TO WHOLE BODY SINUSOIDAL VIBRATION, SHORT TIME, ONE MINUTE AND THREE MINUTES STUDIES. Aerospace Med. 31: 915-924

ABSTRACT: Short time, one-minute and three minute tolerance studies were performed. Then subjects were included in the short time studies and a tolerance curve based on subjective responses were compiled. Because of the danger of incurring actual body damage, the tolerance range was attained and the actual tolerance level estimated for the long time studies, in which 15 subjects were included.

Sixteen sensations or symptoms were recorded and a table describing regional symptomatology was compiled unique to low frequency, high amplitude sinusoidal whole body vibrations within the reange of subjective tolerance. The possible etiology of the symptoms experienced during vibration are discussed.

ECG was taken before, during, and after each run. No abnormal tracings were observed except in one case. After a one-minute run at 8 cps, the subject experienced momentary syncope associated with inversion of the P wave reverted after 2 minutes with no sequelae. It is suggested that subjective response may be utilized to aid in defining machanical and physiological reactions to the body to vibrations.

Further study is necessary to ascertain the dynamics of the cardiovascular, pulmonary, nervous skeletal, and endocrine systems during low frequency, high amplitude whole body vibration.

580

Magid, E. B. and R. R. Coermann 1960 THE REACTION OF THE HUMAN BODY TO EXTREME VIBRATIONS
In Proceedings of the Institute of Environmental Science, National Meeting, pp.135-154.

581

Magid, E.B., R.R. Coermann, R.D. Lowry & W.J. Bosley 1962 PHYSIOLOGICAL AND MECHANICAL RESPONSE OF THE HUMAN TO LONGITUDINAL WHOLE-BODY VIBRATION AS DETERMINED BY SUBJECTIVE RESPONSE. (Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio) Final Report. MRL-TDR-62-66. June 1962. ASTIA AD 288877

ABSTRACT: The production of symptoms in specific body regions to whole-body vibrations is dependent upon physiological alterations resulting from the mechanical stimulation of various organ-tissue complexes of the body.

We investigated subjective response to gain an insight into the mechanical properties of the body. Fifteen subjects experienced with whole-body vibrations were included in a two-phase study in an attempt to measure qualitatively subjective response to longitudinal vibrations from 1 to 20 cps in a sitting position. In the first phase the complexity of body response to whole-body vibration was demonstrated since the subjects usually experienced several symptoms for each frequency tested. The second phase suggested that the sensations were resonance-dependent. Mechanical and physiological responses were correlated. (Author)

582

Mahaffey, P.T. and K.W. Smith 1960 A METHOD FOR PREDICTING ENVIRONMENTAL VIBRATION LEVELS IN JET-POWERED VEHICLES
(Paper, 28th Symposium on Shock, Vibration and Associated Environments, The Departmental and Commerce Auditoriums, Washington, D.C., February 9-11, 1960) Published in ASTIA AD 244 857

ABSTRACT: A method for predicting environmental vibration levels for jet-powered vehicles is described. A quantitative relationship is determined between structural vibration and acoustic noise level on the external super of a structure by statistical analysis of measured data. Comparisons of measured and predicted levels are shown.

583

Mahone, Richard M & Arthur E. Hirsch 1962 BIBLIOGRAPHY ON THE EFFECTS OF SHOCK AND VIBRATION ON MEN
(David Taylor Model Basin, Department of the Navy, Washington 7, D.C.) Structural Mechanics Laboratory Technical Note No. SML-740-8 Jan. 1962

584

Mains, R.M. 1960 INTRODUCTION TO SHOCK AND VIBRATION SIMULATION
(Paper, 28th Symposium on Shock, Vibration and Associated Environments, The Departmental and Commerce Auditoriums, Washington, D.C., February 9-11, 1960) Published in ASTIA AD 244 857

ABSTRACT: Shock and vibration testing or simulation are essential for demonstrating what improvements can be or have been made in the design, for determining the adequacy and acceptability of the design, and for controlling the quality of the product. These various functions of testing or simulation are discussed in this paper.

585

Mains, R. M. 1961 SIMULATION OF SHOCK AND VIBRATION ENVIRONMENTS. In 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D. C. (Mt. Prospect, Ill.: Institute of Environmental Sciences, P. O. Box 191) pp. 39-52

586

Malcik, V. 1961 OTAZKY KOSMICKEHO LEKARSTVI (Problems of Space Medicine) Tvorba (Prague) 26(17): 387-388, April 27, 1961 (In Czech.)
See also: U.S. Joint Publ. Research Service, Washington, D.C., Trans. No. 4717 (1842-S), June 22, 1961

ABSTRACT: This is a review of the physiological problems encountered in space flight. A rotating anti-g capsule may be installed in the space ship in order to keep the astronaut transverse to the direction of acceleration. Although weightlessness does not affect vital functions, it does affect coordination and orientation in space. Vibration is another problem encountered in space flights. Vibrations of high amplitude cause general fatigue and disturb the nervous system, vision, and hearing. The cabin atmosphere may be composed of 60% oxygen, 20% helium, and 20% nitrogen. If so, the high oxygen content and helium will avert some of the consequences of explosive decompression by reduction of cabin pressure.

587

Mandel, M.J. 1962 EFFECT OF SINUSOIDAL VERTICAL VIBRATION ON THE URINARY SEDIMENT IN MAN. (Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio) Final Report. MRL-TDR-62-63, June 1962. ASTIA AD 283 844

ABSTRACT: Experiments were conducted to determine whether sinusoidal, low frequency vertical vibration for 1 minute at subjective tolerance levels could produce renal damage. Two groups of vibrated sitting subjects (frequency 4 to 9 cps) were compared to a control group which had never been exposed to vibration experiments. One group had long experience, varying from 6 months to 2 years, with experimental sinusoidal vibration at subjective tolerance levels. The other group was experiencing its first shake at high levels (near subjective tolerance). No difference could be detected in the urinary sediment between the two experimental groups or between the vibrated groups and the control subjects. Although the data does not indicate renal damage, it might have occurred if the vibrations had been continued for a longer time period.

588

Mandel, M. J. & R. D. Lowry 1962 ONE-MINUTE TOLERANCE IN MAN TO VERTICAL SINUSOIDAL VIBRATION IN THE SITTING POSITION. (6570th Aerospace Medical Research Lab., Aerospace Medical Division, Wright-Patterson AFB, Ohio) AMRL-TDR-62-121, Oct. 1962. ASTIA AD 292 704.

ABSTRACT: One-minute subjective tolerance in man to sinusoidal vertical vibration was determined in the sitting position. In comparing the data to previously published information, we noted that, although the new levels were higher, the contour of the curve remained unchanged. The reasons for this difference, as well as specific subjective complaints leading to tolerance, are presented and discussed. (ASTIA)

589

Mandel, M. J. 1962 EFFECT OF ANGIOTENSIN INFUSION ON REGIONAL BLOOD FLOW AND REGIONAL VASCULAR RESISTANCE IN THE RAT (Doctoral Dissertation, Ohio State University) December 1962

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Mandel, M. J. and L. A Sapirstein 1962 EFFECT OF ANGIOTENSIN INFUSION ON REGIONAL BLOOD FLOW AND REGIONAL VASCULAR RESISTANCE IN THE RAT Circulation Research 10: 806, 1962

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Mandel, M. J. 1963 SHORT-TIME TOLERANCE AND PULSE RESPONSE IN MAN TO SINUSOIDAL VIBRATION IN THE SEMI-SUPINE POSITION IN X, Y, AND Z AXES. (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 28 - May 2, 1963)

ABSTRACT: Short time subjective tolerance in man in the semi-supine position was determined to ascertain whether this position, best for sustained linear acceleration, was also best for vibration. Thirty male volunteer subjects were exposed to subjective tolerance vibration levels in the 3-20 cps range, utilizing a Western Gear mechanical shake table capable of either vertical or horizontal oscillation. The subjects were positioned so that the vertical direction represented the X axis (front to back). Short time tolerance levels for both the head and body were investigated in the X, Y and Z axes, and the results compared to one-minute body tolerance to vertical sinusoidal vibration in the sitting position. Although the Y and Z axes closely parallel each other with regard to both g tolerance and subjective complaints, the X axis was uniquely different. The g tolerance in the X axis had a very slow rise with increasing frequency unlike the hyperbolic contour seen in the Y and Z axes. Moreover, the X axis, chest pain and inspiratory dyspnea were the most singular tolerance limiting factors in all but one subject regardless of frequency. The pulse rate response monitored by ECG was quite uniform regardless of body position or shake-axis, exhibiting the usual response seen with exercise. Comparison of the results with those seen in the sitting position indicate that the semi-supine position is probably not the best one for vibration.

592

Mandel, M. J. 1963 SHORT-TIME TOLERANCE AND PULSE RESPONSE IN MAN TO SINUSOIDAL VIBRATION IN THE SEMI-SUPINE POSITION IN X, Y, AND Z AXES. (Wright-Patterson AFB, Ohio). Rept. No. AMRL-TDR-62-122, Oct. 1962.

ABSTRACT: Short time subjective tolerance in man in the semi-supine position was determined to ascertain whether this position, best for sustained linear acceleration, was also best for vibration. Thirty male volunteer subjects were exposed to subjective tolerance vibration levels in the 3-20 cps range, utilizing a Western Gear mechanical shake table capable of either vertical or horizontal oscillation. The subjects were positioned so that the vertical direction represented the X axis (front to back). Short time tolerance levels for both the head and body were investigated in the X, Y and Z axes, and the results compared to one-minute body tolerance to vertical sinusoidal vibration in the sitting position. Although the Y and Z axes closely parallel each other with regard to both g tolerances and subjective complaints, the X axis was uniquely different. The g tolerance in the X axis had a very slow rise with increasing frequency unlike the hyperbolic contour seen in the Y and Z axes. Moreover, the X axis, chest pain and inspiratory dyspnea were the most singular tolerance limiting factors in all but one subject regardless of frequency. The pulse rate response monitored by ECG was quite uniform, regardless of body position or shake-axis, exhibiting the usual response seen with exercise. Comparison of the results with those seen in the sitting position indicate that the semi-supine position is probably not the best one for vibration. (Aerospace Medicine 34(3):260-261, March 1963)

593

Mangelsdorf, J.E. 1959 LOGISTIC SUPPORT TO MAN'S ECOLOGY IN SPACE Mechanical Engineering 81:79, July 1959

ABSTRACT: This paper discusses the ecological elements with which the system must provide the satellite crew. Provision for potable water and nutriment and means of ingestion; gases for breathing; disposal of body wastes; protection from thermal, noise, radiation, psychological and G-stresses are treated in some detail. It is shown that the solution of the problem of man's ecology in space requires talent from a number of technical areas. The author briefly examines the Lockheed ecological model, first as a means of illustrating man's metabolic exchange, and second, as a tool for solving some of the problems of designing for long-endurance, manned satellites.

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Manley, R. G. 1943 PENDULUM-TYPE VIBRATION ABSORBERS. J. aeronaut. Sci. 10:38, 1943.

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Marcus, Henri; James E. Walsh; L.P. Clark et al 1948 SHOCK AND VIBRATION BULLETIN NO. 7
(Office of Naval Research, Naval Research Lab., Washington, D.C.) NRL Rept. No. S-3229 ASTIA ATI 75 153

ABSTRACT: The eighth symposium on shock and vibration was held at Naval Research Laboratory. Papers presented were concerned with the effect of shock and vibration on structures, vibration problems of aircraft, theoretical and experimental research on flutter in aircraft, photoviscous flow channel, static stress in aircraft structures, the measurement of mechanical transients following landing impact of a model airplane, ejection of pilots from aircraft, and the measurement of forces acting on the pilot during crash landing.

596

Markarian, S.S. 1959 O VLIIANII VIBRATSII NA LORORGANY.
(The Effect of Vibrations on the Ear-Nose- and Throat Organs.)
Voennomeditsinskii Zhurnal (Moscow)(4): 70-74, April 1959

ABSTRACT: Five series of experiments were conducted with 14 male subjects, 22-35 years of age using the following parameters of vibration, characteristic of certain types of aircraft: (1) Frequency 10 cps, amplitude 1.8 mm; (2) Frequency 40 cps, amplitude 0.8mm; (3) 40 cps, amplitude 1.6 mm; (4) 10 cps, 2.4 mm; and (5) 70 cps, 0.4 mm. The exposure in the first three series lasted 4-hours; in the last two series 8-hours. A predominantly high-frequency noise in the intensity range of 105-110 db was added in the first and second series for 6 subjects. The function of the sound analysor was examined by audiometry before the start of vibrations, five or ten minutes after vibrations, and an hour after the vibration was discontinued. The function of the vestibular analysor was investigation by means of electric rotary chair before, during, and after vibrations. Vibration in the parameters studied unassociated with noise does not produce any changes in the function of the vestibular or cardiovascular system. Vibrations of a frequency of 70 cps, amplitude 0.4 mm and above produce hearing changes in presence of noise of 105-110 db. It is concluded that vibration in combination with noise within the limits indicated is not physiologically permissible.

597

Marko, A.R. 1959 OPTIC-MICROSCOPIC REGISTRATION OF MICROVIBRATION OF THE HUMAN BODY. Mikroskopie, 14:102-5, July 1959

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Marko, A.R., M.A. McLennan, E.G. Correll 1962 A SOLID STATE MEASURING DEVICE FOR GALVANIC SKIN RESPONSE
(6570th Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio)
TDR No. AMRL-TDR-62-117 ASTIA AD 292 690

ABSTRACT: The problem of monitoring galvanic skin resistance, especially when used in combination with electrocardiographic or electroencephalographic recordings is discussed. A new approach is outlined that eliminates interference from other measurements. A small, lightweight laboratory model has been built that has low power consumption and is insensitive to vibration and acceleration forces. The performance, stability, and accuracy of the model is equivalent to larger, more conventional instruments used for the same purpose.

599

Marshall, G. S. 1933 THE PHYSIOLOGICAL LIMITATIONS OF FLYING.
J. Royal Aero. Soc. 37:389-410
See also Flight 25:99-100

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Martin Co., Denver, Colo. 1961 MTSS. GENERAL HUMAN FACTORS CONSIDERATIONS. VOLUME III.
(Aeronautical Systems Division, Wright-Patterson AFB, Ohio) ASD-CR-61-14, ASD-TR-61-211, July 1961 ASTIA AD 273 005L

ABSTRACT: Contents include material in the following subjects:
Acceleration
Weightlessness
Artificial Gravity
Labyrinthine Sensitivity in Space Flight
Vibration
Summary of Vibration Test Results
Summary of Literature Surveyed

601

Matthews, R.H.C. 1945 HUMAN LIMITS IN FLIGHT
(Smithsonian Institute, Washington, D.C.) Publication 3785

ABSTRACT: A modern aircraft will climb in a few minutes to heights at which the air is so thin that will no longer support life. It can turn and maneuver so fast that pilot may easily be rendered unconscious from the mechanical

forces which it imposes on his body, and in an aircraft which is moving rapidly in three planes of space the pilot can be subjected to stresses beyond the limits which the human body can stand. Besides the stresses from wind pressure, cold, vibration, and noise, the pilots body must also be protected from other less obvious stresses. The two greatest stresses which an aircraft puts upon the pilot and those reviewed in this publication are those stresses due to acceleration and those due to high flying in the rarefied air of the upper atmosphere.

602

Mayo, A.M. 1951 BASIC ENVIRONMENTAL PROBLEMS RELATING TO MAN IN THE "AEROPAUSE" AS SEEN BY A AERONAUTICAL ENGINEER
(Douglas Aircraft Co., Inc., El Segundo, Calif.) Nov. 6, 1951 ASTIA AD 87 435

ABSTRACT: While many new factors and principles must be considered in design for flight in the AEROPAUSE, emphasis on the cardinal principles of working toward the optimum pilot-airplane combination, will probably pay the greatest total dividend in operational efficiency. This principle can best be approached by making use of the best available aeromedical and engineering data, in order to arrive at workable compromises in each. Some of the new problems will radically affect some of the equipment associated with the airplane.

New problems include those of fit and arrangement of the aircraft cabin, time-distance factor, temperature of the aircraft, pressure environment in the cabin, acceleration, noise and vibration and the escape problem.

603

Mayo, A. M. 1952 BASIC ENVIRONMENTAL PROBLEMS RELATING MAN AND THE AEROPAUSE AS VISUALIZED BY THE AERONAUTICAL ENGINEER. In White, C. S., & O. O. Benson, Jr., eds., Physics and Medicine of the Upper Atmosphere, A Study of the Aeropause (Albuquerque, N. Mex.: University of New Mexico Press, 1952) pp. 6-22

ABSTRACT: Flight in the aeropause will impose great physiological and psychological demands on pilot and crew. The rapid advances in aircraft construction call for a corresponding step-up in education and training. The human factor should, on the other hand, be considered in the design of equipment and instrumentation. The latter should be reduced to the absolute essentials. Further clarification of the visual effects of reduced light dispersion is required. The reduction of the time-distance factor in high-speed flight will put more reliance on automatic control mechanisms, confining the human element to slow-rate monitoring operations. Temperature regulation systems will have to be adapted to the increasing speeds (a chart indicating various cooling systems practicable at the various speed ranges is presented). Problems concerning pressurization, physiological effects of acceleration, of noise, and vibration are discussed. Brief sections are dedicated to radiation and meteor hazards. General principles of escape mechanisms are analyzed. In conclusion it is recognized that a compromising formula is to be worked out to balance all factors involved and keep the resulting costs at a minimum.

604

Mayo, A.M. 1959 SOME SURVIVAL ASPECTS OF SPACE TRAVEL
Electronic Ind. Feb. 1959 Pp. 60-63

ABSTRACT: Discussion of the need for highly reliable and accurate high-speed automatic control systems. Various environmental problems, such as exposure to cosmic radiation meteorites and temperature, and high acceleration rates are discussed.

605

Megel, H & F.M. Keating 1961 EFFECT OF ELEVATED AMBIENT TEMPERATURE AND VIBRATION UPON THE RECTAL TEMPERATURE OF THE RESTRAINED RAT. (Paper, 32nd Annual Meeting, Aerospace Medical Association, Chicago, Ill. 24-27 April 1961)

ABSTRACT: Restrained male rats (140-160 grams) of a Sprague-Dawley strain were exposed to non-lethal elevated ambient temperatures and to vibration. Ambient temperature, vibrational frequency, and duration of exposure were kept constant. The vibrational amplitudes were varied. Rectal temperature of the animals was measured using a thermistor probe. Restrained animals were subjected to varying vibrational displacements (0.0", 0.100", 0.210", and 0.320" double amplitude) keeping frequency (30 cps) and temperature 110° F. (43.4°C.) constant. The rectal temperatures of the animals following a 20 minutes exposure were +3.1° F., +4.7°F., +6.1° F., and +7.8° F., respectively. The incidence of lethality for these animals up to 24 hours following exposure was 0, 10, 25, and 75 per cent, respectively. The experiment was repeated at a different frequency. Varying the vibration displacement was repeated at a different frequency. Varying the vibration displacements (0.0", 0.050", 0.075", and 0.100" double amplitude) and maintaining the frequency (60cps) and temperature 110° F. (43.4° C.) constant resulted in an increase in rectal temperature of +3.1° F., +6.4° F., +14.9° F., respectively. The incidences of lethality up to 24 hours following exposure were 0, 24, 42, and 100 per cent, respectively. At both frequencies, the rise in rectal temperature was correlated with the increase in acceleratory force. In order to determine the mechanism underlying the nature of rectal temperature response to increasing acceleratory forces, animals were sacrificed by exposure to ether anesthesia and immediately vibrated at varying displacements (0.0", 0.050 ", 0.075", and 0.100" double amplitude) keeping frequency (60 cps) and ambient temperature 110° F. (43.4° C.) constant. This particular set of conditions was chosen because the differential in rectal temperature of the live animals was greater with increasing vibratory amplitudes. Following the 20 minute period of exposure, the rectal temperature of the dead animals were +2.0° F., +7.9° F., +9.8° F., and +13.7° F., respectively. The rectal temperatures of the dead animals were not significantly different from those of the live animals exposed to the identical stress conditions. Mechanisms by which elevated rectal temperatures result from exposure to increasing acceleratory forces may possibly be that vibratory energy is translated into heat energy an/or vibration facilitates transfer of heat from the environment into the animal. Although the rectal temperatures of the animals were not significantly different from those of the live animals exposed to the same environmental conditions, metabolism and heat transfer mechanisms available to the live animals cannot be disregarded.

606

Megel, H., F.M. Keating, and J.A. Stern. 1961 EFFECT OF ELEVATED AMBIENT TEMPERATURE AND VIBRATION UPON THE RECTAL TEMPERATURE OF THE RESTRAINED RAT. Aerospace Med. 32 (12): 1135-1139

ABSTRACT: Restrained male rats (140-160 gm) were exposed to non-lethal ambient temperature and to vibration (110F°, 30 and 60 cps, 10, 15, and 20 g). Ambient temperature, vibrational frequency, and duration of exposure were kept constant. It was noted that the rectal temperatures of the animals rose in proportion to increased acceleration. Possible mechanisms in the production and retention of heat by the animals are discussed.

607

Megel, H, H. Wozniak, E.L. Frazier & H.C. Mason 1962 EFFECT OF ALTITUDE UPON TOLERANCE TO VIBRATION STRESS
Paper: 33rd Annual Meeting of the Aerospace Medical Association, Chalfonte-Haddon Hall, Atlantic City, N.J., April 9-12, 1962

ABSTRACT: Restrained adult male rats of a Sprague-Dawley strain were exposed to a constant vibration stress (60 cps-15 g) at varying altitudes. Using lethality as an index of tolerance, exposure of animals to vibration and altitudes less than 10,000 feet resulted in an incidence of lethality which did not differ from that observed for vibration alone. Above 10,000 feet, the per cent mortality increased as a function of altitude even though exposure to these altitudes per se were sub-lethal. It was demonstrated also that the increased lethality resulting from simultaneous exposure to the combined environments was caused by the reduced partial pressure of oxygen rather than the reduction in barometric pressure. Massive lung hemorrhage and severe intestinal damage were found in those animals succumbing to the combined environments. The possible causes for the enhanced mortality will be discussed.

608

Megel, H., H. Wozniak, E. Frazier and H.C. Mason 1963 EFFECT OF ALTITUDE UPON TOLERANCE OF RATS TO VIBRATION STRESS. Aerospace Medicine, 34(4): 319-321, April 1963

ABSTRACT: Restrained adult male rats of a Sprague-Dawley strain were exposed to sinusoidal or random vibration at varying simulated altitudes. Using mortality as the index of tolerance, exposure of animals to sinusoidal vibration and altitudes less than 10,000 feet resulted in incidences of mortality which did not differ from that observed for vibration at sea level. Above 10,000 feet, per cent mortality increased as a function of altitude. The increased mortality resulting from simultaneous exposure to the combined environments may be attributed to the effects of reduced partial pressure of oxygen. Exposure of restrained rats to the combined environments of random vibration and an altitude of 18,000 feet resulted in interaction with regard to mortality. Pulmonary hemorrage was found in those animals succumbing to the combined environments.

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Meister, F.I. 1937 A PHYSIOLOGICAL EVALUATION OF VIBRATION MEASUREMENTS Akust. Z. 2:1-10

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Meister, F. J. 1935 SENSITIVITY OF THE HUMAN BODY TO VIBRATIONS. (Made public by the Institute for Research on Noise and Warmth at Stuttgart Institute of Technology). See also Forschung (V. D. I. Berlin) 6:116-121, May-June, 1935.

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Meister, F. J. 1935 SENSITIVITY OF HUMAN BEINGS TO VIBRATION. Forschung (V.D.I. Berlin), 6:116-121, May-June, 1935.

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Melching, W. H. 1955 A SHOCK AVOIDANCE APPARATUS EMPLOYING AN INSTRUMENTAL MANIPULATORY RESPONSE. (USAF School of Aviation Medicine, Brooks AFB, Texas) Rept. 55-25, August 1955.

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Meltzer, S.J. 1900 EFFECT OF SHAKING UPON RED BLOOD CELLS. The Johns Hopkins Hosp. Reports 9:133-151

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Melville-Jones, G. 1960 A NOTE ON SOME HUMAN FACTORS IN HELICOPTER FLYING. (RAF, Institute of Aviation Medicine, Farnborough) FPRC Memo No. 142.

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Melvill-Jones, G., & D.H. Drazin 1961 OSCILLATORY MOTION IN FLIGHT. (RAF, Institute of Aviation Medicine, Farnborough) FPRC report 1168 July 1961.

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Mendelson, E. E., H. Conway, and J. R. Poppen 1947 CLINICAL SURVEY OF VIBRATORY INFLUENCE OF I-16 JET ENGINE ON MAN (Navy Dept. Bureau of Aero. Rept.) TED NAM AE-5090, December 11, 1947.

617

Mendes, M.F. 1952 FATORES QUE AFETAM AOS AVIADORES, DURANTE, O DESEMPHENHO DE SEUS DEVERES (Factors Which Affect Aviators During The Performance of Their Duties)
Revista Medica da aeronautica (Rio de Janeiro) 4(3): 5-18

ABSTRACT: The last decade witnessed the expansion of the literature of aviation medicine. The majority of pertinent studies centered around three physical phenomena: the density of air, the ambient temperature, and acceleration. The factors most likely to affect the pilot during flight, such as altitude, temperature, noise, light, position of the body in flight, diet, and fatigue are analyzed in some detail.

618

Mercier, A. 1948 L'INFLUENCE DES VIBRATIONS SUR LA VISION (The Influence of Vibration on Vision)
La Médecine Aéronautique 3(-6): 154-162; May-June 1948

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Mercier, A., G. Perdriel, and P. Ganas 1959 LA VISION DANS LE VOL A BASSE ALTITUDE ET A GRANDE VITESSE. (Vision In Low Altitude and High Speed Flying.) Médecine Aéronautique (Paris), 14: 15-24

ABSTRACT: From the 271 answers to a questionnaire sent to test, fighter, and reconnaissance pilots and to all-weather fighter navigators, the authors conclude that low-altitude, high speed flying does not precipitate a noticeable visual fatigue, but generates a nervous tension which, added to the effects of turbulence could impair the visual function. Vision is impaired by the increasing speed of scanning while sensory perception remains relatively slow. Reading the instrument panel or the map is almost impossible and the fatigue of accommodation is manifested, especially among radar navigators. Low-level obstacle jumping (impossible in jets) has no influence on vision. Detection and identification of an aircraft from a distance of 4.5 km is often difficult Goggles are easily fogged because of the elevated cabin temperature, and especially if the oxygen mask is improperly adjusted. Vibrations, although usually rare, affect vision and often cause flyers to return to higher altitudes. During night flying, watching the instruments impairs retinal adaptation and increases visual fatigue.

620

Mercier, A. & G. Perdriel 1962 LES PROBLEMES VISUELS DANS LE VOL A BASSE ALTITUDE (VISUAL PROBLEMS IN FLIGHT AT LOW ALTITUDE) in VISUAL PROBLEMS IN AVIATION MEDICINE (Advisory Group for Aeronautical Research and Development Paris (France), Oxford, N.Y.: Pergamon Press)

ABSTRACT: The importance, for combatants in general, and more particularly for aviators, to acquire and maintain a good night vision, has for a long time stimulated research towards improving it. Studies on the value of the morphoscopic night vision threshold, that is to say on the perception of shapes under reduced conditions of illumination, which seems to constitute the best standard for testing the practical value of an aviator's night vision have revealed that this threshold improves with the number of night flight hours. It was therefore logical to try to simulate the conditions of night flight in order to obtain such an improvement of night vision as a great number of night flight hours achieves, similarly to pilot training accomplished on the ground with a Link-trainer. The Rose and Flack device, modified and improved by Perdriel, has been used systematically for this purpose, according to a technique making it possible to achieve the successive stages of mesopic and scotopic vision and to demonstrate the possibilities as well as limitations of night vision, and the means to avoid them. An improvement by 18 percent of the value of the morphoscopic vision threshold after 8 training sessions has established the efficiency of this technique which permits checking, maintaining, and recovering a satisfactory night vision without resorting to the expensive and sometimes dangerous method of frequent night flights. (AUTHOR)

621

Methven, T. J., G. R. Allen & B. C. Short 1961 THE TRANSMISSION OF AIRCRAFT VIBRATION TO MAN-MOUNTED EQUIPMENT. (Royal Aircraft Establishment, Great Britain) Technical Note No. Mech. Eng. 334, June 1961. ASTIA Doc. No. AD-266 123.

ABSTRACT: The transmission of aircraft vibration to man-mounted functional equipment was investigated by laboratory tests on subjects in aircrew equipment assemblies and an ejection seat. Transmissibility/frequency curves were derived in the three cardinal directions for items in the head and trunk regions, and show that man-mounted equipment will be subjected to significant proportions, and in some cases amplifications, of aircraft vibration. In the vertical and fore and aft directions the curves approximate to those of a classical spring-type anti-vibration mounting system with viseous damping, a low natural frequency and negligible transmissibility above 30 cps. The results show a fair degree of correlation with limited measurements made of body vibration. (Author)

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Meyer-Delius, J. 1959 EFFECT OF SOUND ON MAN
(Trans. of ATZ (Automobiltechnische Zeitschrift) (Germany) 59(10):293-297, 1957)
(SLA Translations Center, Chicago, Ill.) 59-17398

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Michon, P. 1939 ON THE TIME OF VIBRATORY REACTIONS: TECHNIQUE, PHYSIOLOGICAL INFORMATION Compt. rend. soc. biol. 130:358-359

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Mikulinskii, A. M. & A. V. Krakovskii 1962 A METHOD FOR THE MEASUREMENT OF HIGH-FREQUENCY VIBRATIONS.
Gig Sanit. 27:55-57, Oct. 1962 (Russian)

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Milin, R. and O. Kosak. 1951 UTICAJ BUKE I POTRESA NA NADBUBREZNE ZLEZDE. (Effect of noise and vibration on the adrenal glands)
Med. pregled, Novi Sad. (9-10):120-130

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Miller, C. 1956 CONVAIR REPORT ON HUMAN CENTRIFUGE TEST. (Convair, San Diego, Calif.) Report 2C-8-033, 29 Oct 1956

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Miller, E. M. 1956 WINDOW INTO SPACE Air Force 39:43-46

ABSTRACT: Research in the field of space medicine conducted at the School of Aviation Medicine (SAM), Randolph AFB, Texas. Article also names some of the physicians and scientists working in SAM and its Dept. of Space Medicine, defines the school's mission and briefly traces SAM's history from its creation in 1918. For a report on man's probable reactions to space travel and equipment necessary to keep him alive in a space ship, see the author's recorded interview with J. G. Guame, M. D., and Capt. E. M. Roth, USAF(MC), titled "To Mars and Back - How Soon" ibid, pp 47-52.

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Miller, G.A., W.A. Rosenblith, R. Galambos, I.J. Hirsh and S.K. Hirsh 1950 A BIBLIOGRAPHY IN AUDITION (Psycho-Acoustic Lab., Cambridge 38, Mass.: Harvard University Press)

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Miller, H., M.B. Riley, S. Bondurant, & E.P. Hiatt 1958 THE DURATION OF TOLERANCE TO POSITIVE ACCELERATION. (Wright Air Development Center, Air Research and Development Command, Wright-Patterson AFB, Ohio) WADC TR 58-635, Nov. 1958. ASTIA AD 208 151.

ABSTRACT: Human tolerance to prolonged positive (headward) accelerations of sub-blackout magnitude was investigated in this study. The data indicate that man is able to withstand the forces of positive g for durations much longer than previously supposed. Exposures as long as an hour at 3.0 g appear well tolerated by most subjects. Except for moderate tachycardia no pathologic abnormalities were observed in the electrocardiographic tracings recorded continuously on all subjects. Explored were the durations of tolerance at g levels varying from 3.0 to 6.0 g. The effects of anti-g suits upon tolerance are also reported.

630

Miller, H., M. B. Riley, S. Bondurant, & E. P. Hiatt 1959 THE DURATION OF TOLERANCE TO POSITIVE ACCELERATION. Aerospace Med. 30(5):360-366, May 1959. See also (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 58-635; ASTIA AD-208 151.

ABSTRACT: Human tolerance to prolonged positive (headward) accelerations of sub-blackout magnitude was investigated in this study. The data indicate that man is able to withstand the forces of positive g for durations much longer than previously supposed. Exposures as long as an hour at 3.0 g appear well tolerated by most subjects. Except for moderate tachycardia no pathologic abnormalities were observed in the electrocardiographic tracings recorded continuously on all subjects. Explored were the durations of tolerance at g levels varying from 3.0 to 6.0 g. The effects of anti-g suits upon tolerance are also reported. (AUTHOR)

631

Miller, J. et al. 1953 A BIBLIOGRAPHY FOR THE DEVELOPMENT OF STRESS-SENSITIVE TESTS. (Psychological Research Associates, Washington, D.C.) PRB Technical Research Note 22, October 1953. ASTIA AD-41773.

ABSTRACT: The items in this bibliography have been selected and assembled

with view to providing a survey of the background material useful in the preparation of stress-sensitive tests. It contains a list of references cited by title only and abstracts of those references which were deemed most important and having the most direct bearing on the present research.

632

Miller, J.W., ed. 1962 VISUAL PROBLEMS OF SPACE TRAVEL
(National Academy of Sciences, National Research Council, Washington, D.C.)
June 18, 1962 ASTIA AD 276 513

ABSTRACT: The problems of space flight as they relate to the visual mechanism are discussed. Substantial portions of the Brown report are quoted in the present report. This report, in addition to updating the Brown report presents a considerable amount of additional information regarding specific critical visual problems, as well as a recently compiled, extensive bibliography of research in this field. (Author)

633

Miller, S. U., N. S. Namerow & P. G. Strauss 1960 A PRAGMATIC APPROACH TO BIO-INSTRUMENTATION
In Vistas in Astronautics--1960, Proceedings of Third AFOSR Astronautics Symposium, Los Angeles, Calif., October 12-14, 1960. (Society of Automotive Engineers, Inc., New York, New York) III, 95-102, Oct. 1960.

ABSTRACT: This paper discusses a number of problem areas associated with the abstraction of meaningful physiologic data from man and experimental animals under the actual or simulated conditions of space. The bioinstrumentation profiles essential to both current and future generations of space flight are considered. It is demonstrated that single measurements can at times be quite misleading, and tha, optimally, several carefully chosen nonredundant physiologic and environmental parameters should be monitored. The practicality of bioelectric devices is briefly discussed. (Tufts)

634

Miller, W. H. 1938 ANALYSIS OF THE AVIATION MEDICINE SITUATION AND RECOMMENDATIONS FOR A BUREAU PROGRAM. (Civil Aeronautics Authority, Washington, D. C.) Technical Development Rept. No. 9; Apr. 1938

SUMMARY: The purposes of the work reported herein are to conduct a survey of various research facilities adaptable to or engaged in a study of pilot fatigue

factors and outline a program of investigation. It was necessary to obtain information relative to existing or projected efforts of this nature as well as their state of attainment and desirability. Attention was given to the administration, personnel, and physical properties of many institutes and agencies. Conclusions have been reached and recommendations made for Bureau sponsorship of investigation in this field.
The main effort is toward the determination of effects of pressure changes and of anoxemia on human and animal physiology. Simulated and actual flying conditions are used to produce symptoms. Study is being made regarding centrifugal, centripetal, and gravitational forces and the resultant physiological alterations Some study has, in the past, been made regarding the effects of acceleration, deceleration, and gravitational forces. (CAA)

635

Milliron, J.R. 1960 SPACE ENVIRONMENTAL EFFECTS
In: Wright Air Development Ctr., Wright-Patterson AFB, Ohio, Proceedings of WADC Space Technology Lecture Series, Volume I Technical Areas. WADC TR 59-732, Pp. 61-74. ASTIA AD 235 424.

ABSTRACT: The environments described may occur individually or in combination, and certain combinations cause more significant effects than others. The effects are a function of many variables including the components, the characteristics of the component materials, and the environmental conditions. To achieve reliable performance the designers of systems will need to acquire an understanding of the associated environments and their combined effects. Test conditions should relate directly to the actual conditions encountered in space. (Author)

636

Minecki, L. 1962 BIOLOGICAL EFFECTS OF VIBRATIONS.
Med. Pracy. 13:355-369, 1962 (Pol)

637

Ministry of Aviation 1962 A BIBLIOGRAPHY ON AIRCRAFT NOISE. SUPPLEMENT NO. 7. (Ministry of Aviation, Gt. Brit.) Rpt. no. TIL/BIB/11, ASTIA AD-286 437, July 1962

638

Ministry of Supply 1955 PERSONNEL RESEARCH: A BIBLIOGRAPHY OF UNPUBLISHED REFERENCES. PART I. HUMAN ENGINEERING. PART II. HEALTH AND SAFETY. (Ministry of Supply, Gt. Brit.) Report No. TIB/BIB(U)3, pt 1 and 2, April 1955 ASTIA AD 84 989.

639

Minoguchi, G. 1940 EFFECTS OF ULTRASONIC WAVES ON RABBIT Acta Schol. Med. Univ. Imp. Kioto 23:250-284

640

Misrahy, G. A., W. J. Gannon, & K. M. Hildreth 1958 EFFECTS OF LOUD SOUNDS ON THE EEG AND EVOKED POTENTIALS IN RABBITS (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 57-453; ASTIA AD-130 935; May 1958

ABSTRACT: Young rabbits were subjected to 1000 cps tones ranging in intensity from 100 to 130 db. Normal patterns of EEG and evoked potentials are presented and discussed as well as changes produced during sound stimulation. The latter consists of a flattening of the EEG with increased fast activity and a diminution of the amplitude of the various components of the evoked potential. Chlorpromazine hastened the return to normal of the EEG and evoked potential.

641

Misrahy, G. A., E. W. Shinabarger, & J. E. Arnold 1958 CHANGES IN COCHLEAR ENDOLYMPHATIC OXYGEN AVAILABILITY, ACTION POTENTIAL, AND MICROPHONICS DURING AND FOLLOWING ASPHYXIA, HYPOXIA, AND EXPOSURE TO LOUD SOUNDS. J. Acoustical Society of America 30(8):701-704, Aug. 1958

642

Mitchell, B. R., & A. T. Bernardini 1959 ANIMAL AND HUMAN STUDIES OF THE EFFECTS OF LOW-FREQUENCY OSCILLATION COMBINED WITH TRANSVERSE ACCELERATION. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 59-92.

643

Modignani, L., L. Renato, B. D. Blivaiss, and E.G. Magid 1962 EFFECT OF ALL BODY VIBRATION ON PLASMATIC AND URINARY CORTICOSTEROID LEVELS In Proceedings of International Congress on Hormonal Steroids, Milano, Italy, May 1962.

644

Moffitt, O. P., J. Tonndorf, and E. Guild 1948 THE VESTIBULAR APPARATUS. PHYSIOLOGY AND APPLICATION TO AVIATION MEDICINE (USAF School of Aviation Medicine, Randolph AFB, Texas) Dec. 1948.

645

Molloy, C. T. 1958 SOLUTIONS TO VIBRATION PROBLEMS ARE EASY TO FIND USING 4-POLE PARAMETERS.
S.A.E. Journal 66(11):62-65, Pt. 2

ABSTRACT: "Four-Pole Parameters" is an analytical technique which simplifies the solution of complicated mechanical vibration problems. Complex problems are broken up into a series of small ones; then the small problems are solved and the results combined to produce the desired answers. Not only does this technique simplify a problem but in addition the solutions to the "small problems" can be used over and over again in other complex problems. This paper presents an outline of the four-pole theory. This is the first time a concerted effort has been made to apply them to mechanical problems. The range of mechanical problems that yield to four-pole analysis includes all linear systems and in the future it may be possible to extend the theory to some non-linear cases.

646

Monroe, J. 1961 A PROBLEM OF SINUSOIDAL VS. RANDOM VIBRATION
In 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D. C. (Mt. Prospect, Ill.: Institute of Environmental Sciences, P. O. Box 191) pp. 571-576

CONCLUSIONS: Of interest to those perplexed by the question of sinusoidal vs. random testing is the fact that this program pointed out an area in which random testing succeeded whereas sinusoidal techniques failed. A procedure has been derived for obtaining a random test - which need not be white noise - calculated to produce the same performance characteristics as did the service environment. This equivalence is obtained in spite of the fact that the service environment was known only in sinusoidal parameters. The equivalent test was verified by obtaining laboratory results comparing very well with service results.
The random vibration test is currently in use for assuring the quality of production hardware and has proven to be a useful tool in improving the service reliability of the equipment. (AUTHOR)

647

Montgomery, Jr., A.V. 1962 EFFECT OF SPACE ON MAN
In: National Symposium on Effects of Space Environment on Materials, St. Louis, May 7, 8, and 9, 1962 (St. Louis McDonnel Aircraft Corporation)

ABSTRACT: A few principles involved in the definition of a spacecraft environment are outlined and exemplified. These principles involve individual variations, duration of stimulus, discrete range of acceptability, and interactive effects between simultaneously applied environmental factors. (Author)

648

Moore, F. L. 1952 NEW DITCHING SURVIVAL PLAN URGED. Aviation Week 56: 84-86, 12 May 1952.

ABSTRACT: New equipment for passenger survival after water landings may result from evidence CAB collected from survivors of a DC-4, "ditching" off Sand Spit Airport B. C. Basic assumptions as to what passengers and crew could do within the minute or two the plane floated after landing on water, are given, but only two of six water landings since 1949 have been successful. Recommendations are given for survival and a description of the accident at Sand Spit is given, when an engine quit on a DC-4, whereby the crew and 33 passengers died, after the pilot tried to make a landing on the airfield and turned off the runway into the water.

649

Moralevich, A. 1960 ANIMAL ASTRONAUTS
Komsomol'skaya pravda P. 4; 6 July 1960.

650

Morgan, R. L., & G. A. Eckstrand 1953 EFFECTS OF A CHANGED ENVIRONMENTAL CONTENT UPON PERFORMANCE OF A TRACKING TASK. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 53-235; Oct. 1953

ABSTRACT: To study the effect of environmental content on transfer of training, two groups of 20 male subjects kept movable cross hairs centered on a spot with a control stick in a simulated cockpit. One group practised in a complex situation, (enclosed cockpit, red panel lights, helmet, engine noise, vibration, etc.) the other in a simplex situation (open cockpit, ambient illumination, no helmet, no noise, no vibration). A week later, both groups practised in the complex situation. Tracking accuracy under final conditions is interpreted regarding degree of realism required in training simulators. (NTDC)

651

Morin, L. 1961 LA PHYSIOLOGIE DE L'ESPACE (THE PHYSIOLOGY OF SPACE)
Laval medical (Montreal) 32(2): 161-177, Sept. 1961, in French

ABSTRACT: This is a review of the physiological effects and ecological problems of space flight. The astronaut will be subjected to acceleration, deceleration, weightlessness, vibration, noise, monotony, extreme temperatures, and the danger of meteorites and radiations.

652

Morozov, V.P. 1960 THE ROLE OF VIBRATION SENSATION IN REGULATION OF VOCAL FUNCTION OF MAN (O roli vibratsionnogo chuvstva v regulirovani golosovoi funktsii cheloveka). Vestnik leningradskogo universiteta (Leningrad), 15(3) : 174- 178

ABSTRACT: The accuracy of vocal reproduction of the duration of a given tone was studied by a special voice-recording apparatus under normal conditions, in noise, and in noise with artificial vibratory feed-back applied to the hand surface. The accuracy of vocal response is considerably reduced by noise as it interferes with the acoustic feedback. It is, however, restored to a great extent by the vibratory feedback of the subject's own vocal activity to the skin. Since vocalization under normal conditions is accompanied by strong vibratory stimulation of natural origin (vibration of vocal cords, resonance, et cetera), the sensation of vibrations by ear and muscle receptors is important in the regulation of the vocal function in speech and singing.

653

Morris, G.J., & J.W. Stickle 1960 RESPONSE OF A LIGHT AIRPLANE TO ROUGHNESS OF UNPAVED RUNWAYS. (National Aeronautics and Space Administration, Washington, D.C.) NASA Technical Note D-510, Sept. 1960. ASTIA AD 241 933

ABSTRACT: The response of a light liaison-type airplane to roughness of unpaved runways was studied by measuring center-of-gravity acceleration as the airplane was taxied at constant speeds over two grass runways and a concrete taxiway. The results are presented in the form of acceleration distributions, acceleration power spectra, transfer functions, and average peak accelerations as functions of taxiing speed. Measurements from elevation profile surveys of the runways and taxiway are presented in the form of elevation profiles and power spectra. (Author)

654

Moskal, B. 1961 PROBLEMS IN ACOUSTICAL ENVIRONMENTAL SIMULATION (Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D. C.; Paper not available for publication)

655

Mozell, M. M. and D, C. White 1958 BEHAVIORAL EFFECTS OF WHOLE BODY VIBRATION
(U.S. Naval Air Development Center, Johnsville, Pennsylvania)
NADC-MA-5802 January 28, 1958 ASTIA AD 156 470

ABSTRACT: A study was made of the effect of whole body vibration on the ability of humans to read the digits of an aircraft mileage indicator and their ability to do a tracking task which simulated the control of an

aircraft. Vertical sinusoidal vibration of frequencies ranging between 0 and 50 cycles per second (cps) with amplitudes of 0.05, 0.1, and 0.16-inch double amplitude were used. It is concluded that increasing the frequency of vibration above 8 cps has an increasingly detrimental effect on visual performance. This effect reaches a maximum between 40 and 50 cps. The increase of amplitude of vibration from 0.05 to 0.1-inch double amplitude has no effect upon visual performance. Therefore, a case was made for using frequency and amplitude rather than G as vibration coordinates. It is further concluded that vibration, within the limits of the experiment, has little effect upon tracking ability.

656

Mozell, M. M. and D. C. White 1958 BEHAVIORAL EFFECTS OF WHOLE BODY VIBRATION
J. of Aviation Medicine 29(10):716-724, October 1958

ABSTRACT: A study was made of the effect of whole body vibration on the ability of humans to read the digits of an aircraft mileage indicator and their ability to do a tracking task which simulated the control of an aircraft. Vertical sinusoidal vibration of frequencies ranging between 0 and 50 cps with amplitudes of 0.05, 0.1, and 0.16-inch double amplitude were used. It is concluded that increasing the frequency of vibration above 8 cps has an increasingly detrimental effect on visual performance. This effect reaches a mixiмum between 40 and 50 cps. The increase of amplitude of vibration from 0.05 to 0.1-inch double amplitude has no effect upon visual performance. A case was made for using frequency and amplitude rather than G as vibration co-ordinates. It is concluded that vibration, within the limits of the experiment, has little effect upon tracking ability.

657

Müller, B. 1956 FLUGMEDIZINE: KOMPENDIUM DER LUFTFAHRTMEDIZIN (Aviation Medicine: Compendium of Aviation Medicine)
(Dusseldorf: Droste, 1956) Nordrhein-Westfalen. Ministerium fur Wirtschaft und Verkehr. Verkehrswissenschaftliche Veroffentlichungen. Heft 34.

ABSTRACT: This monograph surveys the field of aviation medicine and is intended for use by medical students, students of aerotechnology, physicians, engineers, and fliers interested in aeromedical problems. The chapters deal with the historical development of aviation and aviation medicine, high-altitude flight and the effects of altitude, acceleration and centrifugal forces, motion sickness, sensory organs and sensory illusions in flight, orientation as to the position in space and movement, psychophysiology of fliers, flight hygiene, flight accidents, physical and psychological examinations of fliers, flying fatigue -- symptoms and therapy, and some problems of space medicine.

658

Muller, E. A. 1938 DIE WIRKUNG SINUSFÖRMIGER VERTIKALSCHWINGUNGEN AUF DEN SITZENDEN UND STEHENDEN MENSCHEN. (The Effect of Sinusoidal Vertical Vibration on the Seated and Standing Man.)
Arbeitsphysiologie 9(10):459-476

659

Mullinger, D.E. 1961 THE DEVELOPMENT OF A RANDOM MOTION VIBRATION SYSTEM. (Royal Aircraft Establishment, Gt. Brit.) Technical note no. GW 571; ASTIA AD- 259 789 ; April 1961

ABSTRACT: Development is described of an equipment intended for studies in random motion within the frequency range 30 c/s to 5 Kc/s. The statistical properties of random noise are summarised, as are the reasons for the choice of the equipment. A moving-coil vibrator of 500 lb rms thrust was used, and the main task was to obtain a flat frequency response from the system, using electrical correcting networks. Originally multiple band-pass filters were provided for equalising and spectrum shaping, but these were found to be unacceptable as the mixing of coherent signals could produce de-randomisation. The equalising method adopted uses notch and step filters and gives satisfactory results. A further problem was to obtain a stable mechanical response, and this involved a structural modification to the vibrator. A simple method of shaping noise spectra was evolved which is particularly suitable for vibration testing. It is concluded that the adaptation of a vibration system for random motion can be a simple process if the vibrator characteristics are satisfactory. (Author)

660

Mulwert, E., T. Schultes and H. Schultes 1942 A DEVICE FOR TREATING MATERIALS AND ANIMALS WITH ULTRASONIC WAVES FOR THE PURPOSE OF INDUCING CHEMICAL, BIOLOGICAL OR PHYSICAL EFFECTS Chem. Abstr. 36:939
See also: German Patent 703,884, 13 Feb. 1941

661

Myklestad, N. O. 1956 FUNDAMENTALS OF VIBRATION ANALYSIS
(New York: McGraw-Hill, 1956)

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662

Nadel, A.B. 1958 HUMAN FACTORS REQUIREMENTS OF A MANNED SPACE VEHICLE (General Electric Co., Santa Barbara, Calif.) Rept. RM 58TMP 10 April 1958

ABSTRACT: This report presents an analysis of human factors requirements of a manned space vehicle in light of present knowledge. One section deals with the physical environment of the operator, covering the effects of physical stimuli from space external to the craft, their possible effects on the operator and protective measures needed. Another section is concerned primarily with inputs from space received via the sensory system of the operator. Phenomena apprehended through the perceptual system are described together with their possible effects and practices recommended to avoid undesirable effects. The information processing function (information items needed, displays, and display-control relations) is discussed at length.

663

Nadel, A.B. 1959 SUPPORTING MAN IN SPACE: 1970-1975 (General Electric Co., Santa Barbara, Calif.) RM 59 TMP-85 Nov. 30, 1959

ABSTRACT: Reviews progress in space technology expected during the periods 1970-1975. Discusses requirements and capabilities in these areas: (1) the physical environment-atmosphere, gravitational forces, temperature and radia tion; and (2) acoustic noise and vibration

664

Nadel, A. B. 1959 AUDITORY NOISE AND VIBRATION PROBLEMS FOR MANNED SPACE VEHICLES. (Technical Military Planning Operation, General Electric Co. Santa Barbara, Calif.) Research Memo RM 59TMP-50, 20 Oct. 1959

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Naimark, G. M. 1951 BIBLIOGRAPHY ON SONIC AND ULTRA-SONIC VIBRATION: BIOLOGICAL, BIOCHEMICAL AND BIOPHYSICAL APPLICATIONS. Franklin Inst. J. 251:279-299, 402-408.

ABSTRACT: Includes 580 titles from 1900 to 1950.

666

Nefedov, P. 1960 THE PRIDE OF THE 20TH CENTURY Izvestiya P. 1; 24 August 1961

667

Neiswander, R.S. & H.T. Armstrong 1947 MOTION ASPECTS OF FLIGHT STIMULATION (Link Aviation Devices, Inc., Binghamton, New York) Eng. Rept. No. 164.233

668

Newcomer, E.H. and R.H. Wallace 1949 CHROMOSOMAL AND NUCLEAR ABERRATIONS INDUCED BY ULTRASONIC VIBRATIONS Am. J. Botany 36:230-236

669

Newman, E.B. 1955 PSYCHO-PHYSICAL EFFECTS OF NOISE (Psycho-Acoustic Lab., Harvard U., Cambridge, Mass.) Rept. No. PNR-176, 1955

670

Newman, R.P 1962 MULTI-RESONANCE RESPONSE TO SINE AND RANDOM VIBRATION (Institute of Environmental Sciences, Mt Prospect, Ill.) Reprint 62-561

ABSTRACT: The intent of this study is to consider the output response of a system of resonant components excited by three different types of vibration: (1) sine vibration (2) random vibration and,(3) controlled sine-spectrum (periodic vibration

The approach to this study was to construct a simple test system containing seven resonant components each component having its resonant frequency separated from all others such that harmonics from one component would not excite another. The test system was then subjected to sine vibration, random vibration, and controlled sine-spectrum(periodic) vibration. Comparisons of the time variant excitations of the seven resonant components subjected to the three different types of vibrations are presented and discussed.

671

Nickerson, J.L., G. Nemhauser, C. Gannon, J. Greenman, and R. Satzman. 1961 RESONANT FREQUENCIES ON INTERNAL BODY STRUCTURES. Fed. Proc. 20: 215

ABSTRACT: An X-ray kymograph has been devised which enables us to determine with high accuracy, the resonant frequencies and the amount of movement of internal organs under externally applied sinusoidal forces. Values for structures in the abdomen and the thorax are reported.

672

Nickerson, J. L., & R. R. Coermann 1962 INTERNAL BODY MOVEMENTS RESULTING FROM EXTERNALLY APPLIED SINUSOIDAL FORCES. (6570th Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio) AMRL-TDR-62-81; July 1962 Same as ASTIA AD-290 500

ABSTRACT: This report contains a description of an x-ray device designed to permit the observation of the movement of internal structures in the animal body subjected to sinusoidal oscillations. From the x-rays taken by this device, it has been possible to determine the resonance frequency and phase shift of regions within the abdomen and thorax set in motion by external oscillatory forces. The results of observations made on anesthetized dogs show that the visceral content of the abdomen and thorax appears to oscillate as a mass having a resonant frequency of 3 to 5 cycles per second and with damping of one-fifth to one-quarter of the critical value. (AUTHOR)

673

Niven, J. I. & W. C. Hixson 1961 FREQUENCY RESPONSE OF THE HUMAN SEMICIRCULAR CANALS: I. STEADY-STATE OCULAR NYSTAGMUS RESPONSE TO HIGH-LEVEL SINUSOIDAL ANGULAR ROTATIONS (USN School of Aviation Medicine, Pensacola Air Station, Fla. & National Aeronautics and Space Administration, Washington, D. C.) Proj. MR005.13 6001, Subtask 1, Rep. 58, March 1961.

ABSTRACT: The use of a transition technique for quantifying nystagmic response to semicircular canal stimulation by high level, sinusoidal angular accelerations is presented. The frequency response characteristics are evaluated from cornea-retinal potential recordings obtained at rotation frequencies from 0.02 to 0.20 cps with a constant peak acceleration of 40 degrees/sec.^{2}. Interpretation of the data is directed toward an analysis of the performance of the cupula-endolymph system, rather than a description of its physical characteristics. (Tufts)

674

Nixon, C. W. 1962 INFLUENCE OF SELECTED VIBRATION UPON SPEECH, I RANGE OF 10 CPS TO 50 CPS
In Journal of Auditory Research 2:247-266, 1962

675

Nixon, C.W. & H.C. Sommer 1963 INFLUENCE OF SELECTED VIBRATIONS UPON SPEECH (RANGE OF 2 CPS - 20 CPS AND RANDOM)
(Biophysics Lab., 6750th Aerospace Medical Division, Dayton, Ohio)
Tech. Doc. Rept. No. AMRL-TDR-63-49; Project No. 7231; Task 723103

ABSTRACT: Certain characteristics of speech are altered during low-frequency vibration of a talker. Therefore, adequate speech communication cannot be assured during vibration and buffeting associated with powered flight and reentry of space vehicles. In experiment I, seated talkers read standard speech material while being subjected to vertical, low-frequency sinusoidal vibrations. This speech was evaluated both objectively and subjectively in terms of intelligibility duration, and quality of speech. Vibration frequencies of 6 cps, 8 cps, and 10 cps were most detrimental to speech production. In experiment II, sitting talkers read material during random vibration (0.5 - 8 cps). No significant speech production differences were found. Speech may be adequate during the conditions represented in this study, however, when these conditions are exceeded a continuous speech communication capability may not exist

676

Nixon, C. W., & H. C. Sommer 1963 SPEECH IN VIBRATION ENVIRONS
(Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 29-May 2, 1963)

ABSTRACT: A capability ofr continuous speech communication from the space vehicle is a vital requirement in rocket-propelled, manned space flight. The influence of vibration and buffeting to be experienced during powered flight and re-entry upon the speech of space travelers is problematical for vehicles with the increased thrust of future propulsive systems. This communication problem is intensified by the high noise levels which accompany the transient low-frequency vibrations. Certain regions of the body structure most susceptible to low-frequency vibrations are regions also fundamental to normal speech production. This discussion describes research on man's ability to produce adequate speech during exposure to intense low-frequency vibrations. Talkers positioned on a Mercury space couch were exposed to three different modes of sinusoidal vibration along the x, y, and z axes at frequencies from 6 cps to 20 cps. Efficiency of the vibrated speech in quiet and in the presence of noise was evaluated by trained observers. Results indicate changes in intelligibility and other basic parameters of speech due to the vibration stimulus. These data are useful to assist in predicting man's ability to produce satisfactory speech communication during phases of space flight accompanied by low-frequency vibration

677

North American Aviation 1958 PROPOSAL FOR A STUDY OF HUMAN PERFORMANCE CAPABILITY UNDER SIMULATED AIRCRAFT FLIGHT BUFFETING CONDITIONS. (Columbus Division, North American Aviation Co.) NAA Rept. No. NA58H-427, Aug. 1958

678

Novikov, K. & B. Shchandronov 1960 ALTITUDE IS 450 km
Sovetskaya Rossiya P. 4; 20 May 1960

679

Novotny, S. and J. Uher 1959 OCCUPATIONAL TRAUMA BY PNEUMATIC TOOLS AS A CAUSE OF SPINAL LESIONS. Pracov Lek. 11:511-5, December 1959

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Oestreicher, H. L. 1950 A THEORY OF THE PROPAGATION OF MECHANICAL VIBRATIONS IN HUMAN AND ANIMAL TISSUE
(Air Development Center, Wright-Patterson AFB, Ohio)
AF Technical Rep. No. 6244, November 1950

681

Oestreicher, H. L. 1950 A THEORY OF THE PROPAGATION OF MECHANICAL VIBRATIONS IN HUMAN AND ANIMAL TISSUE. J. acoust. Soc. Amer. 22:682
See also WADC TR 6244

682

Oestreicher, H. L. 1951 FIELD AND IMPEDANCE OF AN OSCILLATING SPHERE IN A VISCO-ELASTIC MEDIUM WITH APPLICATIONS TO BIOPHYSICS
Journal of the Acoustical Society of America 23:707-714, 1951

683

Office of Naval Research 1955 SYMPOSIUM ON PHYSIOLOGICAL PSYCHOLOGY, SCHOOL OF AVIATION MEDICINE, U.S. NAVAL AIR STATION, PENSACOLA, FLORIDA, MARCH 10, 11, 1955, UNDER THE SPONSORSHIP OF PHYSIOLOGICAL PSYCHOLOGY BRANCH, PSYCHOLOGICAL SCIENCES DIVISION, OFFICE OF NAVAL RESEARCH.
(Office of Naval Research, Washington, D.C.) ONR Symposium rept. no. ACR-1; ASTIA AD 80 100.

684

Ogle, D.C. 1957 MAN IN SPACE VEHICLE
U.S. Armed Forces Med. J. 8(11): 1561-1570, Nov. 1957

ABSTRACT: This is a discussion of the physiological forces in man during a spaceflight. The author also comments on the hazards of the upper atmosphere

685

O'Hearne, C. S. 1961 STUDIES APPLICABLE TO THE EVALUATION OF THE EFFECT OF FASTENING LOOSENESS ON EQUIPMENT RESPONSE TO FOUNDATION OSCILLATIONS. In 1961 Proceedings of the Institute of Environmental Sciences National Meeting April 5, 6, 7, 1961, Washington, D. C. (Mt. Prospect, Ill.: Institute of Environmental Sciences, P. O. Box 191) pp. 585-594

CONCLUSIONS: For the range of parameters investigated, play retarded by minimum coulomb friction tends to alleviate the rms oscillatory load response to stationary random input. This may be attributed to a peak biting or clipping effect. Play with almost no friction tends to aggravate the rms oscillatory load response only slightly. Sinusoidal inputs at frequencies near resonance apparently produce responses following a similar trend. The limited results suggest that the range of the effect is more extreme in the sinusoidal case. (AUTHOR)

686

Okos, G., L. Magos, and G. Kovac. 1954 DURCH VIBRATIONSSCHADEN VERURSACHTE GEFASSVERANDERUNGEN. (Vascular changes caused by vibration injury.) Acta med. hung. 6:75-79

687

Oleson, M.W. 1960 APPLICATION OF A SPECIAL TEST FIXTURE TO VIBRATION MEASUREMENT DURING STATIC FIRING OF ROCKET MOTORS
(Paper, 28th Symposium on Shock, Vibration and Associated Environments, The Departmental and Commerce Auditoriums, Washington, D.C., February 9-11, 1960) Published in ASTIA AD 244 857

ABSTRACT: Measurement of vibration induced during rocket motor static firings is one technique for obtaining environmental data applicable to rocket vehicle components. However, the usefulness of such data may be compromised by conditions peculiar to the static test itself. The accuracy of data obtained may be improved by the use of special test fixtures during the static firings, as shown by measurements on two different types of rocket motor.

688

Olmer, D. & I. Jacques 1928 TRANSIENT INCREASE IN BLOOD PRESSURE AND DECREASE IN PULSE RATE PRODUCED BY LEANING FORWARD
Compt. Rend. Soc. de Biol. 99: 169-170

689

Ordway, F.I., J.P. Gardner & M.R. Sharpe 1962 SPACE MEDICINE: THE BASIC FACTORS
In: Basic Astronautics: An Introduction to Space Science, Engineering, and Medicine (Englewood Cliffs, N.J.: Prentice-Hall Space Technology Series) Pp. 468-471

Sections on Vibration, Sound, Temperature (Chapter 12)

ABSTRACT: The effects of vibration on the human being are primarily mechanical and to a much lesser degree thermal. Vibration in space carrier vehicles has many sources such as rotating engine components, engine pulses, and gimbaling, acoustic pressures, buffeting, and fuel slashing. Vibration produces movement and displacement of the internal organs of the body, all of which have different natural frequencies. The range is still largely unknown but the thorax and abdominal organs appear most sensitive to vibration, having a natural frequency of some 3 cps. Elastic corsets and pressure suits instead of damping this frequency merely shift it to higher values, but a rigid restraint like a cast reduces it to 1.5 cps. With regard to space flight it seems that the vibrational frequency range most detrimental to man lies between 2 and 100 cps. (CARI)

690

Oshima, Masamitsu 1961 VIBRATION AND HUMAN BODY.
Tekko Rodo Eisei 2:39, 1953 (Aerospace Technical Intelligence Ctr., Wright-Patterson AFB, Ohio Trans. No. MCL-803; 25 April 1961) ASTIA AD-259 593

ABSTRACT: The author gives a detailed report on the sense of vibration and the effects of generalized vibration on the human body. He also discusses the theory of disturbances of vibration, permissible doses of vibration, and damage to human beings by vibration. Medications and other methods to increase the tolerance against vibrations is still another subject discussed. Many charts are included for illustration of facts and figures.

691

Oslake, J. J., N. L. Haight, & L. J. Oberste 1960 ACOUSTICAL HAZARDS OF ROCKET BOOSTERS. VOLUME II. EFFECTS ON MAN. (Aeronutronic, Newport Beach Calif.) Technical Rept. No. U-108:97; Contract N123(61756)23304A; ASTIA AD-253 316; 30 Nov. 1960

CONTENTS:

Effects of rocket noise on hearing:
- Mechanism of hearing;
- Temporary hearing loss;
- Permanent hearing loss;
- Exposure to rocket noise;
- Attenuation by ear defenders

Psychological and biological effects:
- Central nervous system effects;
- Influence on visual thresholds;
- Aural pain;
- Effects of mechanical vibrations

Effects of noise on speech;
- Statistics of speech;
- Speech intelligibility;
- Effects on warning devices

Community reaction to rocket noise:
- Community characteristics;
- Prediction of community reaction

Acoustical criteria for rocket noise:
- Hearing damage risk criteria;
- Criteria for speech communication;
- Criteria for residential areas

(ASTIA)

692

Paic, M., P. Haber, J. Voet and A. Eliasz 1935 BIOLOGICAL ACTION OF ULTRASONICS Compt. rend. soc. biol. 119:1061-1063

693

Pak, C. H. 1961 FORCED VIBRATIONS OF A MASS ON A NONLINEAR SPRING. (Masters Thesis: U. S. Naval Postgraduate School, 1961) Rept. P12

694

Palmisano, C. 1951 STUDIO DEL TONO LABIRINTICO E DEI RIFLESSI VEGETATI-VOLABIRINTICI IN SOGGETTI IMBARACTI SU NAVI DI SUPERFICIE E STUDIO DELLE VARIAZIONI DELL'ECCITABILITA VESTIBOLARE PER LO STI'MOLO FIXICO DI MOVIMENTI NAVE NELLA NAUPATIA (Labyrinth Tone and Autonomic Labyrinth Reflexes in Sailors and Variations of Vestibular Excitability Due to the Physical Stimulus of Ship Movements in Seasickness) Annali di medicina navale e coloniale (Rome) 56(4): 424-426. July-Aug. 1951.

695

Paparopoli, G. and S. Terranova. 1955 RILIEVI FOTOPLETISMOGRAFICI IN LAVORATORI ADDETTI A STRUMENTI VIBRANTI. (Photoplethysmographic data in workers using vibrating instruments.) Folia med. 38:1260-1271

696

Pape, R.W. and D.E. Goldman. 1960 OBSERVATIONS ON DAMAGE TO EXPERIMENTAL ANIMALS EXPOSED TO MECHANICAL VIBRATION. Aerospace Med. 31 (4) : 317

ABSTRACT: Anesthetized male cats have been exposed to mechanical vibration in the range from 5 to 20 cps. Pulmonary hemmorhage and evidence of traumatic myocardial damage may occur if the acceleration exceeds about 5 G for a sufficient time. Both the frequency and severity of the injuries increase as the acceleration increases. When the acceleration exceeds about 10 G death may result from the exposure. Minimal injury indicated by delayed changes in cardiac potentials, which may, however, be reversible. Confirmatory evidence is obtained from post mortem and histological examination of tissues. Other observations have revealed a definite effect of the method of supporting the animals during exposure.

697

Parey, W. 1952 SENSITIVENESS OF THE HUMAN BODY TO VIBRATIONS Power Plant Eng 36:705

698

Parks, D.L. 1960 A PRELIMINARY STUDY OF THE EFFECTS OF VERTICAL AIRCRAFT VIBRATION ON TRACKING PERFORMANCE AND REACTION TIME (Boeing Airplane Co., Wichita, Kansas) D-3-3476, November 1960

ABSTRACT: Applicable human vibration data is limited in quantity and restricted in utility for application to design problems since most of the information is based upon sinusoidal vibration which is seldom found in an operational environment

699

Parks, D. L., 1961
A COMPARISON OF SINUSOIDAL AND RANDOM VIBRATION EFFECTS ON HUMAN PERFORMANCE
(The Boeing Company, Wichita Division, Kansas)
Tech. Rep. No. D3-3512-2 July ASTIA AD 261 331

ABSTRACT: Ten male subjects performed a complex task during vertical vibration in a preliminary study to compare performance with sinusoidal, constant period random amplitude, and random (aircraft-turbulence)

vibration. Performance on the three subtasks varied: performance on a t tracking task with delayed control-display feedback was differently affected according to type of vibration; no affect was found for a tracking task without feed-back delay; and response time did not change.

Results were analyzed for consistent trends in vibration effects which could be correlated with mechanical and psychological definitions of vibration for evidence of a human performance transfer function for vebration. Psychological and amplitude bases for this function could not be found, vibration acceleration (g) effects were not clear, and RMS amplitude power was correlated with constancies in performance. It was suggested that testing combinations of RMS and frequency (and related factors) could lead to a performance transfer function permitting transformation of human performance data from sinusoidal to operational vibrating environments.

700

Parks, D. L., & F. W. Snyder 1961 HUMAN REACTION TO LOW FREQUENCY VIBRATION. (Boeing Co., Wichita, Kansas) Technical Rept. No. 1; Document No. D3-3512-1; Contract Nonr-299400; 24 July 1961; ASTIA AD-261 330

ABSTRACT: Systematically derived judgments of levels of vertical sinusoidal vibration severity from 1 to 27 cps were obtained under laboratory controlled conditions for each of 16 selected male subjects. These vibration levels were established in terms of four levels defined as Definitely Perceptible, Mildly Annoying, Extremely Annoying and Alarming as acceleration increased for each fixed frequency at a constant rate. The results established four profiles of acceleration from 1 to 27 cps to be used as the vibration frequency and amplitude points in the vibration environment for a series of tests of human performance in the remaining program. Correlation of judgment with velocity, acceleration, and double amplitude according to frequency were noted. A definite correlation between reported body area selectively affected and frequency was also found. As reported in previous studies sensitive to vibration at selected frequencies, suggesting body organ and appendage resonance. (AUTHOR)

701

Parks, Donald L. 1961 A COMPARISON OF SINUSOIDAL AND RANDOM VIBRATION EFFECTS ON HUMAN PERFORMANCE
(The Boeing Company, Wichita Division) Naval Research Contract Nonr 2994(00) Technical Report D3-3512-2 July 28, 1961 ASTIA AD 261331

ABSTRACT: Ten male subjects performed a complex task during vertical vibration in a preliminary study to compare performance with sinusoidal, constant period random amplitude, and random (aircraft turbulence) vibration. Performance on the three subtasks varied: performance on a tracking task with delayed control-

display feedback was differently affected according to type of vibration; no effect was found for a tracking task without feedback delay; and response time did not change.

Results were analyzed for consistent trends in vibration effects which could be correlated with mechanical and psychological definitions of vibration for evidence of a human performance transfer function for vibration. Psychological and amplitude bases for this function could not be found, vibration acceleration (g) effects were not clear, and RMS amplitude power was correlated with constancies in performance. It was suggested that testing combinations of RMS and frequency (and related factors) could lead to a performance transfer function permitting transformation of human performance data from sinusoidal to operational vibrating environments.

702

Parks, D. L. 1962 DEFINING HUMAN REACTION TO WHOLE-BODY VIBRATION
Hum. Factors 4:305-314, Oct. 1962.

703

Parin, V. 1960 GREAT EVE
Izvestiya P. 3; 17 May 1960

704

Parin, V.V. 1960 ON THE EVE OF THE SOLUTION OF THE PROBLEM
Trud P. 2; 17 May 1960.

705

Parin, V. 1960 GET TO KNOW: SPACE BIOLOGY
Trud P. 3; 15 October 1960

706

Parin, V. 1961 THANKS TO THIS DAY LIFE IS WORTH LIVING
Vestnik vozdushnogo flota 4: 53-55

707

Eldredge & Henry F. Koster 1948 PHYSIOLOGICAL
[illegible] INTENSE SOUND
[illegible] Division, Air Materiel Command, United States Air Force)
Eng. Div. Memo. Report No. MCREXD-695-71B May 24, 1948 ASTIA ATI 28968

ABSTRACT: This report presents results obtained in preliminary experiments designed to determine the physiological effects of intense sound on man and animals

708

Parrack, H.O. and D.H. Eldredge 1947 CERTAIN PHYSIOLOGICAL REACTIONS TO INTENSE SOUND FIELDS Federation Proc. 7:90

709

Parrack, H. O., H. von Gierke, H. Oestericher & W. W. von Wittern 1950 ABSORPTION OF VIBRATORY ENERGY BY HUMAN BODY SURFACE.
Fed. Proc. 9:99-100. ASTIA AD 261 330.

ABSTRACT: Measurements were made of the response of the body surface to mechanical vibrations. Three methods were used in overlapping frequency ranges so as to span a total frequency range of 20-20,000 cps. The results are consistent and describe the mechanical impedance of the body surface and the elastic properties of the tissue. The impedance consists of a frictional resistance and a reactance. The resistance is proportional to the square root of the frequency. The reactance is an elastance varying inversely with frequency up to about 50 cps where it becomes zero. Above this frequency the reactance is an inertance that is proportional to frequency throughout the measured range. The vibratory energy absorbed at the body surface and converted to heat in the tissues may be calculated from the impedance. From these results was developed a theory on the mechanical behavior of the vibrating body tissue that considered the tissue as an elastic medium with viscosity. For such a model, and for the frequency range 20-20,000 cps, equivoluminal shear waves with velocities less than sound are predominant. It is only at still higher frequencies that compression waves play an important roll. The theory also explains the surface waves observed experimentally

710

Parrack, H. O. 1956 NOISE, VIBRATION AND PEOPLE
Noise Control 2(6):10-24, Nov. 1956

ABSTRACT: The physiological effects of acoustic energy are considered in relation to mechanical damage to the body and functional impairment of sense organs. An attempt is made to evaluate the percentage of population who will develop hearing loss due to aging alone, those who will develop hearing loss due to exposure to noise, and those who will develop it for other reasons. Persons who are susceptible to permanent hearing damage from exposure to noise may be detected by an unusually large temporary threshold shift for a given noise exposure. Less direct effects of noise include interference with communication and arousal of antagonistic emotions. Problems created by noise fields found in practical situations are considered for the air crew, passengers, aircraft maintenance crew, other ground support personnel, and people outside an air base.

711

Parsons, J.A., 1956 SPECTROPHOTOMETRIC ANALYSIS OF SOCIUM, CALCIUM AND POTASSIUM IN BLOOD SERUM OF NORMAL AND NOISE EXPOSED ANIMALS
(Masters Thesis, Pennsylvania State University, June 1956)

712

Paton, C.R., E.C. Pickard & V.H. Hoehn 1940 SEAT CUSHIONS AND THE RIDE PROBLEM
S.A.E. Journal 47: 273-283, July 1940

Paulson, E. C. 1949 TRACTOR DRIVERS' COMPLAINTS.
Minnesota Medicine 32(4):386-387, April 1949.

ABSTRACT: An enumeration of symptoms suffered by a small group (23) of farmers directly attributable to tractor driving is made. The mechanism of production is discussed as is their prevention and treatment. The most important point is recognition of the more unusual manifestations of this condition so that correct advise and treatment is instituted

COMPLAINT	NUMBER
Backache	10
Indigestion	7
Abdominal soreness	5
Sore stiff neck	3
Pain in extremities	2
Others	3

714

Pearl Harbor Naval Shipyard, T.H. 1960 VIBRATION AND NOISE SURVEY REPORTS ISSUED FOR 1959. ASTIA AD-231 263, 8 January 1960

ABSTRACT: An investigation to determine the cause of excessively vibrating fore mast was conducted aboard the USS Forster (DER 334) on 26 January, 1959. Vibration data were obtained on the fantail (after towing pad) and at the base of the foremast. Spot checks were made in other spaces of the ship. The natural period of vibration of the foremast platform was experimentally determined after the sea-trial. The hull vibration levels observed were considered acceptable. The most vibrations occurred at normal hull vibration criticals. The foremast platform has a natural period of vibration close to the 180 rpm hull critical which explains any high vibration levels. No corrective action should be undertaken at the present time with respect to the shafting or propellers. The mast vibration should be corrected by stiffening the mast to shift the natural period away from the hull criticals; preferably 220 cpm to 260 cpm.

715

Pearlstein, J. 1960 MEASUREMENT OF DISPLACEMENT, VELOCITY, AND ACCELERATION: BIBLIOGRAPHY WITH ABSTRACTS AND INDEX. (Diamond Ordnance Fuze Laboratories, Ordnance Corps, Washington 25, D. C.) TR-836; ASTIA AD-243 420; 22 Aug. 1960

ABSTRACT: A bibliography is presented with abstracts and index covering technical literature on the measurement of displacement, velocity, and acceleration. The references were obtained from the peek-a-boo files of the Office of Basic Instrumentation of the National Bureau of Standards and represent a sample of the literature published from about 1950 to 1958. (AUTHOR)

716

Pennsylvania State U. 1957 BIBLIOGRAPHY ON SHOCK AND SHOCK EXCITED VIBRATIONS VOLUME I (INTRODUCTION AND ABSTRACTS OF TECHNICAL PAPERS) (Pennsylvania State U. Coll. of Engineering and Architecture, University Park) Sept 1957, ASTIA AD-200 830

717

Perilhou, P. & H. Pieron 1942 QUELQUES CARACTERISTIQUES DES SENSATIONS VIBRATOIRES (Some Characteristics of the Vibratory Sensations) C.R. Soc. Biol. (Paris) 136: 448-449

718

Perry, C. D. & H. R. Lissner 1961 SHOCK AND VIBRATION HANDBOOK, Vol. I BASIC THEORY AND MEASUREMENTATION, Chapter 17 Strain Gage Instrumentation McGraw Hill Book Co

719

Piccoli, P., A. Rossi & O. Elmino 1962 BEHAVIOR OF COAGULATION FACTORS IN ANIMALS SUBJECTED TO VIBRATIONS. Folia Med (Napoli) 45:1236-1247, Dec. 1962 (Italy)

720

Piersol, A. G. 1957 THE EFFECT OF PROPELLER PHASE SYNCHRONIZATION ON DC-7 CABIN SOUND & VIBRATION LEVELS. (Douglas Aircraft Co.) DACo Testing Division, R pt. No. DEV. 2427, 23 July 1957

721

Piolett, L. 1960 LE VOYAGE TERRE LUNE-SERA-T-IL UN JOUR UN VOYAGE D'AGREMENT? (THE EARTH-MOON TRIP - WILL IT ONE DAY BE A PLEASURE TRIP?) L'air, May 1960, Pp. 16-18, in French

ABSTRACT: The author presents the following hazards which must be solved before man has a 90% chance of survival of a space flight: (1) the accelerations of launching and landing, (2) extreme temperature variations, (3) the noise and vibration of the rocket, (4) the state of weightlessness, (5) ionizing and nonionizing radiation, and (6) meteoritic impact.

722

Pisarenko, G. S. 1960 OSCILLATIONS OF ELASTIC SYSTEMS WITH CONSIDERATION OF ENERGY SCATTERING IN THE MATERIAL. Kolebaniya Uprugikh Sistem S Uchetom Rasseyaniya Energii V Materiale. pp. 236 (Aerospace Technical Intelligence Ctr., Wright-Patterson AFB, Ohio, Trans. No. MCL-128/1 + 2, 15 Dec. 1960) ASTIA AD-254 195

ABSTRACT: Theoretical analyses of oscillations of elastic systems with allowance for dissipation of energy in material are presented. The method of calculation

involves direct integration of the differential equation of oscillation of a system with the non-linear law of internal dissipation of energy. Chapters are included on:
(1) vibration of a system with one degree of freedom,
(2) transverse vibrations of the shaft with a constant cross-section,
(3) transversal vibrations of the rod of changing cross-section,
(4) transversal vibrations of turbine vanes of constant cross-section in the field of centrifugal forces,
(5) transversal vibrations of a turbine vane in the case of slow changing frequency of excitation,
(6) transversal vibrations of short bars applied to design of turbine vanes;
(7) transverse vibration of turbine vanes of variable cross-section in the field of centrifugal forces,
(8) torsional vibrations of shafts,
(9) experimental methods of determining the dissipation of energy in the material during forced vibrations, and
(10) experimental methods of investigating the dissipation of energy in the material during free vibrations
(ASTIA)

723

Plunkett, R. 1962 ANALYTICAL DETERMINATION OF MECHANICAL IMPEDANCE.
In: Shock, Vibration and Associated Environments Bulletin No. 30
(Office of the Secretary of Defense, Washington, D.C., January 1962)
ASTIA AD-273 514, pp. 8-18

ABSTRACT: This paper discusses the impedance, dynamic stiffness, effective mass, mobility, and receptance of simple lumped elements and shows how they may be combined to find the impedance of systems of moderate complexity. It also indicates methods for finding the impedance of systems of moderate complexity. It also indicates methods for finding the impedance of simple uniform, continuous systems and lists references dealing with more complex structures.

724

Pogrund, R.S. 1962 PHYSIOLOGICAL ASPECTS OF THE SPACEMAN
In: Brown, K., and L.D. Ely, eds., Space Logistics Engineering
(New York: John Wiley and Sons, 1962) pp. 55-135

ABSTRACT: The complexity of space logistics engineering for the comfort of the astronaut in a space vehicle is described as a function of mission duration

and of the operational requirements and performance capabilities expected. The following physiological parameters are reviewed: (1) vehicle-induced stresses (propulsion, noise, vibration, accelerations, zero gravity, re-entry, emergency escape); (2) internal environment of the space capsule (sources of oxygen supply, handling food, biological photosynthesis systems, methods of carbon dioxide elimination, water and waste control, toxicological considerations, temperature and humidity regulation); (3) radiation hazard shielding requirements, low-level chronic exposure hazard; and (4) psychological stress (isolation, confinement, and sensory deprivation).

725

Pohlman, R. 1939 ABSORPTION OF ULTRASONIC WAVES IN HUMAN TISSUES AND ITS DEPENDENCE UPON FREQUENCY.
Physik. Z. 40:159-161.
See also Biol. Abstr. 14:8131 (1940)
Phys. Abstr. 42:2169 (1939)

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Pohlman, R. 1939 ABSORPTION OF ULTRASONIC WAVES IN HUMAN TISSUES AND ITS DEPENDENCE UPON FREQUENCY Phys. Abstr. 42:2169 (1939)
See Also: Biol. Abstr. 14:8131 (1940)
Physik. Z. 40:159-161 (1939)

727

Pohlman R., R. Richter and E. Parrow 1939 DISTRIBUTION AND ABSORPTION OF ULTRASONICS IN HUMAN TISSUE AND THEIR THERAPEUTIC EFFECTS ON ISCHIAS AND PLEXUS NEURALGIA
(Deutsche Medizinische Wochenschrift 65 (1939) pp. 251-254)

R.A.E. Translation No. 193 ASTIA AD 266614

728

Pokrovskiy, G. 1961 MAN GOES OUT INTO SPACE
Kryl'ya rodiny 1961(6):17-18

ABSTRACT: The article deals with the first cosmic flight of Major Yu. A. Gagarin in the spaceship "Vostok", which proved that man can exist and function normally in space. K. E. Tsiolkovskiy was amongst the first scientists to point out that man in a cosmic flight would experience two distinctly different states, i.e. overloads which would be felt during the acceleration and deceleration in the atmosphere before landing, and a state of weightlessness while the spaceship is in orbit. Insignificant "g" loads would be possible during change-over from one orbit into another or before landing. "g" loads have been known to high-speed pilots, and momentary weightlessness to aerobatic pilots. Checking of a prolonged state of weightlessness had to be carried out under conditions of a real cosmic flight. Three aspects of the phenomena were observed: 1) weightlessness reduces the load on blood vessels and facilitates the heart functions. It lowers the strain of the human body, and could be used as a treatment for heart diseases; 2) it affects the intake of food, which becomes weightless; further investigation as to the food's progress in the digestive system was required; 3) the force of gravity must play an important part in man's orientation in space as it acts on the body as a whole, and on the vestibular apparatus, which governs the sensation of "Top" and "Bottom". After Major Yu. A. Gagarin's flight in space it was found that the human body withstands all unexpected and unusual conditions quite well. (CARI)

729

Polotskii, I.G. and S.S. Urazovskii 1946 PHYSICOCHEMICAL AND BIOLOGICAL EFFECTS OF ULTRASONICS Vrachebnoc Delo 26:85-90

730

Portsmouth Naval Shipyard 1959 LIST OF TECHNICAL REPORTS ON VIBRATION MEASUREMENTS, 1957 - 1958. (Portsmouth Naval Shipyard, N.H.)
ASTIA AD- 225 969

731

Postlethwaite, F. 1944 HUMAN SUSCEPTIBILITY TO VIBRATION. Engineering, No. 157

732

Powell, A. and T.J.B. Smith 1962 A BIBLIOGRAPHY ON AEROSONICS (California U., Los Angeles, Calif.) Rept. no. 62-4, Contract Norn-23362, Proj. NR 062-299. 1-28-60

ABSTRACT: This bibliography consists mainly of references to open literature relating to those sections of acoustics which are particularly associated with fluid motion ard thermal action. (Author)

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733

Radio Corporation of America 1960 STUDY OF INSTRUMENTATION AND TECHNIQUES FOR MONITORING VEHICLE AND EQUIPMENT ENVIRONMENTS AT HIGH ALTITUDE. INSTRUMENTATION AND MONITORING TECHNIQUES. (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TN 59-307 June 1960 ASTIA AD 268 090

ABSTRACT: Instrumentation techniques are presented which are available within the state-of-the-art; an instrumentation system is proposed for the monitoring of high-altitude environments encountered by typical vehicles. The high altitude environmental effects on typical vehicles and equipment are summarized. The present airborne-instrumentation state-of-the-art is presented for measuring temperature, pressure, strain, vibration, acceleration, radiation, meteorite detection, and acoustic noise. A feasible instrumentation system is discussed for monitoring these deleterious environments. (Author)

734

Radke, A. O. Dec. 1957 VEHICLE VIBRATION, MAN'S NEW ENVIRONMENT. ASME Paper No. 57-A-54, Dec. 1957

ABSTRACT: Man, in his evolution, has adapted himself to, or has found compatible the low-amplitude, low-frequency motion experienced in walking. Where he has exposed himself to other sources of vibration-- that is, until the present automotive air age descended upon him-- he has been able to minimize their effect by limiting the speed at which he traveled (limiting the vibration intensity) or using his legs as a vibration isolator.

The charioteer stood, the horseman stood in his stirrups or posted.) In any case, the number of people exposed was not significant and the duration of their exposure was brief. In our modern environment however, man, almost universally, is exposed to vibration for which he is not physically prepared and, because of the requirements of the vehicles, is not permitted the use of his legs to minimize the effect, nor allowed to control the intensity of the vibration. In addition, his exposure is no longer brief, but in many cases, day long, day in, day out. A study of such effects is described.

735

Radke, A.O., 1957 VEHICLE VIBRATION---MAN'S NEW ENVIRONMENT.
(Bostrom Research Laboratories, Milwaukee, Wisconsin)
BRL Report No. 124, December 1957

736

Radke, A. O. 1958 VEHICLE VIBRATION.
Mech. Engng. 80(7):38-41, July 1958

ABSTRACT: This article reviews the present data available on man's tolerance to vibration. Available threshold data is presented in graphical form. General evidence of the physiologic damage and cost of vibration as reported by medical surveys is also included. Discussion revolves around the problem of insulation from vibration with specific and general recommendations made concerning the design of equipment (primarily suspension seating) to reduce vibration.

737

Radulov, S. 1959 [illegible] CHVENIE AKO HYGIENICKY PROBLEM (SHAKING AND VIBRATION AS A HYGIENIC PROBLEM)
Lekarsky Obzor, Vol. 8, No. 10, 1959, in Czech.

738

Randle, R. J., Jr. 1959 VIBRATIONS IN HELICOPTERS: TRAINING CONSIDERATIONS.
(Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TN 59-61;
ASTIA AD-212 314; March 1959
NOTE: CARI P&S 30.1

ABSTRACT: Helicopter instructor pilots were interviewed individually to analyze in detail the role that vibrations play in piloting helicopters. Information was gathered which indicated that vibrations are utilized as cues in both normal control and the detection and diagnosis of system malfunctions. Training considerations are discussed and recommendations made for a relatively gross simulation of each of the several classes of vibrations in a proposed helicopter instrument trainer.

739

Reich, H. Kent 1962 FLIGHT VIBRATION SURVEY OF F-106A AIRCRAFT
(Aeronautical Systems Division, Wright-Patterson Air Force Base, Ohio)
ASD-TDR-62-504 Project No. 1309, Task No. 130906 May 1962
. ASTIA AD 282 207

ABSTRACT: An F-106A aircraft, SN 53-466, was surveyed at Wright-Patterson Air Force Base, Ohio to determine the vibration environment existing throughout the vheicle under all flight conditions expected in service. Approximately 18,890 data points were obtained from 25 separate locations on the vehicle during 23 test flights. The data obtained in this survey were evaluated to determine the adequacy of vibration test requirements for aircraft equipment as contained in Specification No. Mil-E-5272C. The data indicated that the vibration testing requirements of the specification are more than adequate, a finding substantiated by all previous (vibration) surveys performed on Century Series aircraft.

740

Reich, W. J. April 1960 FIXTURE RESONANCE EFFECTS ON SHOCK RESPONSE
(1960 Proceedings of the Institute of Environmental Sciences, 69-80)

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Reiher, H. & F.J. Meister 1931 THE SENSITIVENESS OF THE HUMAN BODY TO VIBRATIONS. (Die Empfindlichkeit Des Menschen Gegen Erschutterung)
Forschung, Verein Deutschen Ingenieure (Berlin) 2(11):381-386, Nov. 1931.
Translation: C.W. Kearns (Air Materiel Command, Wright-Patterson AFB, Ohio)
No. F-TS-616-RE, Sept. 1946. ASTIA ATI 36 971.
Also as (Office of Technical Services, Washington, D.C.) PB 42296, Aug. 1946

ABSTRACT: Investigations were conducted to determine the effect of horizontal and vertical vibrations on the human body. Ten persons of different occupations and temperaments ranging from 20 to 37 years of age were tested on a platform which was set into sinusoidal and horizontal vibrations. The persons to be observed lay or stood so that the vibrations were either along or across their body axis. These tests were conducted to determine the sensitivity and danger to vibratory sensation, and to further the establishment of boundaries of intermediate sensations. Results are given diagramatically.

742

Reinharex, D. 1961 THE CIRCULATORY DISORDERS CAUSED BY NOISE. VASCULAR COMPLICATIONS OF THE TRAUMATO-VIBRATORY SYNDROMEL.
In Bull. Soc. Sci. Med. Luxemb. 98:281-286, June 1961 (France)

743

REM, Inc. 1959 A PROPOSAL FOR RESEARCH AND DEVELOPMENT IN THE COMBINED ACCELERATION-VIBRATION PROBLEM, PARTICULARLY FOR CREWMAN PROTECTION IN SPACE VEHICLE SEATING SYSTEMS
(REM, Inc., Portland, Oregon) Letter #311. 23 July 1959.

744

Research & Development Board, Washington, D. C. 1953 SHOCK AND VIBRATION BULLETIN NO. 19 (Research and Development Board, Washington, D. C.)
ASTIA AD-9 513; 19 Feb. 1953

745

Restarski, J.S. 1945 EFFECT OF VIBRATION UPON THE DENTAL PULP AND PERIOSTEUM OF WHITE RATS. J. Dental Research 24: 57-60

ABSTRACT: Exposure of white rats to vibrations of 0.05 inch at 2600 cpm, 8 hours daily for 28 days did not affect the rate of growth of the incisor teeth or the calcification of the dentin as shown by the constant average width and number of measurable dark and light incremental rings of dentin. Histologic examination of dentin pulp, alveolar periosteum and alveolar bone and structures of the temporomandibular articulation failed to disclose any greater variation incellular changes than occur normally.

746

Rich, H. L., & R. E. Baker 1961 SHIPBOARD SHOCK ENVIRONMENT
In 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D. C. (Mt. Prospect, Ill.: Institute of Environmental Sciences, P. O. Box 191) pp. 197-201

CONCLUSION: Through the study of shock environment and the associated response of mechanical systems information is available on which to base the design of shock resistant equipment. Application of these data will produce equipment and hulls balanced in terms of this ability to withstand attack. (AUTHOR)

747

Richards, J.E. 1949 SUMMARY OF EXISTING INFORMATION IN THE HUMAN REACTION TO VIBRATION. (British Shipbuilding Research Association) Report No. 28, Jan. 1949. (BB 319)

748

Riddell, F.R. & R.W. Detra 1959 RETURNING ALIVE FROM SPACE (Avco Mfg. Corp., Avco Research Lab., Everett, Mass.)

ABSTRACT: The paper discusses three problems of re-entry: deceleration, heat, and terminal landing conditions. (CARI) Hypersonic gliders and pure drag re-entry vehicles are compared. The drag vehicle has inherent advantages over the hypersonic glider which are usually not generally observed.

749

Riley, M. B. and A. T. Bernardini 1959 ANIMAL AND HUMAN STUDIES OF THE EFFECTS OF LOW FREQUENCY OSCILLATION COMBINED WITH TRANSVERSE ACCELERATION. (USAF Aero Med Lab) WADC TN 59-92. Mar. 1959. ASTIA Doc. No. AD 227 503.

Summary: Animal and human endurance is reported to low frequency oscillation during backward acceleration. No significant suggestion of trauma was found in animals subjected to a maximum oscillation-g pattern of 2.8 cycles per second through a 36 degree arc in a 12 g field. In humans, there were no identifiable end-point when they were subjected to a maximum oscillation-g pattern of 0.7 cycle per second through a 36 degree arc in an 8 g field.

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Riser, G.T., 1961 EXPLORATORY INVESTIGATION OF THE EFFECTS OF LOW FREQUENCY RANDOM AMPLITUDE VIBRATION ON HUMAN PERFORMANCE. (The Boeing Company, Wichita, Kans.) Document #D3-3328, March 1, 1961

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Riopelle, A. J., M. Hines, & M. Lawrence 1958 THE EFFECTS OF INTENSE VIBRATION. (Army Medical Research Lab., Ft. Knox, Ky.) Rept. No. 358; ASTIA AD 203 637, 10 Oct. 1958.

ABSTRACT: The behavioral, physiological, and pathological consequences of

intense vibration (10 cps at 0.25 and 0.50 in. peak-to-peak displacement) were studied. One animal died after 1 hr. and 2 survived 8 hrs. (0.25 in). Of the group vibrated at a displacement of 0.50 in, one monkey died after 7 hrs., one died the following day, and 2 recovered. Few behavioral changes were noted. Detailed physiological and pathological changes were noted in all animals.

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Rivers, T.M., J.E. Smadel and L.A. Chambers 1937 EFFECT OF INTENSE SONIC VIBRATIONS ON ELEMENTARY BODIES OF VACCINIA J. Exptl. Med. 65:677-685

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Roberts, W. H. 1931 A TWO-DIMENSIONAL ANALYSIS OF DISCRIMINATION OF DIFFERENCES IN THE FREQUENCY OF VIBRATIONS BY MEANS OF THE SENSE OF TOUCH. J. Franklin Inst. 213:286-312.

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Roggeveen, L. J., & H. A. E. van Dishoeck 1956 VESTIBULAR REACTIONS AS A RESULT OF ACOUSTIC STIMULATION. Practica oto-rhino-laryngologica (Basel) 18(4):205-213, July 1956

ABSTRACT: Literature on vestibular reactions caused by sound stimuli is reviewed. The description of a similar case is added, in which the lesion responsible for vestibular symptoms was demonstrated in the roentgenogram. The lesion consisted of a hiatus in the bony wall of the left superior semicircular canal, a localization not described before. (AUTHOR)

755

Roman, J. A., R. Coermann, & G. Ziegenruecker 1958 EFFECTS OF SEVERE WHOLE BODY VIBRATION ON MICE AND METHODS OF PROTECTION FROM VIBRATION INJURY. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 58-107; ASTIA AD 151 070
See also J. Avia. Med. 30:118-125, 1959.

ABSTRACT: A pilot study was carried out to investigate the mechanism and cause of death as well as other effects of severe vibration. Two hundred mice were exposed to severe vibration in planes parallel to and perpendicular to the

longitudinal body axis. Sinusoidal vibration of varying frequency and amplitude was used and death was selected as the physiological end point. When injuries were sustained, they consisted of G. I. tract bleeding, lung damage and various sites of minor hemorrhage. Data showing the relationship between frequency and duration of exposure required to kill are given for a constant acceleration and they point to a "maximum effect frequency" of 25 cps for transverse vibration and 18 cps for longitudinal vibration. Stroboscopic analysis at these frequencies suggests the existence of a resonant system made up of abdominal contents, abdominal wall, lungs and diaphragm. Tissue damage appears to have been caused by distortion and relative displacement of tissues or organs. Pure pressure effects were not observed. Means of protection against injuries resulting from whole body vibration were investigated and preliminary protection studies were done on humans. The principles of protection against severe whole body vibration are discussed as well as the relationship between vibration protection and protection from impact. (AUTHOR)

756

Roman, J., I.R. Coermann, & G. Ziengenruecker 1958 VIBRATION, BUFFETING AND IMPACT RESEARCH. (Paper, First Post-satellite Meeting of the Aero-Medical Association, Statler Hotel, Washington, D.C. March 24-26, 1958)

ABSTRACT: A "vertical accelerator" which simulates the dynamic loads expected of future aircraft was developed in order to study the effectiveness of devices for protection against vibration, buffeting, and impact. Experimentation revealed several mechanisms productive of injury in severe vibration of buffeting, and indicated that vibration and impact protection are intimately related and possible by simple means. It was shown that by simplification of mathematical models of organ systems, present knowledge of vibration physics may be directly applied to the development of protective equipment.
(J. Aviation Med., 29(3):248, March 1958)

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Romani, J. D., & P. Bugard 1956 A FURTHER STUDY OF THE INFLUENCE OF SOUNDS ON THE ENDOCRINE SYSTEM. J. Acoust. Soc. Amer. 28(4):773- , July 1956

ABSTRACT: Two-thirds of guinea pigs subjected to sounds of 100 to 125 db. died after 12 to 18 hours of exposure. Examination showed congestion of the pituitary glands, with degranulation of the acidophil cells; inhibition of the thyroid and inability to react to overstimulation; and a decrease of lipoids in the adrenals. From these data and from previous observation the following is demonstrated: (1) Ultrasonics of 22.5 kc. at 160 to 165 db. for 1 to 4 minutes induce a destruction

of the medullar adrenal area, with the cortical area intact: death occurs in several minutes, with an increase in body temperature. (2) sounds of 100 to 125 db. for 15 to 25 minutes induce an alarm reaction at the stage of exhaustion; death occurs in 12 to 48 hours. (3) Sounds of 1 to 4 kc. at 130 to 140 db. for 1 to 4 hours induce a well-compensated alarm reaction in the dog and rabbit; after 200 hours adaptation occurs, with recuperation of the normal functions of the endocrine system.

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Romba, J. J. & P. Martin 1961 THE PROPAGATION OF AIR SHOCK WAVES ON A BIOPHYSICAL MODEL.
(USA Ordnance Human Engineering Labs., Aberdeen Proving Ground, Md.)
DA Proj. 5B9520001, Tech. Memo. 17 61, Sept. 1961.

ABSTRACT: Shock wave characteristics were studied in the field about and within the rhesus monkey body form. Measurements were obtained in free air, top of animal's head, the mid-brain and the lower thorax with distance and position of the explosive varied in relation to the animal's body. The study of shcok wave transmission from one body level to another was accomplished and the problem of shock wave energy distribution in the field of the organism was emphasized. The effects of medium through which shock wave transmission occurred and of body tissue on the shock wave characteristics were observed. (Tufts)

759

Rosenbaum, R. 1951 PRINCIPLES OF VIBRATION MEASURING EQUIPMENT (WITH EMPHASIS ON THE USE OF EQUIPMENT NOW AVAILABLE IN THE CAA WASHINGTON OFFICE-W-301) (CAA, Airframe & Equipment Engr. Br.; Prepared for CAA In-service Vibration Measurement Course, 14-18 May, 1951)

ABSTRACT: The purpose of this report is to acquaint those persons who may have occasion to use vibration measuring equipment with the basic principles and limitations of the vibration equipment in general use in the aircraft industry. This report is also intended to be used to present background material for a course in instrumentation to be conducted for the benefit of the dynamics specialists in the CAA Regional Offices. The course will cover the basic principles associated with the proper selection, installation and calibration of vibration measuring equipment, with special emphasis on the application of the principles to the use of the specific equipment available at the present time in the Washington Office of the CAA.

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Rosenblith, W. A., & K. N. Stevens 1953 HANDBOOK OF ACOUSTIC NOISE CONTROL, VOL. II, NOISE AND MAN. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 52-204, June 1953

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Rosenfeldova, A. 1959 PRISPEVEK K PATOFYSIOLOGII VIBRACNI NEMOCI (CONTRIBUTION TO THE PATHOPHYSIOLOGY OF VIBRATION DISEASE) (Ceskoslovenska Fysiologie, Vol. 8, No. 6, 1959, in Czech.) Trans.: Czechoslovak Physiology, Praha, CSAV

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Rosenfeldova, A. 1962 CONTRIBUTION TO PATHOPHYSIOLOGY OF VIBRATIONAL DISEASES (OCUPATIONAL DISEASES)(Foreign Technology Command, Wright-Patterson AFB, Ohio, FTD-TT 62-538, 20 April 1962, ASTIA AD280939

ABSTRACT: Applying the plethysmorgraphic method for hand and distal half of fore-arm we studied the primary and tertiary variations on 16 plate straighteners suffering from vibrational disease and 14 normal healthy persons. The plate straightener is more exposed to vibration and that is why his left hand becomes afflicted first of all. Plethysmogram changes in the left and right hands of afflicted persons are given in dependence upon the working anamnestic data and upon subjective complaints and then compared with the plethysmograms of healthy persons.

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Rosmanith, J. 1960 FUNCTIONAL MECHANICAL CHANGES IN THE MOTOR AND STATIC APPARATUS IN RELATION TO WORK AND OCCUPATIONS. Pracov Lek 12:93-8, March 1960

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Roth, E. M. 1955 MEDICAL ASPECTS OF TRAVEL IN OUTER SPACE. Harvard Med. Alumni Bull. 20(4):10-13, July 1955

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Rozenblyum, D. Ye. 1955 OB OSNOVNYKH VOPROSAKH V FIZIOLOGII USKORENIY (Fundamental Problems in Physiology of Accelerations) Voyenno-meditsinskiy zhurnal (Moscow) 7: 89-95
See also: AF Technical Intelligence Trans., AFOIN Rept. AF 747345.

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Ruff, S. 1935 DIE BEGRENZUNG DFR FLIEGERISCHEN LEISTUNG DURCH DEN MENSCHLICHEN ORGANISMUS (The Limitation of the Flying Performance Because of the Human Organism)
Luftwehr. (Berlin) 2: 297-300

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Ruff, S. 1937 DIE LUFTKRANKHEIT (Airsickness)
Luftfahrtmedizinische Abhandlungen (Leipzig) 1: 277-285

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Rust, H.H. and U. Pommerening. 1954 EIGENFREQUENZANREGUGNLUFTGEFULLTER KORPERHOHLEN. (Excitation of inherent frequency resonance in air-filled body cavities.) Arch. Phys. Therap. 6:442-448

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Ryumin, V.P. 1959 THE EFFECT OF VIBRATION ON SECRETORY ACTIVITY OF THE DOGS STOMACH. (Viliyanii vabratsii na sekretsiyu zheludka sobaki.)
Trudy Perm. Med. Inst.

ABSTRACT: The investigations were carried out by means of Morodovtsev's method on 2 dogs, and on a third with a pavolo pouch. It was found that application of vibrations (electromagnetic vibrator producing 100 cps, 0.15 mm amplitude) locally to the gastric area stimulate gastric secretion and results in an increased acidity of the juice produced. The effect is less marked when the stomach is empty and stronger when digestion is actually taking place.

VIBRATION

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Sadoff, M., N.M. McFadden, & D.R. Heinle 1961 A STUDY OF LONGITUDINAL CONTROL PROBLEMS AT LOW AND NEGATIVE DAMPING AND STABILITY WITH EMPHASIS ON EFFECTS OF MOTION CUES (Ames Research Center, Moffett Field, Calif.) NASA Technical Note D-348, Jan. 1961. NASA N62-70922.

ABSTRACT: An investigation was conducted in several types of simulators, including the Johnsville centrifuge, and in flight to assess the effects of incomplete or spurious motion cues on pilot opinion and task performance over a wide range of longitudinal short-period dynamics. Most of the tests were conducted with a conventional center stick; however, a brief evaluation in the centrifuge of a pencil type side-arm controller was also made.

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SAE Riding Comfort Research Committee 1950 RIDE AND VIBRATION DATA - A SET OF REFERENCE CHARTS (Special Publications Dept. (SP-6), SAE, Inc., 29 W. 39th St., New York 18, N.Y.

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S. A. E. 1959 RIDE AND VIBRATION TERMINOLOGY
1959 S.A.E. Handbook (New York: S. A. E., 1959) 718:722

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Salathe, A. 1877 DE L'ANEMIE ET DE LA CONGESTION CEREBRALE PROVOQUEE MECANIQUEMENT CHEZ LES ANIMAUX PAR L'ATTITUDE VERTICALE OU PAR UN MOUVEMENT GIRATOIRE (Concerning Anemia and the Cerebral Congestion Mechanically Caused in Animals by Vertical Position or by a Gyratory Motion)
Physiol. Exper. 3: 251-272

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Salb, O.G. and R.E. Strum 1942 INSTRUMENT USEFUL IN THE ANALYSIS OF VIBRATION IN ORGANIZED LIVING TISSUE, U.S. Patent 2,294,015

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Salter, L.C. 1951 GENERAL SYSTEMIC ACUTE AND CHRONIC DISORDERS RESULTING FROM TRACTOR RIDING.
(A survey among 1800 general practitioners in Iowa. July, 1951)

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Sasagawa, K. 1938 INFLUENCE OF ULTRA-ACOUSTIC WAVES ON LIVING ORGANISMS Isikawa Mem. Vol. 182-199

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Sasagawa, K. 1940 EFFECT OF ULTRASONIC WAVES ON LIVING ORGANISMS Japan. J. Med. Sci. III. Biophysics 6:131-132

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Sato, M. 1961 RESPONSE OF PACINIAN CORPUSCLES TO SINUSOIDAL VIBRATION. In. J. Physiol. (London) 159:391-409, December 1961.

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Schaefer, H.H. 1960 VIBRATION AS REINFORCER FOR INFANT CHILDREN. J. Exp. Anal Behavior 3:160, April 1960

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Schaefer, V. H., & R. G. Ulmer 1959 A REPRESENTATIVE BIBLIOGRAPHY OF RESEARCH IN LOW-FREQUENCY MECHANICAL VIBRATION. (Army Medical Research Lab., Fort Knox, Ky.) AMRL Proj. No. 6-95-20-001-05; Rept. No. 405; ASTIA AD-228 941; 12 Nov. 1959

ABSTRACT: Object - It was desired to provide a collection of basic and representative publications in the field of low-frequency mechanical vibration.
Results- Following a survey of research in the area, and extensive bibliography has been assembled.

781

Schaefer, V.H., H.J. Link, J. U. Farrar, and D Wiens; and D.H. Yost 1959 LETHALITY IN RATS AS A FUNCTION OF FREQUENCY IN CONSTANT-DISPLACEMENT VIBRATION. USAMRL Report No. 390

ABSTRACT: Restrained rats died significantly more quickly as frequency increased. Variability in lethal time decreased as frequency increased. Heart and lung hemorrhages were frequently observed; pulmonary atelectasis, emphysema and edema and gastrointestinal hemorrhages were found occasionally. There was some evidence of age and sex differences in susceptibility to vibration. Castration increased the survival time in male rats. Range 10-45 cps at 0.25 in. Females tend to be more resistant than males.

782

Schaefer, V. H., R. G. Ulmer, & H. J. Link 1959 SOME BEHAVIORAL AND PHYSIOLOGICAL STUDIES IN VIBRATION. (Army Medical Research Laboratory, Fort Knox, Ky.) Proj. No. 6-95-20-001; Rept. No. 389; ASTIA AD-218 075; June 12, 1959

ABSTRACT: Data were obtained on behavioral and physiological effects of whole-body vibration. Vibrated rats ate less, weighed less, required more food to maintain a given weight level, were less active, and ran more slowly in several situations to food rewards than non-vibrated controls. Testicular atrophy and myocardial hemorrhages were observed in some of the vibrated animals. The majority of the results support an interpretation of vibration as producing a marked but transitory general organismic debility. Other highly important effects, however, seem permanent and irreversible. (AUTHOR)

783

Schaefer, V.H., H.J. Link, J.U. Farrar, D. Wiens and J.M. Dinsmore 1959 LETHALITY IN RATS AS A FUNCTION OF FREQUENCY IN CONSTANT - DISPLACEMENT VIBRATION (U.S. Army Medical Research Labs., Ft. Knox, Kentucky) Report No. 390, 20 June, 1959

ABSTRACT: It was the purpose of this research to study the relationship between frequency of constant-displacement whole-body vibration and lethal exposure time. It was also desired to investigate pathological effects of vibration.

784

Schafer, H. C. 1963 VIBRATION STUDIES FOR JET FIGHTER AND ATTACK BOMBER AIRCRAFT INSTRUMENTATION
(U. S. Naval Ordnance Test Station, China Lake, Calif.)
NOTS TP 3026 February 1963 ASTIA AD297 924

ABSTRACT: Data on the total vibration environment of the instrumentation of four Air Force century-series fighters and two Navy carrier-type jet fighter or light attack bomber aircraft are reviewed. These data are combined to represent a composite aircraft for the study of the vibration environment of instrument sensors and indicators for aircraft in these categories. The location zones of the instrument modules in the aircraft are taken into account, and vibration levels with respect to particular zones are discussed. The study indicates the need for additional data to be used in establishing typical vibration levels for aircraft instrumentation.

785

Schmidt, I. 1938 BIBLIOGRAPHIE DER LUFTFAHRTMEDIZIN. (Bibliography of Aviation Medicine)
(Berlin: J. Springer, 1938)

ABSTRACT: The first volume of an important bibliography, covering the literature in aviation medicine and high-altitude research up to the end of the year 1936. Constitutes a survey of world literature on the subjects of psychophysiology of the flier, altitude research, acceleration research (including centrifugal forces, parachute jumping, and air sickness), accidents, effects of sound, fatigue, flying sickness, flying fitness and aviation hygiene.

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Schmidt, I. 1943 BIBLIOGRAPHIE DER LUFTFAHRTMEDIZIN. ZWEITE FOLGE. EINE ZUSAMMENSTELLUNG VON ARBEITEN UBER LUFTFAHRTMEDIZIN UND GRENZGEBIETE, 1937 BIS ENDE 1940. (Bibliography of Aviation Medicine, Part Two).
Luftfahrtmedizin Vol. 8, No. 1, March 1943.

ABSTRACT: The second volume of an important bibliography, covering the literature in aviation medicine and high-altitude research through the years 1937 to the end of 1940. Constitutes a survey of world literature on the subjects of psychophysiology of the flier, altitude research, acceleration research (including centrifugal forces, parachute jumping, and air sickness), accidents, effects of sound, fatigue, flying sickness, flying fitness and aviation hygiene.

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Schmidt, I. 1948 BIBLIOGRAPHY OF AVIATION MEDICINE. VOLUME III. (Incomplete) (School of Aviation Medicine, Randolph Air Force Base, Texas)

ABSTRACT: A compilation of reports pertaining to Aviation Medicine and its borderline fields, covering the years 1941 through 1945, and including supplementary references for the year 1940.

After the present material had been supplemented above all by Anglo-American literature, it was supposed to be published as the third volume of the "Bibliographie der Luftfahrtmedizin". But the war prevented its completion. As we believe that these references will be of interest to many an aeromedical scientist, they will be disseminated for public use. The references concern first of all German publications, but include also those foreign papers which have been accessible. Anglo-American references have been omitted, since they are all listed in the "Bibliography of Aviation Medicine" by E. C. Hoff and J. F. Fulton.

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Schmitt, F.O., Olson, A.R. and C.H. Johnson 1928 EFFECTS OF HIGH FREQUENCY SOUND WAVES ON PROTOPLASM Proc. Soc. Exptl. Biol. Med. 25:718-720
See Also: Biol. Abstr. 6:24732 (1932)

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Schmitt, F. O., & B. Uhlemeyer 1930 THE MECHANISM OF THE LETHAL EFFECTS OF ULTRASONIC RADIATION. Proc. Soc. Expl. Biol. & Med. 27:626-628

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Schmitt, F.O., A.R. Olson, and C.H. Johnson 1932 EFFECTS OF HIGH FREQUENCY SOUND WAVES ON PROTOPLASM Biol. Abstr. 6:24732
See Also: Proc. Soc. Exptl. Biol. Med. 25:718-720

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Schmitz, M.A. 1957 THE PSYCHOLOGICAL ASPECTS OF FARM WORK EFFICIENCY
Boxtrom Research Laboratories Report No. 125
Also: Paper, American Society of Agricultural Engineers, Chicago, Illinois, December 16, 1957. ASAE paper no. 57-621

ABSTRACT: The author briefly summarizes much of what is known to date that could be applied to the farm tractor-farmer system and then covers rather thoroughly one of these variables that is now being studied in his laboratory.

The variable concentrated on in this paper is that of vibration. Past research over a wide range of frequencies and intensities of vibration have shown that man's physiological and psychomotor performance is generally affected by vibration. The present research is concentrated in the range of frequencies from one to seven cycles per second with amplitudes ranging from 3/16 inch to 1-1/8 inch. This range has been chosen on the basis of distributions reported by Simons and Radke as being typical of vibrations measured on rubber tired tractors and trucks. When man sits on a vibrating source he automatically deprives himself of a natural vibration isolator - his legs and feet, which isolate him very well from shock and from vibration frequencies over 1-½ cps. Tests on the vibration in farm equipment seats show the following trends: (1) visual acuity may be impaired up to 20%; (2) ability to perceive depth may be affected; (3) the ability to balance oneself may be impaired; (4) ability to track and keep constant foot pressure on a foot pedal shows greater error; (5) reaction time may be increased.

792

Schmitz, M.A. 1958-1959 EFFECT OF LOW FREQUENCY HIGH AMPLITUDE WHOLE BODY VIBRATION ON HUMAN PERFORMANCE. (Bostrom Research Laboratories, Milwaukee, Wisconsin) Progress Report No. 2, Contract no. DA-49-007-MD-797

ABSTRACT: The problems under investigation were: Do relatively low frequency and high amplitude vertical vibration (of the type found in work vehicles) affect human psychomotor performance?; What types of performance are affected?; How are these responses affected by exposure time?

Eighteen human subjects were exposed to vibrations (while seated on a wooden chair on a mechanical shake table) of 2.5 and 3.5 cps frequency at 2 displacements (4 conditions total) for 90 minute periods. Their performance was compared to a no-vibration condition on the following tests: Hand Tremor; Visual Acuity; Compensatory Tracking; Foot Pressure Constancy; Foot Reaction Time; and Body Equilibrium. Results show a significant decrement in performance for visual acuity, compensatory tracking, and foot pressure constancy. No significant changes were observed for hand tremor, foot reaction time or body equilibrium test measures.

The performance decrements appear to be a direct function of the vibration stimulus. No reliable change in performance for any of the measures was observed

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Schmitz, M.A., and A.K. Simons 1959 MAN'S RESPONSE TO LOW FREQUENCY VIBRATION (Amer. Soc. of Mech. Engineers (ASME), Bostrom Research Labs, Milwaukee, Wisconsin) November 1959, Report No. 59-A-200.

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Schmitz, M.A. 1959 THE EFFECT OF LOW FREQUENCY, HIGH AMPLITUDE VIBRATION ON HUMAN PERFORMANCE (Bostrom Research Laboratories, Dept. of Army, Washington 25, D.C., Office of the Surgeon Gen.) Progress Report No. 21, January 1960, AD 218 201.

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Schmitz, M.A. and A.K. Simons 1959 MAN'S RESPONSE TO LOW-FREQUENCY VIBRATION (Bostrom Res. Lab. Milwaukee, Wisc.) ASME Publication, Paper No. 59-A-200, Nov. 1959.

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Schmitz, M.A., A.K. Simons, & C.A. Boettcher 1960 THE EFFECT OF LOW FREQUENCY, HIGH AMPLITUDE WHOLE BODY VERTICAL VIBRATION ON HUMAN PERFORMANCE. (Bostrom Research Labs., Milwaukee, Wis.) Rept. No. 130; Contract DA 49-007-md-797; Jan 31, 1961. ASTIA AD 241 792.

ABSTRACT: The problem investigated was essentially one of determining whether certain performances of humans would be affected by low frequency, high amplitude, vertical vibration; and if so, to what degree: and whether exposure time plays a significant role. This type of vibration is found in most ground vehicles. General conclusions based upon three studies are that whole body, low frequency, large amplitude, vertical vibration appears to: (1) increase error for compensatory tracking tasks during vibration as compared to control trials; (2) increase error for a constant foot pressure task as a function of frequency and intensity of vibration; (3) increase reaction time only after vibration ceases and is negatively correlated with input intensity; and (4) impair visual acuity as compared to control trials. Exploratory physiological studies with three dogs and one human are described. (Author)

797

Schmitz, M.A. 1959 THE EFFECT OF LOW FREQUENCY, HIGH AMPLITUDE WHOLE BODY VERTICAL VIBRATION ON HUMAN PERFORMANCE (Bostrom Research Laboratories, Milwaukee, Wisc.) Rept. no. 128, Sept. 24, 1959. ASTIA AD 218 201

NOTE: CARI P&S 30.1

ABSTRACT: Eighteen human subjects were exposed to vibrations of 2.5 and 3.5 cps. frequency at 2 displacements for 90 minute periods. Pre and post control measures were also taken before and after each test session. Their performance was compared to a no-vibration condition on the following tests: (1) Hand

Tremor; (2) Visual Acuity; (3) Compensatory Tracking; (4) Foot Pressure Constance (5) Foot Reaction Time and (6) Body Equilibrium. Results show a significant decrement in performance for visual acuity, compensatory tracking, and foot pressure constancy. No significant changes were observed for hand tremor, foot reaction time or body equilibrium test measures. The performance decrements appear to be a direct function of the vibration stimulus. No reliable change in performance for any of the measures was observed for length of time exposed.

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Schmitz, M.A. and C.A. Boettcher. 1960 SOME PHYSIOLOGICAL EFFECTS OF LOW FREQUENCY, HIGH AMPLITUDE VIBRATION. ASME Paper No. 60-Prod. 17 (Bostrom Research Labs, Milwaukee, Wis.) May 1960.

ABSTRACT: Man's need to move from place to place has led him to make use of various modes of transportation which have one factor in common, viz., whole body vibration in the range of 1-8 cps. This environmental variable has produced a need for research to determine its physiological effects on man. The present investigation was conducted in compliance with this need.

One human subject and 3 dogs were exposed to frequencies in the 1-8 cps range and the following physiological measures taken on the three dogs: a) blood pressure in the right atrium of the heart; b) blood pressure in the right ventricle of the heart; c) blood pressure in the left ventricle of the heart; d) blood pressure in the aorta at heart level; e) heart rate, and f) cardiac output.

Blood pressure and heart rate were measures taken on the human subject. The results of the exploratory physiological studies in general showed evidence of the following changes; 1) an increase in systolic and a decrease in diastolic pressure in the aorta, and right atrium in anesthetized dogs. 2) an increase in systolic pressure in man, but no appreciable change in diastolic pressure. 3) an increase in cardiac output. 4) large variations in pulse pressure. And 5) no appreciable change in heart rate. All changes appeared to be a function of frequency of vibration as well as intensity of vibration.

799

Schmitz, M. A., A. K. Simons, & C. A. Boettcher 1960 THE EFFECT OF LOW FREQUENCY, HIGH AMPLITUDE WHOLE BODY VERTICAL VIBRATION ON HUMAN PERFORMANCE. (Bostrom Research Labs., Milwaukee, Wisc.) Final Rept. 1 Apr. 1957 - 31 Jan. 1960; Rept. No. 130; Contract DA 49-007-md-797; ASTIA AD-241 792

ABSTRACT: The problem investigated was essentially one of determining whether certain performances of humans would be affected by low frequency, high amplitude, vertical vibration; and if so, to what degree; and whether exposure time plays a significant role. This type of vibration is found in most ground vehicles. General conclusions based upon three studies are that whole body, low frequency,

large amplitude, vertical vibration appears to: (1) increase error for compensatory tracking tasks during vibration as compared to control trials; (2) increase error for a constant foot pressure task as a function of frequency and intensity of vibration; (3) increase reaction time only after vibration ceases and is negatively correlated with input intensity; and (4) impair visual acuity as compared to control trials. Exploratory physiological studies with three dogs and one human are described. (AUTHOR)

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Schneider, O. 1955 THE FOURTH CONGRESS OF THE FRENCH LANGUAGE SECTION OF THE INTERNATIONAL AERO-MEDICAL ASSOCIATION
Office of Naval Research, London. Technical Rept. No. ONRL-111-55, Oct. 27, 1955 ASTIA AD 82 711

ABSTRACT: The Fourth Congress of the French Language Section of the Association met in Paris 27-30 September 1955. The morning programs were devoted to discussions of special topics, including noise and vibration effects, aeronautica aspects of gastro-duodenal ulcer and pulmonary tuberculosis, and tropical diseases of importance in aviation. Afternoon sessions were devoted to a wide variety of aero-medical subjects. At the close of the Congress, the French Language Section voted to reconstitute itself as the European Section, with the aim of increasing the scope of its activities. The 1956 Congress will meet in the Netherlands at a place as yet undecided, and the 1957 Congress is scheduled for one of the Scandinavian countries.

801

Schmitz, M.A., A.K. Simons, and C.A. Boettcher 1961 THE EFFECT OF LOW FREQUENCY, HIGH AMPLITUDE WHOLE BODY VERTICAL VIBRATION ON HUMAN PERFORMANCE. (Bostrom Research Laboratories , Milwaukee, Wisconsin) Final report, Contract #DA-49-007-MD-797, January 31, 1961

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Scholtz, G. 1935 AKTUELLE FRAGEN DER PHYSIOLOGIE DES FLIEGENS (Actual Questions About the Physiology of Flying)
Deutsche Medizinische Wochenschrift (Stuttgart) 61: 780

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Schreiber, V. 1950 PUSOBENI MECHANICKYCH OTRESU NA ENDOKRINNI SYSTEM. (The effect of mechanical vibration on the endocrine system.) Pracovni lek. 2:153-165

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Schreiber, V. 1950 THE EFFECT OF MECHANICAL SHAKING ON THE ENDOCRINE SYSTEM, PART I. Pracovni Lekarstvi (Czech.) 4:153

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Schreuer, E. 1947 THE PHYSICAL BASIS OF BIOLOGICAL AND THERAPEUTIC EFFECTS OF ULTRASONICS Aerzil. Forsch 1:118-121

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Schroeder, H.A. 1953 PERTINENT STUDIES OF HUMAN TO ACCELERATION Shock and Vibration Bulletin No. 19

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Schwichtenberg, A.H. 1960 SPACE MEDICINE AND ASTRONAUT SELECTION Minnesota Med. 43(12): 797-812 Dec. 1960

ABSTRACT: In a manned space flight project, there is an interdependence in the fields of medicine, design engineering, and human engineering. The author describes the physical tests given during the selection of astronauts. He suggests that the knowledge and experience gained from research in aviation medicine be applied to the general medical practice.

808

Sebek, Jan, Valja Styblova 1959 VEGETATIVNI ZMENY U ONEMOCNENI Z VIBRACI (VEGETATIVE CHANGES IN THE EFFECTS OF VIBRATION) (Casopis Lekaru Ceskych, Vol. 98/1959, No. 25, 1959, in Czech.) Summary in: Russian, English, French

ABSTRACT: This is a preliminary report of the vegetative disturbances in 150 various types of workers, with particular attention to the types of work in the various sub-groups. There was a vegetative sympotomatology in 63 %, in particular vasomotor, thermal and sudomotor with vascular pain, various generalized changes, to which attention is given in the present article, while trophic changes will be concentrated on later.

809

Selye, H. 1950 THE PHYSIOLOGY AND PATHOLOGY OF EXPOSURE TO STRESS. (ACTA, Inc., Montreal, Canada)

810

Serbin, Hyman 1953 EFFECT OF FREE BODY MOTION ON FLUTTER. (Hyman Serbin) AF Technical Rept. No. 5988; Contract AF 33(038)11067; ASTIA AD-14 070; Jan. 1953

ABSTRACT: The problem considered is that of the longitudinal, short-period oscillations of aircraft and missiles in which an additional, elastic bending participates to overcome the rigid body damping. Both dynamic flutter stability and classical dynamic stability analyses are made of an elastic missile. The analyses indicated that the longitudinal dynamic instability of a body stabilized by a lifting surface which is flexible in bending can be predicted either by flutter theory or the classical dynamic stability theory which includes aeroelastic bending. For aircraft or missiles with only one lifting surface, the most critical configurations from the standpoint of low-frequency instability were those with high wing loadings, the body mass concentrated near the center of gravity, and the lifting surface located between 1 to 2 chord lengths behind the center of gravity. Increasing the sweepback angle of the lifting surfaces, while keeping the static stability constant, raises the instability speed. The instability is almost eliminated by adding a rigid tail behind the lifting surface. An equation is presented which approximately predicts the critical instability speed for a body with one unswept lifting surface. (ASTIA)

811

Semotan, J. 1961 VYZAM DUSEVNI HYGIENY V ASTRONAUTICE (THE IMPORTANCE OF MENTAL HYGIENE IN ASTRONAUTICS)
Cekoslov. Psychiat. (Prague) 57(1): 61-69, Jan. 1961. In Czech. with English summary.

ABSTRACT: Possible damage to the mental facilities of astronauts during space flight is discussed in this article. The dangerous influences include weightlessness, acceleration and deceleration, noise, vibration and isolation. The author suggests a psychogenic approach to the selection of spacemen. He also describes the present and future research for the preservation and development of mental health in the space crew.

812

Shablin, V.A. 1961 THE INFLUENCE OF ANGULAR DISPLACEMENT OF A JOLTING NATURE ON THE HUMAN BODY. (O Viliyanii Na Organizm Cheloveka uglovykh [illegible]meschenii Tolchkoobraznogo Khuraktera) Gigena i sanitariya (USSR) 26: 46-51

ABSTRACT: Some observations on 10 healthy persons 20 to 22 years indicated that the nature of functional changes in the body depends on the frequency of

angular displacements, the number and magnitude of the jolts. Angular displacements with a frequency of 23 per minute (0.38 cps) and an amplitude of 6° where the jolts were 13 per minute and an acceleration of 1.5 g acting on the human body for 2 hours originally changes the functional condition of the vestibular apparatus and its excitability. Bradycardia is noted in the cardio-vascular system after the effect of these vibrations. With the increase in the rate of angular displacement from 23 to 48 per minute (0.8 cps) keeping other physical factors constant there is an increase in volume of pulmonary ventilation (to 174%) oxygen consumption (162% energy expenditure of the body (177%). Under these conditions which are otherwise the same the increase in the number of jolts per minute with simultaneous although slight increase in their magnitude from 1.0 to 2.0 g. Along with the changes mentioned leads to distinct phenomena of cardio-vascular and nervous system excitation.

813

Shabalin, V. A. 1962 O KHARAKTERE IZMENENIIA USLOVNOREFLEKTORNYKH REAKTSII LIUDEI PRI VOZDEISTVII OKISI UGLERODA I VIBRATSII (ON THE CHARACTERISTICS OF CHANGES IN THE CONDITIONED REFLEX REACTIONS IN PEOPLE DURING THE ACTION OF CARBON MONOXIDE AND VIBRATION) Biulleten' eksperimental' noi biologii i meditsiny (Moskva) 53(1):45-47, Jan. 1962

ABSTRACT: Conditioned reflexes (CR) were elaborated in four groups of 9 subjects each, as follows: (a) Group I--blinking to sound as the conditioned stimulus (CS) and air blast as the unconditioned stimulus (UCS); (b) Group II--motor CR's (according to A. G. Ivanov Smolenskii) with speech reinforcement to yellow and green lights as the positive stimulus and red light as the negative stimulus; (c) Group III--latencies of reactions to sound and color signals during electrical stimulation of the skin on the forearm; and (d) Group IV--simple reaction times registered to the appearance of colored stimuli without UCS reinforcement. Experimental conditions involved a 15-20 min. exposure to carbon monoxide in concentrations up to 2.5 mg./liter, and vibrations of 15-18 jolts per minute at an impact level of 1.5-2 g. Under both conditions variability of CR latencies was considerably reduced, suggesting lowered functional mobility of the cortical processes.

814

Sherrick, C. E., Jr. May 1953 VARIABLES AFFECTING SENSITIVITY OF THE HUMAN SKIN TO MECHANICAL VIBRATION. Reprint from J. Experimental Psychology 45(5)273-282;
NOTE: CARI P&S 30.1

ABSTRACT: An examination was made of the role of the skin as a mechanical system in producing the usual U-shaped sensitivity curve to vibration as a function

of frequency. It was assumed that the receptors sensitive to mechanical vibration do not respond selectively to frequency and that either skin or bony tissue possesses mechanical characteristics such that it has a natural period of vibration, accompanied by maximum spread of disturbance, in the frequency region of 100 to 300 cy./sec. Hypotheses based on the above assumption were tested experimentally and it was concluded that: (a) Both skin and bony tissue may have resonant points within the usual ffequency range of vibrotactile investigation. (b) The conductivity of skin is maximal at the frequency of greatest vibratory sensitivity, and bony tissue is more efficient in the propagation of disturbances. (c) Mechanica impedance is minimal at the frequency of greatest sensitivity, and bony tissue shows a more sharply tuned resonance curve than relatively bone-free areas. The results of other investigators were discussed in the light of the present research, and it was concluded that more extensive research on sensitivity of pressure "spots" and on the physical characteristics of the skin may reveal the cause of the lack of agreement of results at present in the literature.

815

Shpil'berg, P.I. 1962 ELEKTROENTSEFALOGRAFICHESKIE ISSLEDOVANIIA PRI VIBRATSIONNOI BOLEZNI, OBUSLOVLENNOI VOZDEISTVIEM OBSHCHEI VIBRATSII (ELECTROENCEPHALOGRAPHIC STUDIES OF VIBRATION SICKNESS CAUSED BY THE ACTION OF GENERAL VIBRATION
Gigiena truda i professional'nye zabolevaniia (Moskva), 6 (4): 14-22. April 1962. In Russian, with English summary (p. 22)

ABSTRACT: Electroencephalographic investigation of 105 cases of vibration sickness showed diffuse or bilateral encephalographic changes in the majority of the cases and localized changes in a few cases. The EEG were characterized by synchronized alpha and theta waves, rarely delta waves. Synchronized waves in form of spindles appeared at rest or upon provocation, e.g., hyperventilation. Sometimes the waves were continuous. External stimuli resulted in prolonged latency of the response. Alpha waves were obtained chiefly from occipital area, while theta waves were derived from the sincipito-temporal areas or occurred diffusely. In some patients the EEG shifts were reversible while in others they persisted even after removal of the vibration hazard.

816

Shchelkunov, I. P. 1962 ROENTGENOLOGICAL DATA ON CHANGES IN THE OSTEOARTICULAR SYSTEM DURING VIBRATION IN DYNAMICS.
In Ortop. Travm. Protez. 23:42-48, July 1962 (Russian)

817

Simons, A.K. 1951 TRACTOR RIDE RESEARCH
Paper: Society of Auto. Engineers National Tractor Meeting, 10-13, Sept. 1951
S.A.E. Preprint 653
See also: Society of Automobile Engineers Transactions, April 1952, Pp. 357-364
Note: CARI P&S 30.1

ABSTRACT: It cannot be over emphasized that the job the tractor must do, the position of the seat on the tractor, and the posture of the body in the seat will all affect tractor seat suspension design. One scientific approach to the problem is to (1) record the absolute tractor motion in all 3 directions simultaneously while the field operation is in progress, (2) subsequently analyze those records in the light of human tolerances and (3) design the seat suspension to isolate against the objectionable part of this motion. The use of such electronic equipment opens up new fields of investigation to the suspension engineer and the medical profession to determine physical and human responses to all conditions of motion. The challenge is to the seating engineer to try to devise a seat suspension that will do as good a job in isolating vibration and supporting his body as do his own legs without that unfortunate adjunct of becoming fatigued.

818

Simons, A.K. 1952 TRACTOR RIDE RESEARCH.
SAE Transactions, 6: 357-364

ABSTRACT: The results of these studies revealed: a) the test course ride typified plowing and discing operations, b) the predominance of all motion was near the natural frequency of the tractor in the vertical and transverse directions, c) the accelerations were consistantly beyond Jacklin's disturbing comfort level in the vertical and transverse directions and occasionally in the longitudinal direction, d) the need for reducing transverse and vertical vibrations appeared to be mutually desirable.

819

Simons, A.K. 1955 HEALTH HAZARDS OF ROUGH RIDING VEHICLES
(Bostrom Research Laboratories, Milwaukee, Wisconsin) Rept # 113, July 1955.

See also Report to Commission on Accidental Trauma, Dept. of Defense.

ABSTRACT: In spite of mounting evidence that truck and tractor riding conditions are undesirable, investigations studying human reactions in the vibration range

820

Simons, A.K., A.O. Radke & W.C. Oswald 1956 A STUDY OF "TRUCK RIDE" CHARACTERISTICS OF STANDARD CUSHION VS. SUSPENSION TYPE SEATS IN MILITARY VEHICLES
Detroit Arsenal and Aberdeen Proving Ground Contract No. DA-11-022-ORD-1999; ORD Project TT1-696; DA Project 5f7201001; Sub-Directive 6.405330-11-80802. Rept. No. 118, 16 March 1956.

ABSTRACT: The purpose of this study was to electronically record and compare the "truck ride" (1-8 cps) felt by the truck driver in a standard seat cushion assembly and suspension seats installed in a rubber-tired military truck and driver over permanent test courses at the Aberdeen Proving Ground. Truck acceleration levels in the vertical, transverse and longitudinal directions were found to exceed the "intolerable" and "uncomfortable" limits suggested by vibration table studies in Europe and the U.S.A. The standard driver's cushion seat amplified vertical basic truck motions (1½-6 cps), transmitting an average of 124% of the vehicle vibration intensity to the driver's belt on the Belgian block and staggered bump courses. The assistant driver's seat averaged 139% transmission. The suspension seats attenuated the basic truck motions (1½-6 cps) to the extent of transmitting an average of 80% of the truck vibration intensity

821

Simons, A.K. 1956 MECHANICAL RESPONSE OF THE HUMAN BODY TO WHEELED VEHICLE VIBRATION, 1-6 CPS. (Paper presented at the 4th Annual Conf. of Human Engineers, New York University, Sept. 17, 18, 1956) Bostrom Res. Labs. Rept. no. 121

ABSTRACT: Laboratory vibration table studies on man in a rigid seat reveal man's gross natural frequency of about 4 cps and the different responses of man's head, neck and belt and the effect of muscle tone.

The truck driver exerts physical effort to control his "ride" when vibration isolation is not provided. This human effort is minimized and vibration isolation achieved only when the predominant vehicle frequencies are avoided in truck seat design.

Research should be accelerated on the effects of truck "ride and vibration" (1-8 cps) on the health, safety and efficiency of the soldier-driver and passengers

to the driver's belt for suspension A (69% for suspension B), over the same test courses. These field test results correlate with performances determined in laboratory vibration table studies of man on the standard and suspension type seats. This correlation is important because laboratory vibration table studies are easier to make and are subject to greater experimental controls. Laboratory vibration studies on man in a rigid seat were made (0-6cps) which show the different responses of man's head, neck and belt and the gross effects of variation in muscle tension.
Some theories are presented on man's expenditure of energy in holding onto steering wheel and pushing into back cushion to reduce the amplifying effect of conventional cushions. The serious lack of data throughout the world on man's short and long term reaction to vibrations in the 1-8 cps range is emphasized.

822

Simons, A.K. & M.A. Schmitz 1957-58 THE EFFECT OF LOW FREQUENCY, HIGH AMPLITUDE WHOLE BODY VIBRATION ON HUMAN PERFORMANCE. (Research & DevelopmentDivision, Office of the Surgeon General Dept. of the Army, Washington, D.C.) Progress Report No. 1 April 1, 1957 - Jan. 31, 1958. ASTIA AD 157 778

ABSTRACT: Two sets of five subjects each were used for the exploratory phase of this research. Variables explored included: 1) Tapping rate; 2) Hand reaction time; 3) Hand tremor; 4) Body sway; 5) Mental addition; 6)Depth perception; 7) Visual acuity; 8) Tracking; 9) Foot pressure constancy; and 10) Foot reaction time.

Each subject, during this pilot phase of the project, was exposed to two vibration conditions and a control condition in a random order. The vibration conditions were i) 2.5 cycles per second with a full amplitude of 1/2 inch giving an intensity level of .17 g acceleration; and 2) 3.5 cycles per second with a full amplitude of 1/2 inch giving an intensity of .31 g acceleration. Measures were taken before, at intervals during, and after the two vibration conditions and the control condition. All subjects were tested on a shake

823

Simons, A.K. 1956 MECHANICAL RESPONSE OF THE HUMAN BODY TO WHEELED VEHICLE VIBRATION, 1-6 CPS
(This is a summary of Report #118, Sept, 1956)

824

Simons, A. K., & M. A. Schmitz 1958 THE EFFECT OF LOW FREQUENCY, HIGH AMPLITUDE WHOLE BODY VIBRATION ON HUMAN PERFORMANCE. (Bostrom Research Labs., Milwaukee, Wisc.) Progress Rept. No. 1, 1 Apr. 1957 - 31 Jan. 1958; Contract DA 49-007-md-797; ASTIA AD-157 778

ABSTRACT: The problem under investigation is: 1) Does low frequency, relatively high amplitude vertical vibration affect human performance?; 2) What kinds of per formance does it affect?; and 3) What are the effects as a function of time exposed? Two sets of five subjects each were used for the exploratory phase of the research. Variables explored included: 1) Tapping rate; 2) Hand reaction time; 3) Hand tremor; 4) Body sway; 5) Mental addition; 6) Depth perception; 7) Visual acuity; 8) Tracking; 9) Foot pressure constancy; and 10) Foot reaction time. Each subject, during this pilot phase of the project, was exposed to two vibration conditions and a control condition in a random order. The vibration conditions were 1) 2.5 cycles per second with a full amplitude of 1/2 inch giving an intensity level of .17 g acceleration; and 2) 3.5 cycles per second with a full amplitude of 1/2 inch giving an intensity level of .31 g acceleration. Measures were taken before, at intervals during, and after the two vibration conditions and the control condition. All subjects were tested on a shake table while seated on a wooden contoured chair. Results appear to show trends toward table while seated on a wooden contoured chair.

Results appear to show trends toward decrement in performance in: 1) Hand reaction time; 2) Body sway: 3) Depth perception; 4) Visual acuity; 5) Tracking: and 6) Foot pressure constancy.

These variables have been chosen for further study using a sample of 20 male university students as subjects. This study is now underway and whether these trends hold and become conclusions depends upon data now being collected

decrement in performance in: 1) Hand reaction time; 2) Body sway; 3) Depth perception; 4) Visual acuity; 5) Tracking; and 6) Foot pressure constancy. These variables have been chosen for further study using a sample of 20 male university students as subjects. (AUTHOR)

825

Sisakyan, N. 1961 MANNED SPACE FLIGHT PROBLEMS DESCRIBED FBIS, USSR & East Europe, Nr. 145, July 28, 1961

ABSTRACT: Successful completion of a series of experiments with satellite ships made it possible to start preparing for man's flight into space. Results of research have shown that the limits of endurance could be considerably expanded, provided one makes intelligent use of the organism itself, and even more-so of the proper technical means. The state of weightlessness is considered one of the characteristic factors of space flight. Experiments carried out on animals which were returned to earth proved that their 24-hour period in a state of weightlessness had no negative effect on their main functions. When a very careful analysis was carried out, some slight changes in the activity of the blood circulation apparatus had been discovered. (CARI)

826

Sisakyan, N.M. 1961 BIOLOGY AND COSMIC FLIGHTS
Dept. of Commerce, Washington, D.C. JPRS Trans. No. 9469, June 19, 1961
Original Source: Priroda (Nature) (Moscow) (1): 7-16, Jan. 1961

ABSTRACT: Soviet accomplishments in space biology in terms of space flights to date are summarized, and the problems to be resolved for successful manned cosmic flights are discussed. Vertical rocket flights carrying animals to 450 km altitude solved certain problems of assuring safety and special recovery under special flight conditions. The effects of acceleration and deceleration were manifested in the elevation of blood pressure, an increase in pulse frequency and certain changes in the electrocardiogram; during weightlessness these changes gradually decreased and approached the original level. After 5 to 6 minutes or at the end of the weightless period, the indices of the main physiological functions returned to the original level. The physiological information obtained by telemetry is still not completely processed; preliminary data testifies that changes in the physiological indices did not exceed changes observed during training.

827

Sisakyan, N.M. & V. Parin 1961 (COMMENTS)
Vestnik vozdushnogo flota 4: 34-39; April

828

Sisakyan, N.M. & V.I. Yazdovskiy 1962 METHODS AND TECHNIQUES OF BIOMEDICAL CONTROL IN SPACE FLIGHT
Aerospace Information Division, Washington, D.C. AID Report No. 62-201, Dec. 19, 1962. ASTIA AD 294 573
Original Source: Pervyye Kosmicheskiye Polety Cheloveka (First Space Flights of Man) Moskva, Izd-vo AN SSSR, pp. 167-174

ABSTRACT: Physiological measurements performed on Vostoks I and II included electrocardiography (with two sets of leads), pneomography, and registration of pulse rate. In addition, kinetocardiography was performed on Vostok II. The pulse rate was monitored continuously by means of a cardiophone which transformed the R peaks of electrocardiographs into rectilinear pulses of 0.1 to 0.2 sec duration. These were modulated by an auditory frequency of 3 kc and were transmitted continuously by a signal transmitter on a frequency of 19.95 mc. Other measurements were transmitted periodically. During reentry all physiological parameters were registered by means of a self-contained onboard system. After ejection of the cosmonaut, registration was carried on by means of a self-contained device located on his person. Transmitted data on pulse frequency was recorded on undulating and on magnetic tapes. (Author)

829

Sisakyan, N.M. & V.I. Yazdovskiy 1962 PHYSIOLOGICAL RESPONSES OF COSMONAUTS DURING SPACE FLIGHT
Aerospace Information Division, Washington, D.C. AID Rept. No. 62-202
Dec. 19, 1962 ASTIA AD 294 572
Original source: Pervyye Kosmicheskiye Polety Cheloveka (First Space Flights of Man) Moskva, Ozd-vo AN SSSR, pp. 176-198

ABSTRACT: This publication presents a detailed report of the physiological responses of Yu. A. Gagarin and G.S. Titov to space flight. The record of changes in pulse rate and respiration rate during acceleration and weightlessness are presented.

830

Sisakyan, N.M. 1963 PROBLEMS OF SPACE BIOLOGY. (Problemy Kosmicheskoy Biologii) (Foreign Tech., Div., Air Force Systems Command, Wright-Patterson AFB, Ohio) Trans. no. FTD-MT-62-78 from Izdatel'stvo Akademii Nauk SSSR. pp. 1-462, 1962 ASTIA AD-299 677

ABSTRACT: Experimental and theoretical works carried out chiefly within the last years, are presented. The first part includes theoretical and survey articles, encompassing the main problems of cosmic biology and giving general presentation concerning results and perspective of researches. The second part is devoted to an account of the results of experimental researches conducted under the conditions of real space flights on ships-satellites in 1960-1961. The third part summarizes the results of the biilogical experiment on the second artificial satellite of the Earth with the dog Layka-- the experiment which searches in the cosmos. In the fourth part are entered experimental laboratory and methodic works. (author)

831

Sisakyan, N.M. & V.I. Yazdovskiy 1962 RESULTS OF POSTFLIGHT MEDICAL EXAMINATIONS OF G.S. TITOV
Aerospace Information Division, Washington, D.C. AID Report No. 62-204
Dec. 19, 1962 ASTIA AD 294 571
Original Source: Pervyye Kosmicheskiye Polety Cheloveka (First Space Flights of Man) Moskva, Izd-vo AN SSSR pp. 125-153

832

Sisakyan, N.M., V.V. Parin et al. 1962 PROBLEMS OF SPACE BIOLOGY AND PHYSIOLOGY
Joint Publications Research Service, New York JPRS-16083, Nov. 7, 1962
ASTIA AD 299 909

833

Skolnick, A. 1938 UPPER LIMIT OF CUTANEOUS SENSITIVITY TO FREQUENCY OF VIBRATION IN THE WHITE RAT J. Exptl. Psychol 22:273-276

834

Skilling, D. C. 1961 ACOUSTIC HYPER-ENVIRONMENT AND ITS SIMULATION
In 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D. C. (Mt. Prospect, Ill.: Institute of Environmental Sciences, P. O. Box 191) pp. 611-621

835

Sjoberg, A.A. 1931 EXPERIMENTELLE STUDIEN UBER DEN AUSLÖSUNGSMECHANISMUS DER SEEKRANKHEIT (Experimental Studies Concerning the Release Mechanism of Seasickness)
Acta Oto-Laryngologica (Stockholm) Supp. 14:1

836

Skudrzyk, E. 1949 THE MECHANICAL AND BIOLOGICAL EFFECTS OF ULTRASONICS BASED ON THE ANALOGY BETWEEN SOUND AND HEAT Acta physiol. Austriaca 3(1):56-65
See Also Phys. Abstr. 53:640 (1950)

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Skudrzyk, E. 1950 THE MECHANICAL AND BIOLOGICAL EFFECTS OF ULTRASONICS BASED ON THE ANALOGY BETWEEN SOUND AND HEAT Phys. Abstr. 53:640
See Also: Acta physiol. Austriaca 53:640

838

Slager, U.T. 1962 SPACE MEDICINE
Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1962
Library of Congress Catalog Card No. 62-12491

ABSTRACT: Contents include papers on the following subjects: "The Conc. of Space Flight"; "Development of the Space Vehicle"; "The Concept of Space Medicine" "Pressure and Oxygen in the Upper Atmosphere and Space"; "Meteoritic Material in the Upper Atmosphere and Space"; "Experimental Space Simulation"; "The Biological Effects of Low Pressure"; "The Temperature During Flight in the Atmosphere"; "The Temperature During Orbital Flight"; "Experimental Space Simulation"; "The Biological Effects of Temperature Variations"; "Radiation in Space"; "Experimental Space Simulation"; "Interaction of Electromagnetic Radiations With Matter"; "The Biological Effects of Non-Ionizing Radiation"; "Ionizing Radiations in Space"; "Experimental Space Simulation"; "Mode of Action of Ionizing Radiations"; "The Biological Effects of Ionizing Radiation"; "Dynamics of Space Flight"; "Experimental Simulation of Space Flight Accelerations"; "The Biological Effects of Acceleration"; "The Dynamics of Weightlessness"; "The Experimental Simulation of Weightlessness"; "The Biological Effects of Weightlessness"; "Noise and Vibration in Space Flight"; "Experimental Space Simulation"; "The Biological Effects of Sound and Vibration"; "Metabolic

839

Smith, A.M.O. and C.F. Lombard 1951 THE EFFECT OF ELASTICITY UPON THE PRESSURES WITHIN A LIQUID FILLED TUBE WHEN SUBJECTED TO FLUCTUATING FORCES (Department of Aviation Medicine, Univ. of Southern Calif., School of Med., Los Angeles, Calif.) Contract NSori77, Task 1, 31 March 1951

ABSTRACT: In order to better understand the recorded blood pressures of animals exposed to the fluctuating accelerations of the Epicyclic contrifuge, a theoretical analysis is presented so that the nature of the dynamic responses can be envisioned. This is a highly mathematical and theoretical treatise.

Requirements in Space"; "Experimental Space Simulation"; "The Biological Effects of Life Support Systems Imbalance"; "Life-Support Systems"; "Ionizing Radiation"; "Particulate Matter"; "Toxic Chemical Compounds"; "Psychological Stress in Space" "Experimental Space Simulation"; "Psychological Effects of Space Flight"; "The Space Environment"; and "Biology of Far Space".

840

Smith, G.B., Jr., S.J. Gerathewohl et al. 1962 BIOASTRONAUTICS
National Aeronautics and Space Administration, Washington, D.C. NASA-SP-18, NASA N63-11508

ABSTRACT: This publication contains papers presented at Session L of the NASA-University Conference on the Science and Technology of Space Exploration, at Chicago, Illinois on November 1-3, 1962. The following papers are presented: "Environmental Biology" by G.B. Smith, Jr. (NASA, Manned Spacecraft Center); "Physiological and Behavioral Sciences" by S.J. Gerathewohl and B.E. Gernandt (NASA. Ames Research Center); "Bioengineering" by Richard S. Johnston (NASA. Manned Spacecraft Center); "Exobiology" by R.S. Young (NASA. Ames Research Center).

841

Smith, G.B. 1962 ENVIRONMENTAL BIOLOGY
In: Proceedings of the NASA-University Conference on the Sciences and Technology of Space Exploration, 1:. 395-398. (Washington, D.C.: National Aeronautics and Space Administration) December 1962 NASA SP-18

ABSTRACT: Environmental factors in space flight and their effects on man are discussed as they relate to promoting and maintaining are included: (1) biodynamics, involving noise and vibrations, sustained accelerations and impacts, and the effects of weightlessness; (2) radiations from the sun, the stars, the Van Allen belt, and nuclear-reactor propulsion or power systems; (3) life support, consisting of providing food, water, oxygen, etc.; and (4) medical selection and maintenance. The National Aeronautics and Space Administration has used the skills of various federal agencies, the academic world, and industry, as well as its own centers in these endeavors.

842

Snow, M.L. H.A., 1928 SOME PHYSIOLOGICAL EFFECTS OF MECHANICAL VIBRATION Physical Therap. 46:113-123

843

Snow, Mary L.H.A. 1930 MECHANICAL VIBRATION-ITS STATUS IN MEDICINE. Phys. Therapeutics, 48:433-442

844

Snyder, F. W. 1957 PRELIMINARY STUDY OF AIRCREW TOLERANCE TO LOW-FREQUENCY VERTICAL VIBRATION. (Boeing Airplane Co., Wichita, Kansas) Document No. D3-1189; Contract AF 34(601)2975; ASTIA AD-155 462; 3 July 1957

ABSTRACT: Five aircrewmen were subjected to vertical harmonic motions of frequencies ranging from 3 to 30 cps with input accelerations ranging to a maximum of over 2.5 g. The subjective judgments of the effect of the vibrations on the aircrewmen were reported by them in terms of a 5-point scale. The results of the subjective judgment tests indicate that aircrewmen are able to tolerate unexpectedly high levels of vibratory acceleration for relatively short periods at the frequencies explored. Transmissability of vibration from supporting structure adjoining the seat to just under the body of the seated airman varied with frequency. Generally the higher frequencies were transmitted with a greater loss in amplitude of vibration (or g's) than were the lower frequencies. The same aircrewmen performed a tracking task while being subjected to vibration of various amplitudes and frequencies. The magnitude and duration of error in tracking was electrically integrated to produce a comparable score for each vibration condition. It was tentatively found that there were statistically significant decrements in performance under vibration conditions which were judged to be nearly "intolerable." In addition, there were some notable individual differences in response to the

845

Snyder, F.W. 1962 EFFECTS OF LOW FREQUENCY VERTICAL VIBRATION ON HUMAN PERFORMANCE

Paper: 33rd Annual Meeting of the Aerospace Medical Association, Chalfonte-Haddon Hall, Atlantic City, N.J., April 9-12, 1962

ABSTRACT: This program was initiated in 1959 under contract with Office of Naval Research. A laboratory facility designed for human experimentation is used. Seventeen subjects participated in the first experiment establishing judged vibration severity levels identified as definitely perceptible, mildly annoying, extremely annoying, and alarming. Sinusoidal vibration frequencies ranged from 1-27 cps. Acceleration ranged from 0.01 G at 1 cps to 1.5 G at 20 cps. Performance of six to nine subjects was measured for continuous tracking and discrete tasks during vibration. Highlight results are: performance is degraded on some tasks but not on others; subjects are not always aware of performance degradation; some correlation exists between affected body region and vibration frequency; distracting irritation in nose region occurs above 12-14 cps; visual degradation is greatest in the range 12-23 cps.

846

Sokolov, V.A. 1961 STAGES ON A GREAT ROAD

Air Information Division, Wright-Patterson AFB, Ohio AID Rept. No. 61-156
ASTIA AD 269 794
Original Source: Nauka i zizhn' April 1961. Pp. 5, 8ff.

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Sommer, J. 1939 ZUR FRAGE DER EINWIRKUNG VON MECHANISCHEN SCHWINGUNGEN AUF DEN EIGENREFLEXAPPARAT DES MENSCHEN (To the Question of the Effect of Mechanical Vibrations Upon the Individual Reflex Apparatus of Man) Luftfahrtmedizin 4: 292.

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Sommer, J. 1940 ZUR FRAGE DER EINWIRKUNG VON MECHANISCHEN SCHWINGUNGEN AUF DEN EIGENREFLEXAPPARAT. (Effect of mechanical vibration on proprioceptive reflexes of man.) Luftfahrtmedizin, 4:292-293. R.A.E. Trans. no. 216

849

Sontag, L.W. and F.R. Wallace. 1936 CHANGES IN THE RATE OF THE HUMAN FETAL HEART IN RESPONSE TO VIBRATORY STIMULI. AM. J. Dis. Child. 51:583-589

ABSTRACT: in a total of 217 experiments made between one day and 127 days before delivery on 8 pregnant women there was an average increase of 1.2 ± 0.47 beats per minute in fetal heart rate following the application of vibratory stimuli of a frequency of 120 beats per second on the mothers abdomen. The increase was greater than the increase due to fetal movement.

850

Specht, W., K. Huhlicke, and S. Haggenmiller 1949 BIOCHEMICAL CHANGES IN THE BLOOD DUE TO ULTRASONIC VIBRATIONS Grenzgebiete Med. 2:391-393
See Also: Chem. Abstr. 44:1185d (1950)

851

Spells, K.E. 1959 THERMAL CONDUCTIVITIES OF SOME BIOLOGICAL FLUIDS. FPRC 1071. April 1959.

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Stadelman, W.J., & I.L. Kosin 1957 THE EFFECTS OF SOUNDS OF VARYING INTENSITIES ON CHICKENS AND HATCHING EGGS. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 57-87, Feb. 1957. ASTIA AD 118 038.

ABSTRACT: Young chickens were grown in pens subjected to sound levels varying from 80 to 115 decibels pressure at 20 minute intervals. The sound field was obtained with sound reproduction equipment using a tape with jet and propeller driven plane flyovers and airfield noises. Chickens grown under noise conditions from day old developed just as rapidly as chickens grown in control pens with a noise level of 65 decibels. There were no differences in growth rate, body weight, feed efficiency, feathering, mortality and abnormalities. When the noise level was maintained near 65 decibels for the first 30 days and then noise levels up to 120 decibels were applied, there was evidence of fright resulting in stampeding, crowding and smothering of chicks. Sound levels in excess of 120 decibels had no effect on hatchability when applied during incubation and hatching. The moving of setting hens from normal hen house environment to a pen with noise levels of about 115 decibels was effective in "breaking up" the setting hens. Eleven of 12 hens so treated did not remain broody. Other setting hens moved to similar pens except for the sound field remained broody and

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Krasnaya zvezda P. 3; 18 May 1960

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ABSTRACT: Work is being done to determine the effects of sound and vibration on psychomotor efficiency. In addition to a battery of psychomotor, physiological and psychological tests, equipment has been developed for the generation of sound fields similar to those encountered in aircraft. These sound fields are generated electronically. Variable speed motors driving eccentric loads are used to generate vibrations similar to those encountered in air craft. These two interferences were shown to decrease the physiological and psychological efficiency of the individuals tested. Accomodation, visual acuity, marksmanship, and steadiness decreased; eye fatigue and lessened coordination resulted. The results were based upon the relative scores made on psychomotor tests with and without disturbances.
hatched chicks. The subjecting of mature New Hampshire male chickens to sound levels of 112 decibels failed to affect the rate and nature of spermatogenesis when judged by both quantitative and differential sperm counts.

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(Off. Sci. Res. Dev., Wash., D.C.) 1941 Publ. Bd. No. 8333, Dept. Commerce 1946

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(Psycho-Acoustic Lab., Harvard U., Cambridge, Mass.) Contract N50ri-7611 and Nonr-186615, Proj. NR142-201, 31 Dec. 1961, ASTIA AD 277 839.

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Internationaler Sportarzte-Kongress, II. (Berlin) 2: 212-215

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Stýblová, V. 1956 VLIV MECHANICKYCH OTRESU NA NERVOVY SYSTEM. (EFFECT OF MECHANICAL VIBRATION ON THE NERVOUS SYSTEM) Pracovni lekarstvi (Praha) 8(4): 262-265, Aug. 1956

ABSTRACT: In workers exposed to mechanical vibrations, neurological changes of the neuritic, polyneuritic, or neuritic amyotrophic types were observed, especially in the arms. Mention is made of the participation of the nervous system in the development of occupational vasoneuroses. (AUTHOR)

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Styblova, V. 1959 NEUROLOGICAL PHENOMENA IN WORKERS EXPOSED TO VIBRATION Arch Gewerbepath 17:485-503

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Styblova V. 1962 NEUROLOGICAL PHENOMENON IN WORKERS SUBJECTED TO VIBRATIONS. (Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.) Trans. no. FTD-TT-62-536 from Arciv fur Gewerbepathologie und Gewerbehhygiene, no. 17, pp.485-503,1959; ASTIA AD-290 103

ABSTRACT: In the present work the neurological conditions of 350 workers who have been subjected to shocks or vibrations are reviewed. In 74% of these workers the neurological condition was positive. In 65% of the cases the condition was insignificantly natural, 9% displayed signs of severe damage to the nervous system which could already endanger the subjects ability to work. The opinion is expressed that the positive neurological condition that is encountered is definitely connected with work in which dangerous vibrations are involved since a similar picture with so many disturbances of the nervous system could neither be found in examining the control group nor in general clinical practice. Functional and organic disturbances of the nervous system appeared in workers engaged in work were vibrations are encountered. A classificztion of these neurological changes are proposed in accordance with the following three symptom complexes: (1) The neuritic or polyneuritic syndrome with signs of organic changes in the nervous system;(2) The syndrome of a more or less developed amyotrophic lateral scoliosis with damage to the peripheral and central motor neurons; and (3) The polyfunicul neuralgic syndrome. The problem dealing with the pathophysiology of vibration diseases up to now is to be considered as unsolved and required additional clinical studies. In the work presented here the investigation is undertaken as a hypothetical interpretation of the pathophysiology of vibration diseases and these with the assumption of (a) an axon pseudoreflex (b) a reflex reaction in the sense of a physiopathological syndrome according to Froment-Babinski, and (c) a direct stimulation of the nerve fiber in connection with a continuous indication of an increased stationary excitation. Measures of a prophylactic and therapetuic nature are proposed.

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Styblova, V. 1962 EFFECT OF MECHANICAL VIBRATION ON THE NERVOUS SYSTEM Procovni Lekaystvi 8(4):262-265, 1956 (Translation Services Branch, Foreign Technology Div., Wright-Patterson AFB, Ohio) Translation FTD-TT-62-537/1; 20 April 1962; ASTIA AD-280 932

SUMMARY: We have presented the results of neurological investigations carried out on 150 laborers exposed to vibration. We have recorded a greater number of avident pathological findings. The neurological character showed however changes in the nature of neuritis and polyneuritis, or neuritic amyotrophy predominantly in the upper extremities, but (in a lesser percentage) more or less expressed syndrome amyotrophic lateral sclerosis. We have compared the neurological changes with rtg find of cervical spine. We assume that it is necessary to pay greater attention to the participation of the nervous system during pathophysiological interpretatior of professional vasoneurosis. (AUTHOR)

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Sueda, M. 1937 EXPERIMENTAL STUDY OF THE EFFECT OF VIBRATION UPON THE LIFE PERIOD OF SPERMATOZOA TAKEN FROM LIVING ANIMALS. Mitt. Med. Akad. Kioto, 19:324-325

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Sueda, M. 1937 ON THE EFFECT OF VIBRATIONS UPON THE OESTROUS CYCLE OF WHITE RATS Mitteilungen aus der Medizinischen Akademie zu Kioto Kyoto-Ikagaigaku-Zasshi 21:1066-82

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Sueda, M. 1938 (EXPERIMENTAL STUDY OF THE EFFECT OF SOME MEDICINES UPON THE GENERAL CONDITIONS, BODY-WEIGHT AND LIFE PERIOD OF ANIMALS SUBJECTED TO CONTINUOUS VIBRATIONS. V. REPORT. THE EFFECT OF THE INJECTION OF 1.6% GLUCOSE SOLUTION TOGETHER WITH VITAMIN A.) Mitt. med. Akad. Kioto 24:53-59. English Summary:269-270. 1938

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Sueda, M. 1938 EXPERIMENTAL STUDY OF THE EFFECT OF VIBRATIONS UPON THE BLOOD PRESSURE OF RABBITS. Mitt. med. Akad. Kioto, 24: 672-676

ABSTRACT: A group of male rabbits were placed in a box prepared to reproduce the lurching vibrations of trains and the box was moved for 24 hours continuously. At certain intervals during and after the shaking operation, the maximal blood pressure was examined. The results were as follows:

1. In the case of a large number of animals (a) the maximal pressure rises during the course of the shaking process. In the case of the remainder (b), the pressure falls. Following 24 hours of oontinuous shaking, the blood pressure returns essentially to its original point in both groups.

2. In the case of convalescent animals, the blood pressure rises slightly at the beginning of the process, then falls, a fall from which it does not recover even after 24 hours of repose.

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Sueda, M. 1938 (EXPERIMENTAL STUDY OF THE EFFECT OF SOME MEDICINES UPON THE GENERAL CONDITIONS, BODY-WEIGHT AND LIFE PERIOD OF ANIMALS SUBJECTED TO CONTINUOUS VIBRATIONS. IV. REPORT. THE EFFECT OF THE INJECTION OF 1.6% GLUCOSE SOLUTION TOGETHER WITH CITAMIN C.) Mitt. med. Akad. Kioto 23:246-256. English summary:484. 1938.

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Sueda, M. 1938 (EXPERIMENTAL STUDY OF THE EFFECT OF SOME MEDICINES UPON THE GENERAL CONDITIONS, BODY-WEIGHT AND LIFE PERIOD OF ANIMALS SUBJECTED TO CONTINUOUS VIBRATIONS. I. REPORT. THE EFFECT OF THE INJECTION OF PHYSIOLOGICAL SALINE SOLUTION AND 0.8% GLUCOSE SOLUTION. Mitt. med. Akad. Kioto 22:808-820. English summary:1077, 1938.

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Sueda, M. 1938 VIBRATION EFFECT ON BODY TEMPERATURE, QUANTITY OF FOOD, QUANTITY OF URINE, QUANTITY OF FECES, RATES OF RESPIRATION AND PULSE Mitt. med. Akad. Kioto 22:391-392

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Sueda, M. 1938 (EXPERIMENTAL STUDY OF THE EFFECT OF SOME MEDICINES UPON THE GENERAL CONDITIONS, BODY-WEIGHT AND LIFE PERIOD OF ANIMALS SUBJECTED TO CONTINUOUS VIBRATIONS. III. REPORT. THE EFFECT OF THE INJECTION OF GLUCOSE SOLUTION AND VITAMIN B_1.)
Mitt. med. Akad. Kioto 23:1-15. English summary:211. 1938

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Sueda, M. 1938 THE INFLUENCES OF VIBRATION. II. REPORT. THE EFFECT UPON THE BODY TEMPERATURE, QUANTITY OF FOOD, QUANTITY OF URINE, QUANTITY OF FAECES, RATES OF RESPIRATION AND PULSE
Mitt. med. Akad. Kioto. (Kyoto-Ikadaigaku-Zasshi) 22: 391-392

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Sueda, M. 1938 THE BODY TEMPERATURE OF RABBITS DURING AND AFTER VIBRATION. Mitt. Med. Akad. Kioto, 25:231-234

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Sueda, M. 1938 EXPERIMENTAL STUDY OF THE EFFECT OF ALTERNATE VIBRATION AND RESPONSE UPON THE BODY-WEIGHT OF ANIMALS. Mitt. Med Akad. Kioto, 25:30-34

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Sueda, M. 1938 EXPERIMENTAL STUDY OF THE EFFECT OF SOME MEDICINES UPON THE GENERAL CONDITIONS, BODY-WEIGHT AND LIFE PERIOD OF ANIMALS SUBJECTED TO CONTINUOUS VIBRATIONS. VI. REPORT. AN EXAMINATION IN WHICH THE INJECTION OF SALINE SOLUTION WAS OMITTED Mitteilungen aus der Medizinischen Akademie zu Kioto 24:535-39 English Summary 615-616

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Sueda, M. 1938 (EXPERIMENTAL STUDY OF THE EFFECT OF VIBRATIONS UPON THE HEALING OF WOUNDS.)
Mitt. med. Akad. Kioto 24:1014-1016. English summary:1170. 1938

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Sueda, M. 1938 UPON THE EFFECTS OF CONTINUOUS VIBRATION ON THE LIFE PERIOD OF RABBITS DEPRIVED OF BOTH KIDNEYS
Mitt. med. Akad. Kioto 23:874-880. English summary, pp. 1088-1089

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Sueda, M. 1939 BODY-TEMPERATURE OF RABBITS DURING AND AFTER VIBRATION
(Mitt. med. Acad. Kioto (Kyoto-Ikadaigaku Zasshi) 25, 397)

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Sueda, M. 1939 (EXPERIMENTAL STUDY OF THE EFFECT OF ALTERNATE VIBRATION AND REPOSE UPON THE BODY-WEIGHT OF ANIMALS.)
Mitt. med. Akad. Kioto 25:30-34. English summary:209-210. 1939

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Temkin, J. 1933 DAMAGE TO THE EAR CAUSED BY NOISE AND VIBRATION Monatsschr. ohrenheilk 67:257-299, 450417, 527-553, 705-736, 823-834

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Temkin, Ia S., 1960 THE PATHOGENESIS AND CLINICAL ASPECTS OF VIBRATORY COCHLEOVESTIBULAR DISORDERS. Vestn Otorinolaring 22:5-15, May-June 1960

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ten Cate, W., tr. Murray, R. C. 1953 VIBRATION NUISANCE (TRILLINGSHINDER). Instituut T. N. O. Voor Werktuigkundige Constructies, Delft, Rept. No. 147, May 1953 (Royal Aircraft Establishment, Great Britian, Library Trans. No. 693, Oct. 1957) ASTIA AD-159 701

ABSTRACT: A review of published information on the evaluation of the nuisance levels of vibration in houses, cars and aircraft for personnel, with proposals for better studies based on opinion sampling. (AUTHOR)

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ten Cate, W. 1957 APPENDICES TO REPORT 147 (MAY, 1953) ON VIBRATION NUISANCE (Instituut T.N.O. Voor Werktuigkundige Constructies, Delft, Report No. 150) October, 1957, Royal Aircraft Establishment, Great Britian, Library Translation No. 694, ASTIA AD 161 ·77

ABSTRACT: Comments on various papers which have been published since the appearance of Report 147, in the form of three appendices.

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Terent'ev, V. G. 1959 CHANGES IN VASOMOTOR REFLEXES DURING EXPOSURE OF THE INDIVIDUAL TO GENERAL VIBRATIONS. Pavlov Journal of Higher Nervous Activity 9(5):570-577 May 1960
Translation of Zh. Vyss. Nerv. Deiat. Pavlov 9(5):649-656, 1959.

ABSTRACT: Vibrations of frequencies from 10 to 70 cps and amplitude of 0.4 mm did not generally produce any changes in conditioned or unconditioned vasomotor reflexes. Vibrations of frequencies from 10 to 40 cps and amplitude 0.8-1.2 mm. and of 50 cps and amplitude 0.8mm. produced moderate changes in conditioned vasomotor reflexes, (reduction in the vascular reaction, disinhibition of differentiation, and increase of spontaneous fluctuations in the plethysmogram), indicative of adaptation. Prolonged exposure of 4 hours induced fatigue. Vibrations of higher frequencies and larger amplitude caused inversion or abolition of the conditioned and unconditioned vascular reflexes. Injection of caffeine reduced the harmful effect of vibration and contributed to the more rapid restoration of conditioned and unconditioned vascular reflexes. Repeated exposure to tolerable ranges of general vibration results in adaptational changes. (Author)

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Tereschovich, K. 1937 WIRKUNG DER BESCHLEUNIGUNG AUF DES ORGANISMS (Effects of Acceleration Upon the Organs)
Vyestn. Vozd. Flota 19(4): 29-34.

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Thiessen, G. J. and E. A. G. Shaw 1958 EAR DEFENDER FOR NOISE PROTECTION
J. of Aviation Medicine 29(11):810-814, November 1958

SUMMARY: Vibration of the whole ear protector is the main mechanism by which low-frequency sound reaches the ear when a well-sealed protector is used. In the case of the cover type of ear defenders, this vibration can be minimized by means of a cushion which uses a high Young's modulus sheath to contain a high bulk modulus filler. In this way a cushion spring constant can be achieved which exceeds many times that of the flesh around the ear and at the same time the equalization of the pressure on the head contributes greatly to comfort. The spring constant of the flesh may be increased by pressure but to this the comfort requirements of the wearer will set a limit. Cup volume and enclosed head area also play their part. A suitably designed ear defender can easily provide 20 db. attenuation at 50 cps.

896

Thomas, C.E. 1961 FLIGHT VIBRATION SURVEY OF F-101A AIRCRAFT.
(Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson AFB, Ohio) ASD Technical Note No. 61-60, ASTIA AD- 400 231, May 1961

ABSTRACT: The F-101A aircraft was surveyed to determine the vibration environment existing throughout the vehicle under all flight conditions expected in service. Approximately 32,630 data points were obtained from 25 separate locations on the vehicle during 31 test flights. The data obtained in this survey were evaluated to determine the vibration test requirements which should be specified for items of equipment to be used on the F-101A aircraft. The data indicated that, in general, the vibration testing requirements listed in Specification MIL-E-5272 are more than adequate for F-101A equipment.

897

Thomas, C. E. 1962 FLIGHT VIBRATION SURVEY OF C-130A AIRCRAFT
(Aeronautical Systems Division, Wright-Patterson AFB, Ohio) ASD-TDR-62-267; ASTIA AD-274 904; March 1962

ABSTRACT: A C-130A aircraft, SN 53-3133, was surveyed at Wright-Patterson AFB, Ohio to determine the vibration environment existing throughout the vehicle under all flight conditions expected in service. Approximately 50,700 data points were obtained from 21 separate locations on the vehicle during five test flights. The

data obtained in this survey were evaluated to determine the adequacy of vibration test requirements for aircraft equipment as contained in Specification No. Mil-E-5272C. The data indicated that the vibration testing requirements of that specification were more than adequate with the exception of the very light pieces of equipment which are attached to the fuselage sidewalls in the vecinity of the prop plane. (AUTHOR)

898

Thomas, C. E. 1962 FLIGHT VIBRATION SURVEY OF XC-123D AIRCRAFT (Aeronautical Systems Division, Wright-Patterson AFB, Ohio) ASD-TDR 62-235; ASTIA AD-274 903; Feb. 1962

ABSTRACT: An XC-123D aircraft, SN 53-8068, was surveyed at Wright-Patterson AFB, Ohio to determine the vibration environment existing throughout the vehicle under all flight conditions expected in service. Approximately 24,300 data points were obtained from 23 separate locations on the vehicle during four test flights. The data obtained in this survey were evaluated to determine the adequacy of vibration test requirements for aircraft equipment as contained in Specification Nr. Mil-E-5272C. The data indicated that the vibration testing requirements of this specification were adequate with the exception of the very light pieces of equipment which were attached to the fuselage sidewalls in the vicinity of the prop plane. (AUTHOR)

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Thompson, A.B. 1959 PHYSIOLOGICAL AND PSYCHOLOGICAL CONSIDERATIONS FOR MANNED SPACE FLIGHT. (Chance Vought Aircraft, Inc., Dallas, Texas) Rept. no. E9R-12349, July 7, 1959

ABSTRACT: An analysis of the various psychological and physiological stresses and deviations from earth environment has been programmed on a systematic basis. Definitions of specific requirements are presented in detail in the order of their occurence on a typical orbital mission.

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Thompson, S.P. 1954 ORIGINS OF PROPOSED SHOCK AND VIBRATION TERMINOLOGY. Magazine of Standards, 25:384-386

901

Thomson, G.R. 1958 FINAL REPORT ON VIBRATION TEST OF E36 COLLECTIVE PROTECTOR Development and Proof Services, Aberdeen Proving Ground, Maryland OCO Project Number 65 ASTIA AD 155 263

ABSTRACT: The purpose of the test was to determine if the E36 Collective Protector would be damaged when subjected to vibration such as might be encountered during transportation and handling. The collective protector was vibrated along each of its three major axes as stated in Specification MIL-T-4807 (USAF), reference test method 1A, for equipment without shock isolators. Drawings of the test setups are shown in Figures 1 and 2, Appendix A, and the test results are presented in Table 1, Appendix B. No apparent damage was sustained by the E36 Collective Protector as a result of this test.

902

Tinker, M. A. 1948 EFFECT OF VIBRATION UPON READING
American J. Psychology 61:386-390, Jan. 1948
NOTE: Reel 7, Flash 6, Item 34

SUMMARY AND CONCLUSIONS: (1) The purpose of this experiment is to study the effect of vibration of textual material on speed of perception in reading. (2) A control group and an experimental group of 69 readers each read Form I and Form II of a speed-of-reading test with 10-min. time limits. For the experimental group, Form II was read while the copy vibrated. (3) Vibration of the copy reduced speed of perception in reading by significant amounts, about 5%. (4) The speed-of-reading technique, when standardized tests are used in an adequate experimental design, may be employed to advantage to measure readability of print. (AUTHOR)

903

Titov, G. 1961 TITOV ADRESSES SCIENTIFIC MEETING
(FBIS USSR & East Europe, No. 199, October 13, 1961)

ABSTRACT: Cosmonaut German Titov said he was confident that Soviet cosmonauts would be the first to fly to the moon. It would be happy to pilot a spaceship once more, he declared. German Titov was addressing a meeting of propagandists of scientific knowledge held at a polytechnical museum tonight.

It is possible to live and work in the state of weightlessness. This is the main conclusion which, in Titov's opinion, can be drawn from his 25-hour flight around the earth on 6 and 7 August. The cosmonaut added that the state of weightlessness proved somewhat different from what the scientists thought about it before the flight.

German Titov pointed out that the noise and vibrations in the cabin did not exceed admissible norms. The vibration, for instance, did not at all hamper him in following the instruments. Titov said that were he to fly again around the earth he would be able to distinguish one sea from another by the color of the water.

The cosmonaut regretted that he had failed to take good photographs of the earth from aboard the ship. "The boys who will fly after me are sure to get better photographs" he added.

Daniel Petrucci, an Italian doctor who spoke at the meeting, expressed admiration at the Soviet achievements in space exploration. (CARI)

904

Titov, G. 1962 MY DAY IN SPACE
Spaceflight 4(5): 146-150 Sept. 1962

ABSTRACT: This is an abridged version of the speech made by the Russian astronaut German Titov on May 3, 1962, at the 3rd Space Science Symposium in Washington, D.C. Various aspects of his 17-orbit flight of August 6-7, 1961, discussed included launching, entering orbit, actual flight, re-entering the atmosphere, and landing. The basic physiological functions conformed well to flight loads and stresses. The flight indicated that man can withstand the effect of weightlessness for 24 hours. Some motion sickness was encountered which later abated, but eating, drinking, muscle coordination, and task performance remained good. The flight was preceded by two preparatory stages, a training program consisting of theoretical, special physical, medico-biological, technical, and flight factors; and an immediate preflight period.

905

Tobias, C.A. & J.V. Slater 1962 OUR VIEW OF SPACE BIOLOGY WIDENS
Astronautics 7(1): 20-22, 47-52, Jan. 1962

ABSTRACT: Biological research in the space program is important. Knowledge of man's ability to withstand acceleration, deceleration, temperature changes, weightlessness, vibration and radiation, is necessary to safely put a man in space. Various phenomena both observed and considered for future research are listed.

906

Togart 1957 A GUIDE TO THE SOLUTION OF VIBRATION AND SHOCK PROBLEMS. Library of Congress no. KAPL-M-SWT-1

907

Tolle, E.A. 1960 SIMULATED COMBINED VIBRATION, SUSTAINED ACCELERATION AND EXTREME TEMPERATURE ENVIRONMENTS. (Aeronautical Accessories Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TN 59-351. Feb. 1960. ASTIA AD 236 057

ABSTRACT: A simulator believed to be the first of its kind to produce simultaneous steady acceleration, vibratory acceleration, and extreme temperature is described. It comprises a 450 pound force electro-dynamic vibrator and temperature box installed on a large-mass centrifuge. The combination of environments produced by this simulator makes possible more realistic testing of certain ballistic missile components than otherwise would be possible. Design and performance characteristics are presented, and component testing results are discussed. (Author)

908

Travers, P. R., & J. C. Guignard 1959 EFFECT OF VIBRATION OF THE HEAD AND OF THE WHOLE BODY ON THE ACTIVITY OF POSTURAL MUSCLES IN MAN: SOME QUALITATIVE OBSERVATIONS. (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. 1063

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Tschermak-Seysenegg, A. 1932 PHYSIOLOGISCH-OPTISCHE BEOBACHTUNGEN IM FLUGZEUG UND IM ROTATORIUM (Physiological-Optical Observations in the Aircraft and in the Rotarium)
Forsch. Fortschr. dtsch. Wiss. (Berlin) 8: 72-73

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Turner, L. 1962 A REVIEW OF THE EFFECTS OF VIBRATION ON PERFORMANCE AMRL Memo. Report P-18, October 1962

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Tuszkiewiez, A.R. and W. Szewczykowski. 1953 WYNIKI KLINICZNYCH BADAN TRAKTORZYSTOW. (Clinical results of examination of tractor workers.)
Ann. Univ. Lubin, sec. D 8:213-230

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Uglow, W., A. Martischenja, and A. Goldberg. 1936 UBER DIE WIRKUNG VON LARM UND ERSCHUTTERUNG AUF DEN GAS AUSTAUSCH. (Effect of noise and vibration on gaseous exchange.) Arbeits physiol. 9:387-391

913

Uglow, W., A. Martischenja & A. Goldberg 1936 EFFECT OF NOISE AND VIBRATION ON BASAL METABOLISM. Arbeits physiol. 9:387-391

914

U.S. Aerospace Information Division 1961 SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS
Science and Technology Branch, Aerospace Information Division AID Rept. 61-156; Nov. 30, 1961 ASTIA AD 269 794

ABSTRACT: This publication contains material on the following subjects: ecological system; stress factors - acceleration, noise, and vibration; weightlessness; radiation effects; training and biotelemetry.

915

Aeronautical Systems Division 1962 A STUDY OF TANDEM HELICOPTER FUSELAGE VIBRATION. (Aeronautical Systems Division, Dir/Aeromechanics, Flight Dynamics Lab., Wright-Patterson AFB, Ohio) Report No. ASD-TDR-62-284, September 1962, ASTIA AD- 290317

ABSTRACT: A comprehensive research program covering many facets of tandem rotor helicopter fuselage vibration was conducted. Analytical portions consisted of the development of methods for the prediction of fuselage natural and forced modes; test portions of the program determined fuselage stiffness properties, rotor shaft vibratory loads and in-flight natural frequencies, modes and vibration levels. The results have proven to be of considerable value in the design of the present generation of helicopters.

916

USAF. Air Dev. Div. 1960 BIBLIOGRAPHY OF RESEARCH REPORTS AND PUBLICATIONS ISSUED BY THE BIO-ACOUSTICS BRANCH. (Wright Air Development Division, Wright-Patterson AFB, Ohio) Dec., 1960

ABSTRACT: Lists publications considered to be of lasting interest which have resulted from the research activities of the Bio-Acoustics Branch, Aero-space Medical Laboratory, Wright-Patterson Air Force Base. Items are listed, without abstracts under the headings: Sound sources and noise fields; Sound propagation; Acoustic instrumentation; Noise control-general; Noise control structures; Hearing and physiology of the ear; Speech; Biological and psychological effects of noise; Ear protection; Mechanical characteristics of the human body, effects of vibration and shock; General noise guides and criteria; Bionics; Miscellaneous. An author index is given.

917

U.S.A.F. Aerospace Medical Division 1962 CUMULATIVE AUDITORY EFFECTS RESULTING FROM MULTIPLE EXPOSURE TO INTENSE ACOUSTIC STIMULATION. PART I. DEAFENING EFFECTS OF NOISE ON THE CAT. (6570th Aerospace Medical Research Laboratories, Aerospace Medical Div., Wright-Patterson AFB, Ohio, Report No. AMRL-TDR-62-99(I). Dec. 1962. ASTIA AD 404 761

ABSTRACT: Aural effects of exposure to intense noise were investigated by measurements of the auditory sensitivity of cats, as determined by their behavior, before and after exposures and by histological examination of their cochleas. Exposures to 115 db for 1/8 hour or 105 db for 1/4 hour result in temporary threshold shift (TTS) with the same general features and course of recovery as for man. However, 1/4-hour exposures require 18 db less sound to produce the same magnitude of shift in the cat. Noise of 115 db for 1/4, 1/2, 2, or 8 hours without interruption produced permanent threshold shift (PTS) in which magnitude depended on the duration of the exposure, the test tone frequency, and the susceptibility of the individual cat. When the 2-hour exposure was divided into 16 doses of 1/8 hour each and four different inter-exposure intervals of 0, 1, 6, and 24 hours were used, PTS declined as inter-exposure interval increased. The pattern of injury ratings along the basilar membrane is highly similar to the pattern of the behavioral audiograms, if both are placed on anatomical-frequency scale.

918

U. S. Air Force 1953 PHYSIOLOGY OF FLIGHT. USAF Manual 160-30. (Wash., D. C.: U. S. Govt. Printing Office, 1953).

919

Armed Services Technical Information Agency 1957 SHOCK AND VIBRATION. ENTRIES SELECTED BY DR. J. NORTON BRENNAN, PENNSYLVANIA STATE UNIVERSITY, IN CONJUNCTION WITH CONTRACT DA 19-129-qm-804. REPORT BIBLIOGRAPHY (Document Service Center, Armed Services Technical Information Agency, Dayton, Ohio) 26 Aug. 1958 ASTIA AD 138 776

920

Armed Services Technical Information Agency 1959 BIO-ASTRONAUTICS: AN ASTIA REPORT BIBLIOGRAPHY (U) (Armed Services Technical Information Agency, Arlington, Va.) Feb. 1959 ASTIA AD 306 007

(Secret Report)

ABSTRACT: This bibliography covers the subject matter from 1952 through 1958 insofar as report literature, represented by ASTIA holdings is concerned. (Unclassified Abstract)

921

Armed Services Technical Information Agency 1961 UNDERSEA WARFARE. A REPORT BIBLIOGRAPHY. (Armed Services Technical Information Agency, Arlington, Va.) ASTIA AD-264 000, 1 October 1961

ABSTRACT: This bibliography was prepared by ASTIA in response to frequent requests for information concerning Undersea Warfare and related topics. A confidential and secret section of the bibliography appear separately as AD-325 700 and AD-325 701 respectively. Citations are included for documents cataloged by ASTIA from 1953 through 1 October 1961. Entries are arranged in alphabetical sequence by subject areas pertaining to problems in detection, navigation, ordnance, propulsion, and underwater sound. Within each category and its subdivisions, reports published by Department of Defense contractors are listed alphabetically by source and contract number, and then by date; military reports are arranged by source and title. (Author)

922

U.S. Army Signal Corp. 1945 ROAD VIBRATIONS IN MILITARY TRUCKS. (Army Signal Corp., Ft. Monmouth, N.J.) Reports #3 & #5, July 1945.

923

U. S. Dept. of the Navy 1962 BIBLIOGRAPHY ON THE EFFECTS OF SHOCK AND VIBRATION ON MEN. (Structural Mechanics Laboratory, Ship Protection Div., David Taylor Model Basin, Washington). Tech. Note SML-740-8

924

U.S.A.F., Foreign Tech. Div. 1962 EARTH-SPACE-EARTH (SELECTED ARTICLES) (Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio) Trans. No. FTD-TT-62-1416 Oct. 11, 1962 ASTIA AD 292 224
Original Source: Zemlya-Zosmos-Zemlya, (Sbornik Materialov, Opublukovannykh V Gazete "Pravda" Izdatel'stvo "Pravda", (Moskva), 24, Pp. 10, 13, 14, 27, 30, 31, 45-47, 51, 52, 56, 57 and 61. 16 Aug. 1962

ABSTRACT: This publication contains articles by the following titles: "Vostok-3 in Outer Space"; "News from Outer Space"; "Vostok-4 in Orbit"; "News from Outer Space"; "Research Program is Being Executed Successfully"; "Conversation in Outer Space"; "Food of Gods"; "Precisely According to Program"; "Before the Completion of a Historical Flight"; "and "Good Wishes to Nations of the World."

925

U.S. Frankford Arsenal 1946 INTERNAL VIBRATIONS EXCITED IN THE OPERATION OF PERSONNEL EMERGENCY ESCAPE CATAPULTS
(Frankford Arsenal Lab. Div., Philadelphia, Pa.) Memo. Rept. MR-340 26 November 1946 ASTIA AD 51 792

ABSTRACT: Studies of the catapults, T2 and T4, emergency escape personnel show that the accelerations transmitted throughout the body by the catapult differ in magnitude and phase from the acceleration applied to the center of gravity of the system. Typical acceleration measurements on dummy and human subjects taken from Air Corps reports are given in this report. Comparisons of these records with independent measurements of pressure-time data show that strong internal vibrations of the several massive components of the ejected system are superimposed upon the motion of its center of gravity. As a consequence of these vibratory components, the internal elastic stresses in the body, depending on the phase of the vibration, at their peaks will exceed the values which would be required for the acceleration of an equivalent rigid body to the required terminal velocity under action of the same applied forces. Since the estimated safe limit for these elastic stresses is not very high compared with the stress level to obtain the required center of gravity acceleration, the excitation of such internal vibratory motion imposes a distinct limitation in the application of the catapult to personnel escape. It is the purpose of this report to consider: (a) the general theory of such mechanical transients and their excitation, and (b) application to the problem of catapult and ammunition design.

926

U.S. Joint Publications Research Service 1962 THE QUESTION OF PHYSICAL HYGIENIC EVALUATION OF PULSE OSCILLATIONS (Joint Publications Research Service, Washington, D.C.) JPRS-14974, 27 Aug. 1962. NASA N 62-17969

ABSTRACT: The study of physical-hygienic evaluation of pulse oscillations in the human organism is discussed. The most important factors in such studies is the establishment of indices which do not cause pathologic changes in the organism and their quantitative expression. For the accomplishment of this task, it is necessary on the widest scale to set up experimental models, primarily using sinusoidal oscillations. It is also necessary to carry out clinical studies using physiological and biochemical methods for the establishment of the early changes which cannot be detected by ordinary clinical methods. The hardness, the duration, the number of shocks per second, and the amplitude of the pulse oscillations should be obtained. It is especially necessary to determine the changes of acceleration with respect to time, since this is a combined index of hardness and is the most stable index.

927

U S. Naval Medical Research Institute 1945 EVALUATION OF CREPE SHOES AND HEELS TO ABSORB SHOCK ON STEEL DECKS. (Naval Medical Research Institute.) Rept. NH6/ALL-X-517, 30 Apr. 1945.

928

U.S. Navy 1957 ENGINEERING REPORTS ON SHIPBOARD VIBRATION PROBLEMS DURING 1957 Mare Island Naval Shipyard, Vallejo, California ASTIA AD 217 665

ABSTRACT: This publication is composed of a series of engineering reports on shipboard vibration. Tests were conducted to determine main engine vibration, propulsion machinery and port turbo generator set noise and vibration, turbo-generator vibration, hull and machinery vibration, and radio and electronic set vibration

929

U.S. Navy 1958 ENGINEERING REPORTS ON SHIPBOARD VIBRATION PROBLEMS DURING 1958 Mare Island Naval Shipyard, Vallejo, California ASTIA AD 217 666

ABSTRACT: This publication is composed of a series of engineering reports on shipboard vibration. Tests were conducted to determine main condenser pump vibration, deck vibration, generator vibration, cooling pumps vibration, and vibration of the No. 2 main diesel engine.

930

U.S. Navy 1959 ENGINEERING REPORTS ON SHIPBOARD VIBRATION SURVEYS - 1957-1958 Portsmouth Naval Shipyard, U.S. Navy ASTIA AD 225 969

ABSTRACT: This report contains the measurement techniques used in shipboard vibration tests and the results of those tests.

931

U.S. Office of Naval Research 1946 MONTHLY REPORT OF THE SPECIAL DEVICES CENTER, DECEMBER 1946
Office of Naval Research, Special Devices Center, Port Washington, L.I., N.Y. ASTIA ATI 28590

ABSTRACT: Synthetic training devices, teaching aids, human engineering, tactical evaluators, research tools, and training methods are the fields for which special devices have been developed. In order to familiarize the operator with his duties, new training techniques include assessing dry aircraft rocket and bombing runs, remote scoring target, projector smoke generator, coordination of navigation devices, and contact-flight simulator. A discussion is given of the pilot ejection seat which is necessary for escape from high-speed aircraft. New developments in sighting for aircraft and anti-aircraft gun systems are automatic sighting systems combining radar information, a gyro unit, a computer, and servos. It is suggested that television be used for mass training of personnel which is an important factor in emergencies.

932

U.S. Office of Sec. of Def. Res. & Engng. 1957 SHOCK AND VIBRATION BULLETIN, PART II. (Office of Sec. Res. & Engng., Washington, D.C.) Dec. 1957. ASTIA AD 247 148.

CONTENTS: Includes papers on saw-tooth shock equipment, drop-test facilities, instrumentation, and cumulative vibration effects.

933

Assistant Secretary of Defense (Research and Development) 1955 SHOCK AND VIBRATION BULLETIN NO. 22 SUPPLEMENT. (Assistant Secretary of Defense, Research and Development, Washington, D.C.) ASTIA AD-94 697

CONTENTS:
Motion sickness, by J.E. Steele
The mechanics of vibration in the human body, by E.K. Franke
Damage to animals due to vibration, by R.C. Fowler
Hydrostatic effects of combined tumbling and deceleration, by R. Edelberg
Vibration tolerance levels in military aircraft, by G.L. Getline
Downward ejections at high speeds and high altitudes, by E.G. Sperry, H.P. Nielsen, and I.M. Barash
Acceleration problems in ejection-seat design, by G.P. Santi

934

U.S. Assistant Secretary of Defense 1957 INDEX TO SHOCK AND VIBRATION BULLETINS. NO. 1 THROUGH 24. A SUBJECT INDEX AND AUTHOR INDEX (U) (Assistant Secretary of Defense (Research and Engineering), Washington, D.C.) Oct. 1957. ASTIA AD 320 436.

935

U.S. Assistant Secretary of Defense 1957 SHOCK AND VIBRATION. BULLETIN, PART I. (Assistant Secretary of Defense (Research and Development) Washington, D.C.) Dec. 1957. ASTIA AD 320 435.

936

U.S. Assistant Secretary of Defense 1959 SHOCK, VIBRATION AND ASSOCIATED ENVIRONMENTS PART III. (Assistant Secretary of Defense, Research and Engineering, Washington D.C.) Bull. no. 27. Pt. 3, ASTIA AD 212 976.

ABSTRACT: Test facilities: Vibration environment of supersonic track sleds; Missile component testing on rocket sleds at the Air Force Missile Development Center; Pneumatic vibration isolators in rocket-sled simulation of missile accelerations; NOTS controlled-vibration track test vehicle; System testing

on dynamic restraints at Lockheed SCTB; low-cost complex-wave machine for quality control vibration tests; Device for vibration (or shock) testing in 3 mutually perpendicular planes simultaneously; Evaluation of the Hyge Shock Tester for water-entry shock simulation; Heavy-equipment vibrator using a toggle mechanism. Combined environments; Combined environment testing; Simulating combined vibration, sustained acceleration, and extreme temperature environments; Investigation of a novel approach to combined environments testing for small components; Environmental test program for components of guided missiles; Destructive testing of missile components under simultaneous high-intensity vibratory, thermal, and electrical stresses; Redstone missile factory-to-impact simulation in the laboratory; Orbital simulations; Facility for space simulation studies. Instrumentation: Low-impendance vibration coupler for missile use; Pick-up to read-out calibrator for vibration channels. See also ASTIA AD-212 975, ASTIA AD 212 977, ASTIA AD 306 004.

937

U.S. Assistant Secretary of Defense 1960 SHOCK, VIBRATION AND ASSOCIATED ENVIRONMENTS PART I. (Assistant Secretary of Defense, Research and Engineering, Washington, D.C.) July 1960. ASTIA AD 318 006.

938

U.S. Assistant Secretary of Defense 1959 SHOCK, VIBRATION AND ASSOCIATED ENVIRONMENTS. PART III. (Assistant Secretary of Defense, Research and Engineering, Washington, D.C.) Bull. No. 27, pt. 4, June 1959. ASTIA AD 212 977.

ABSTRACT: Design and use of vibration test jigs and fixtures: Nature of the vibration testing problem; Design criteria for vibration test jigs and fixtures; Scope of the vibration fixture problem; Vibration fixtures for large test items, Multi-purpose environmental test fixtures; A critical look at vibration fixture performance; Investigation of vibration fixture materials; Comments on seminar on jigs and fixtures; Experimental and theoretical study of an oil film slider; Improved version of the fluid film method of stabilizing an auxiliary vibration table; Oil-film supported table for vibrating large components; Building an inertial guidance facility. Correlation of the effects of laboratory vs service environments on hardware: Real and simulated environment; A specification writer's viewpoint; Damage accumulation in relation to environmental testing; Method of equating long duration-low intensity and short duration-high intensity random vibration; Evaluating the effects of logistic environments on missile reliability; Reliability and mechanical design. Information exchange: National Bureau of standards calibration service for vibration pickups; Ad Hoc Committee on transportation hazards; Research program on random vibration. (See also ASTIA AD 212 976)

939

U.S. Office of the Secretary of Defense 1960 SHOCK, VIBRATION AND ASSOCIATED ENVIRONMENTS, PART IV. (U.S. Office of the Secretary of Defense, Research and Engineering, Washington, D.C.) Bulletin No. 28. ASTIA AD 244 857.

ABSTRACT: This publication contains some of the papers presented at the 28th Symposium on Shock, Vibration and Associated Environments held in the Departmental and Commerce Auditoriums, Washington, D.C., on February 9-11, 1960. The Department of the Air Force was host. This section of the Bulletin contains unclassified papers discussing design, test methods, instrumentation and data analysis. The material discussed at the panel session on the Collection, Analysis and Presentation of Shock and Vibration Data is also included. A Table of Contents for all four Parts of the Bulletin and an attendance list for the 28th Symposium may be found in Part I.

940

U.S. Assistant Secretary of Defense 1962 SHOCK, VIBRATION AND ASSOCIATED ENVIRONMENTS PART II. (Assistant Secretary of Defense, Research and Engineering, Washington, D.C.) Bulletin No. 30, pt. 2, Jan. 1962. ASTIA AD 273 514.

CONTENTS:

Analytical determination of mechanical impedance
Instruments and methods for measuring mechanical impedance
Applications of impedance information
Application of mechanical admittance data to the solution of a practical problem
Structural response to dynamic load.

941

U.S. Assistant Secretary of Defense 1962 SHOCK, VIBRATION AND ASSOCIATED ENVIRONMENTS. PART V. (Assistant Secretary of Defense, Research and Engineering, Washington, D.C.) May 1962. ASTIA AD 276 199

CONTENTS: Includes data on advanced test and simulation facilities, development of a combined environment chamber for physiological testing, measurement and simulation of space environments, vibration testing of the Mercury capsule, simulation problems in futuristic space environmental chambers, vibration at altitude, vibrational environment of the Mercury-Redstone vehicle, and simulation of air drops for the Mercury landing system controller utility of isolators for protection of equipment.

U.S. Assistant Secretary of Defense 1957 SHOCK AND VIBRATION BULLETIN. TEN YEARS OF PROGRESS. (Assistant Secretary of Defense, Research and Development, Washington, D.C.) Bull. No. 24, Feb. 1957. ASTIA AD 320 434

943

U.S. War Dept. n.d. PHYSIOLOGICAL EFFECTS OF ULTRA-SONIC VIBRATIONS (War Dept., Combined Intelligence Objectives Subcomm.) Report #45

944

Usenko, V. R. 1961 EFFECT OF GENERAL VERTICAL VIBRATIONS ON THE VESTIBULAR APPARATUS.
In Tr. Leningrad Sanitarnogig Med. Inst. 71:9-15, 1961, (Russian).

945

Vars, H. M. 1961 A STUDY OF METHODS OF EQUILIBRATING TISSUE OXYGEN REQUIREMENTS AND TISSUE OXYGEN SUPPLY IN SHOCK AND SHOCK-LIKE STATES. Annual Progress Report, 31 July 60 - 31 July 1961. (Pennsylvania University, Philadelphia) (Contract DA 49-007-md-511) ASTIA Doc. No. AD-265 277.

ABSTRACT: The secretion (microgram/min) and peripheral blood concentration of epinephrine (E), norepinephrine (N), 17-hydroxycorticosteroids (17-OHCS) and adrenal vein blood flow were measured in hemorrhagic shock: (1) bled to 60 mm Hg, maintained for 1 hr., then bled to 30 mm Hg and maintained for 1 hr; and (2) bled directly to 30 mm Hg, and maintained for 2 hr. In other experiments peripheral blood levels of E and N were followed during hypotension at 30, 45 and 60 mm Hg, maintained for 1.5, 2, 3, 4 and 6 hr. The adrenal response to shed blood replacement was also observed. With varying degrees and duration of hypotension a prompt increase in E, followed by a lesser and more variable increase in N, occurred in all groups. Blood reinfusion resulted in a sharp decrease to somewhat above control values of E and N when high secretion and blood levels were obtained at the time of transfusion. The adrenal vein blood 17-OHCS concentration usually increased at moderate levels of hypotension (60 mm Hg) although the microgram/min secretion may have decreased due to the reduction in blood flow. When the blood pressure was reduced to 30 mm Hg adrenal blood flow and corticoid secretion were markedly reduced to much lower levels. (Author)

946

van Galen, J. 1957 GERUIS- EN SCHOKBEVEILIGING VAN ONDERZEEBOTEN 1949: BIBLIOGRAFIE NOISE AND SHOCK SAFEGUARDING FOR SUBMARINES 1949: BIBLIOGRAPHY (Technisch Documentatie Centrum voor de Krijgsmacht (Netherlands) 10 Nov. 1957, Rept. no. TDCK 2911-S2, ASTIA AD-156 155

947

Vernon, J.A. 1952 CUTANEOUS INTERACTION RESULTING FROM SIMULTANEOUS ELECTRICAL AND MECHANICAL VIBRATORY STIMULATION (Virginia U., Charlottesville) 2 Sept. 1952; Contract N7onr-372, T.O. 2; ASTIA AD-13 860

948

Vernon, J.A. 1953 CUTANEOUS INTERACTION RESULTING FROM SIMULTANEOUS ELECTRICAL AND MECHANICAL VIBRATORY STIMULATION. J. Experimental Psychology 45(5):283-287. May, 1953

ABSTRACT: The simultaneous application of electrical and mechanical vibratory forces to a common locus on the finger-tip was demonstrated to produce a cutaneous interaction. This interaction, as indicated by the detection of cutaneous beats, was best produced in the narrow frequency range of about 280cycles to 310 cycles per second.

The magnitude of the cutaneous interaction was measured by determining the effect of simultaneous subliminal electrical stimuli upon mechanical vibratory thresholds. When the two forces were presented in one phase relation (the absolute value was unknown), the mechanical vibratory thresholds were greatly lowered as compared with normal mechanical vibratory thresholds, but when the two forces were presented in a phase relation 180° different from the first, there was little or no departure from normal thresholds.

The evidence shows that electrical stimuli do not stimulate the skin by first producing mechanical movements in the skin.

In that an interaction between electrical and mechanical vibratory stimuli has been demonstrated. even under limited conditions, it now appears fruitful to plan future work. The investigation is being extended by the use of continuous phase variation.

949

Verrillo, R.T. 1962 INVESTIGATION OF SOME PARAMETERS OF THE CUTANEOUS THRESHOLD FOR VIBRATION.
J. of the Acoustical Society of America 34(11):1768-1773, Nov. 1962.

ABSTRACT: Sensitivity to vibration on the hand was determined as a function of frequency, contactor dimensions, contactor configuration, and distance of the contactor from a rigid support. It was found that each of these parameters affects the threshold in a different way. In the frequency between 25 and 640 cps, the absolute threshold as a function of frequency yields a u-shaped curve that reaches a maximum of sensitivity in the region of 250 cps. The effect of the geometric parameters appears to be highly complex. (Author)

950

Voight, H., tr. E.N. Labouvie 1958 EINIGE NEUERE ERKENNTNISSE UND ERFAHRUNGEN BEI-SCHIFFSVIBRATIONEN (RECENT FINDINGS AND EMPIRICAL DATA OBTAINED IN THE FIELD OF SHIP VIBRATIONS) Jahrbuch Schiffbautechnische Gesellschaft vol. 47, Translation 268, ASTIA AD-202 516, Feb. 1958

ABSTRACT: The status of German research on causes of vibration in ship hulls appendages, and power plants is described, with examples drawn from the work of the Germanische Lloyd and the STG Technical Committee on Ship Vibration. Various devices for measuring vibration are reviewed. Also included is a discussion of the paper by several specialists in the field. (Author)

951

Vokac, Zdenek 1957 KINETOSY -- NEMOCI POHYBU (KINETOSES -- DISEASES CAUSED BY MOVEMENT)
(Veda Zivot (Czech.) 1957 (3): 153-155, March 1957)

952

Volkov, A.M., and V. Chirkov 1960 OSCILLATIONS OF THE HUMAN BODY UNDER THE EFFECT OF VIBRATION. Gigiena truda i professional'nye zabolevaniia (Moskva), 4 (5): 8-12, May 1960

ABSTRACT: The physiological effects of vibration in the frequency range of 1-70 cps were investigated on humans with the aid of a vibration table and a vibration stand. A method of simultaneous recording of the oscillatory movement of the human body was employed. The results confirm the resonance nature of oscillations in the frequency range of 5-8 cps and 17-25 cps for the human body.

953

von Bekesy, G. 1939 SENSATIONS OF VIBRATION. (Uber die Vibration-semfindung) Akustiche Zeit. 4:316-334.

ABSTRACT: The diffusion of mechanical vibration and the isolation of resonance in the human body are investigated. From the sensation of pressure and vibration it becomes evident that they occur through two different nerve types which have separated themselves spatially in the vicinity of the fibrous root. The frequency dependence of the vibration threshold is continuously measured and it appears, through impedance measurements of the surface of the skin, that the sensation of vibration is not determined by the alternating pressure, but by the magnitude of deformation. Finally, an arrangement for the subjective measuring of vibration force is given.

954

von Bekesy, G. 1939 THE SENSITIVITY OF STANDING AND SITTING MAN TO SINUSOIDAL VIBRATION. (Über die Empfindlichkeit des stehenden und sitzenden Menschen gegen sinusformige Erschutterungen) Akustiche Zeit. 4:360-369.

ABSTRACT: A shake table for vertical vibration was made from a decimal balance which held a load of 100 Kg. With this arrangement the threshold of sinusoidal vibration stimulation of normal standing and sitting man was measured by its frequency raltionship. The frequency range investigated was from 0.1 to 100.0 cps. The displacement of the hand or foot against the resting body which were noticed were also investigated.

With special large-faced quartz microphones the pressure threshold of vibration sensation for standing man could be determined, which as anticipated is independent of frequency in a wide frequency range. With resting, standing or sitting man periodic variations became evident which partly coincided with pulsation.

In order to be able to calculate the vibration transmission over man, the mechanical impedance of man was ascertained by two distinct methods. The frequency dependence of impedance showed that with increasing vibration frequency even smaller masses of the body were displaced in vibration.

By means of a horizontal pendulum the threshold of horizontal vibration were also investigated. At the same time the appearance of the vetebral column could be observed.

955

von Bekesy, G. 1940 UBER DIE STARKE DER VIBRATIONSEMPFINDUNG UND IHRE OBJEKTIVE MESSUNG (Concerning the Strength of the Vibration Experience and Its Objective Measurements)
Akustische Zeitschrift 5: 113-124

956

Von Bekesy, G. 1940 THE NEURAL TERMINATIONS RESPONDING TO STIMULATION OF PRESSURE AND VIBRATION. J. Exp. Psychol. 26:514-519.

957

von Bekesy, G. 1948 VIBRATION OF THE HEAD
J. Acoustical Society of America 20(6):749-760, Nov. 1948

958

von Bekesy, G. 1959 NEURAL FUNNELING ALONG THE SKIN AND BETWEEN THE INNER AND OUTER HAIR CELLS OF THE COCHLEA. (Psycho-Acoustic Lab., Harvard Univ., Cambridge, Mass.) Contract No. 18615, ASTIA AD-229 246; 1 June 1959
See also Reprint J. of the Acoustical Society of America 31:1236-1249

ABSTRACT: An attempt has been made to show that (1) the rotating tones in hearing, (2) the rotating vibrations on the skin, (3) the difference limen for the smallest perceptible distance on the skin, and (4) Mach's law of contrast are all consequence of the same funneling action of the nervous system. In many situations the role of the funneling action can be better understood if a neural funneling unit is proposed, taking into account that a local stimulus produces both an area of activity and, around it, an area of decreased sensitivity. Since the inner and outer hair cells in the cochlea show a difference in sensitivity, the funneling action between these areas of different sensitivity has been investigated. It has been found that, between such areas, the locus of the sensation is continuously displaced as the intensity of the stimulus is increased. This suggests that along the organ or Corti there is a longitudinal displacement produced by variations in frequency, and a radial displacement between the outer and inner hair cells produced by variations in sound pressure. Thus there seems to be a pitch-loudness coordinate system in the ear. The cochlear model (J. Acoust. Soc. Am. 27:830-841, 1955) with nerve supply was therefore further developed into a cochlear model with more and less sensitive nerve supplies, in order to represent the outer and inner hair cells in the organ of Corti. (AUTHOR)

959

von Diringsh[illegible] H. 1935 LOS MAS IMPORTANTES PROBLEMS DE LA MEDICINA AERONAUTICA ([illegible]portant Problems of Aviation Medicine)
Revista médica germano-ibero-americana (Leipzig) 8: 418-438

960

von Diringshofen, H. 1935 DIE WICHTIGSTEN AUFGABEN DES FLIEGERARZTES UND DER LUFTFAHRTMEDIZIN (The Most Important Tasks of the Flight Surgeon and the Aviation Medicine)
Deutsche Medizinische Wochenschrift (Stuttgart) 61: 461-464 & 545-547

961

von Diringshofen, H. 1938 FÜR DEN TRUPPENARZT PRAKTISCH WICHTIG FRAGEN DER LUFTFAHRTMEDIZIN (Practical, Important Questions of Aeromedicine for the Company Doctor)
Luftfahrtmedizinische Abhandlungen (Leipzig) 2: 252-253.

962

von Diringshofen, H. 1950 BESCHLEUNIGUNGSWIRKUNGEN IM RONTGENBILD (Acceleration Effects in the X-ray Pictures)
Weltraumfahrt 1: 135-137

963

von Gierke, H. E. 1949 SOUND ABSORPTION AT THE SURFACE OF THE BODY OF MAN AND ANIMALS. J. of the Acoustical Soc. of Amer. 21:55.

964

von Gierke, H.E. 1950 MEASUREMENT OF THE ACOUSTIC IMPEDANCE AND THE ACOUSTIC ABSORPTION COEFFICIENT OF THE SURFACE OF THE HUMAN BODY.
(Wright Air Development Center, Wright-Patterson AFB, Ohio)
AF Technical Rept. No. 6010, March 1950.

ABSTRACT: Measurements were made of the mechanical impedance and the acoustical absorption coefficient of the human body surface. The measurements were carried out over soft areas (1-18 cm^2) of the body surface for the frequency range 100 to 18,000 cps. For the lower frequencies the data were obtained from the resonance and damping characteristics of an air filled tube closed at one end by the body. At higher frequencies an aluminun rod pressed against the body was employed instead of the air column. These measuring devices are described and for each device two different measuring methods are treated theoretically.

The experimental results show for the body surface the absorption coefficient and the impedance (amplitude and phase) as functions of frequency and measured area. From this data the vibratory energy absorbed by the body surface may be calculated A theoretical explanation for the measured behavior of the body surface is given.

965

von Gierke, H.E. 1950 THE EFFECTS OF SHOCK AND VIBRATION ON MAN
USAF Technical Report 6010, 1950

966

von Gierke, H. E., H. O. Parrack, & D. H. Eldredge 1950 HEATING OF ANIMALS BY ABSORBED SOUND ENERGY (Air Materiel Command, Wright-Patterson AFB, Ohio) AF TR 6240; Oct. 1950

ABSTRACT: In order to explain the observed heating and killing of small animals in sound fields above about 150db ref. .0002 dyne/cm^2, the sound absorption coefficient of rat's body surface is measured as a function of frequency. The absorption coefficient decreases up to about 1500 cps and then increases up to 6000 cps. The behavior below 1500 cps is determined largely by the tissue beneath the skin while the increased absorption above 1500 cps is the result of the presence of the fur. These absorption coefficients permit the estimation of the sound energy absorbed by a whole animal. By calculating the heat balance of the animal in a sound field, the sound intensity and the time required to cause heat death can be calculated approximately. These calculated results agree with the old as well as with new experimental data on the heat death of rats and establish overheating as the agent responsible for death. (Man's situation with respect to overheating in intense sound fields is considered in an appendix.) (AUTHOR)

967

Gierke, H.E. von, H.O. Parrack, and D.H. Eldredge 1952 HEATING OF ANIMALS BY ABSORBED SOUND ENERGY Jour. Cellular and Compar. Physiol. 39(3): 487-505 DLC(QP1.W533, v. 39)

ABSTRACT: The sound absorption of anesthetized rats with normal fur or with the fur shorn, and of the furred rat skin removed from the body was studied. Sound fields above 150 decibels and frequencies up to 6000 c.p.s. were employed. On the intact fur, the sound absorption coefficient decreased up to 1500 c.p.s. the coefficient increased again, being about 12% at 6000 c.p.s. On the bare skin, the absorption coefficient decreased with increasing frequency, and on the isolated furry skin it increased with increasing frequency throughout the tested. - The behavior below 1500 c.p.s. it is dependent on the physical properties of the fur. This coefficient permits the calculation of sound vibration absorbed by the whole animal. The duration of survival of the animal in a sound field is related to its heat balance.

968

vonGierke, Henning, Hans L. Oestreicher, Ernst K. Franke, Horace O. Parrack and Wolf W. vonWittern 1952 PHYSICS OF VIBRATIONS IN LIVING TISSUES (Journal of Applied Physiology, Vol. 4, No. 1, June 1952, pp. 886-900)

ABSTRACT: Experimental data about the behavior of vibrating body tissue in the frequency range from 0 to 20 kcps are given and the experimental techniques

described. The results show that the vibratory energy is absorbed by the body surface in several ways and that for the distribution of the energy inside the body tissue in the different frequency ranges different types of wave propagation are important. The results suggested a theory wherein the propagation of vibratory energy in soft human body tissue is compared to the wave propagation in an elastic viscous compressible medium. The general physical conclusions of this theory are briefly outlined and the three types of wave propagation that we must expect, the shear waves, the compression waves, and the surface waves are characterized. By applying this theory specifically to the experimentally investigated case that the vibrating force is applied perpendicularly to the body surface overlying soft tissue, it is shown that the simplified model of a vibrating sphere in an elastic viscous compressible medium describes entirely the mechanical behavior of the body tissue. The qualitative agreement between the calculated and measured characteristics in terms of impedances was found to be sufficiently good, that it is possible to determine approximate values for the shear elasticity and the viscosity of the body tissue, the most important of the unknown physical constants of the four quantities involved in the theory. With these constants known, the mechanical behavior of the body surface can be calculated for the whole frequency range from 0 to about 10^5 cps in the ultrasound range. The theory is in good agreement with all available measurements by different authors and should apply also in ranges where measurements are still missing. Theoretical explanations or models given in earlier investigations for the low frequency case and for the middle frequency range are special cases of the general theory. The theory enables us also to estimate, from the impedance characteristic measured on the body surface, the kind of wave propagation inside the body. That is, it shows how much of the total energy entering the body is distributed in the body in the form of shear waves and how much as compression waves.

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von Gierke, H E., H. Davis, D.H. Eldredge and J.D. Hardy 1953 AURAL PAIN PRODUCED BY SOUND. BENOX Report, Contract N6-ori-020, ONR Project NR 144079 December 1953

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von Gierke, H. E., & D. R. Warren 1953 PROTECTION OF THE EAR FROM NOISE. (Office of Naval Research & University of Chicago) Contract N6 ori-020, Task Order 44, ONR Project NR 144079, Dec. 1953

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von Gierke, H. E., H. Davis, D. H. Eldredge, & J. D. Hardy 1953 AURAL PAIN PRODUCED BY SOUND (Office of Naval Research & University of Chicago) Contract N6 ori-020, Task Order 44, ONR Project NR 144079, Dec. 1953

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von Gierke, H. E. 1957 TRANSMISSION OF VIBRATORY ENERGY THROUGH HUMAN BODY TISSUE
Proceedings of the First National Biophysics Conference, 1957
(New Haven, Yale University Press, 1959)

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Von Gierke, H. E. 1958 VIBRATION AND NOISE ENVIRONMENT OF MISSILES AND SPACECRAFT. WADC TR 59-732
See also Proceedings of the Wright Air Development Center Space Technology Lecture Series, Section 5, "Space Medicine", Dec. 1958

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von Gierke, H.E. 1959 VIBRATION AND NOISE PROBLEMS EXPECTED IN MANNED SPACE CRAFT. Noise Control 5(3):8-16

ABSTRACT: Noise and vibration problems in space vehicle will be most severe during launch and re-entry. The order of magnitude of the noise levels can be reasonably well predicted for the launch phase; estimates of the noise during hypersonic re-entry are considered less accurate. With proper cabin and personal equipment design, adequate speech communication should be possible during both phases.

Vibration levels are harder to predict. But it is concluded that major vibration problems with regard to human occupants of the rocket craft may be confined to the low-frequency oscillations and transient accelerations expected at rocket burn-out and during re-entry, respectively. The frequency range which requires special attention in this connection through-out the system planning and design phases is from 0.5 to 20 cps. Vibrations in this frequency range are particularly critical for the seated subjects.

Accurate measurements of noise and vibration levels during launch and re-entry should be obtained as soon as possible to insure the optimum design of cabin and personal protection equipment and to direct the course of basic studies on tolerance and performance. In the new and complex stress environment posed by space missions, even noise and vibration levels not affecting human behavior and performance when presented as individual stimuli must be considered as significant compounds of the overall physical and phychological stress picture.

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von Gierke, H. E. 1959 VIBRATION AND NOISE ENVIRONMENTS OF MISSILES AND SPACECRAFT
Space Medicine, Section 5
Proceedings of the WADC Space Technology Lecture Series, WADC Technical Rep. 59-732, Vol. I 1959

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von Gierke, H. E. 1960 VIBRATION AND NOISE ENVIRONMENT OF MISSILES AND SPACECRAFT. In (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) PROCEEDINGS OF WADC SPACE TECHNOLOGY LECTURE SERIES, VOLUME 1 TECHNICAL AREAS. WADC TR 59-732; ASTIA AD-235 424; pp. 145-161

ABSTRACT: Noise, vibration, and transient accelerations have been with aviation from its inception. The noise and vibration problems will be most severe during launch and re-entry. The magnitude of noise levels can be reasonably predicted for the launch phase but noise estimates during hypersonic re-entry are less accurate. Critical and major vibration problems affecting crewmen may be confined to low-frequency oscillations at rocket burnout and transient accelerations during re-entry. Bio-acoustic problem areas should form no serious obstacle to manned flight. However, meager existing data must be supplemented soon by measurements of noise and vibration during launch and re-entry to permit optimum design of cabin and personal protection equipment and to direct a course of basic studies in tolerance and performance of humans. Noise and vibration levels which do not affect human behavior when presented as individual stimuli must be considered significant in the over-all physical and psychological stress picture. (AUTHOR)

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von Gierke, H.E. 1959 VIBRATION AND NOISE PROBLEMS EXPECTED IN MANNED SPACE CRAFT. Noise Control, 5(3): 8-16, May 1959

ABSTRACT: The present information on noise, vibration and transient accelerations of space craft during launch and re-entry is reviewed and discussed with regard to human physiologic and psychologic tolerances and performance. Using general knowledge of noise and vibration sources, estimations and predictions are made of noise and vibration levels which may be experienced inside and outside a manned space craft. The order of magnitude of the noise levels can be reasonably predicted for the launch phase; estimates of the noise during hypersonic re-entry are considered less accurately . It is concluded that vibration problems with regard to human occupants may be confined to the low frequency oscillations and transient acceleration expected at rocket burn-out and during re-entry respectively.

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von Gierke, H. E. 1960 TRANSMISSION OF VIBRATORY ENERGY THROUGH HUMAN BODY TISSUE. In Glasser, Otto, ed., Medical Physics (Chicago, Ill.: The Year Book Publishers, Inc., 1960) 3:647-668

SUMMARY: This survey is by no means exhaustive and only touches on the most important data available on the mechanical properties of body tissue. Phenomena such as nonlinearity and hysteresis are not included at all. The main purpose was to stress the fact that regardless of the frequency range and the application for which the measurements were made, all data should fit together into one general picture of the dynamic mechanical properties of human body tissue. (AUTHOR)

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Von Gierke, H. 1960 REPORT TO THE ACCELERATION PANEL, ARMED FORCES-NRC COMMITTEE ON BIO-ASTRONAUTICS, WOODS HOLE, MASS., AUG. 1960. (Aerospace Med. Lab., WPAFB, Ohio)

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von Gierke, H. E., et al. 1960 THE EFFECTS OF SHOCK AND VIBRATION ON MAN (Naval Medical Research Institute, Bethesda, Md.) No. 60-3, 8 Jan. 1960

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von Gierke, H.E. 1961 BIOMECHANICS OF IMPACT INJURY.
(Aerospace Medical Lab., Wright-Patterson AFB, Ohio)

ABSTRACT: A review of the biomechanics of impact injury indicates that (1) Steady-state vibration studies are very helpful for interpreting impact tolerance data. The mechanical models for the human body derived from such studies are useful as a basis for theoretical analysis and prediction of impact response. (2) Theoretical analysis of the response of the complex human system to impact loads shows clearly that a complete description of the force-time function of the impact load is necessary to define response or tolerance uniquely. Only in very limited impact-duration ranges can a single parameter such as peak acceleration, impulse, or rate-of-onset be considered primary to the response.

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Von Gierke, H. E. & R. R. Coermann 1961 THE BIODYNAMICS OF HUMAN RESPONSE TO VIBRATION AND IMPACT.
Rev. Med. Aero (Paris) 2:201-203, Dec. 1961

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Von Gierke, H. E. & R. R. Coermann 1963 THE BIODYNAMICS OF HUMAN RESPONSE TO VIBRATION AND IMPACT.
Industr. Med. Surg. 32:30-32, Jan. 1963.

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von Gierke, H. E. and D. E. Goldman 1961 SHOCK AND VIBRATION: LIMITS OF COMFORT AND SAFETY
Handbook of Shock and Vibration
(New York, N. Y., McGraw-Hill Book Co., 1961).

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Von Gierke, Cole & Grob 1961 NOISE AND VIBRATION OF PERSONNEL IN AEROSPACE SYSTEMS, AND THE SIMULATION OF THE ENVIRONMENT IN AEROSPACE MEDICAL RESEARCH. (1961 Proceedings of the Institute of Environmental Sciences,; Paper not available at publication).

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von Gierke, H. E. and R. R. Coermann 1961 THE BIODYNAMICS OF HUMAN RESPONSE TO VIBRATION AND IMPACT
In Proceedings of the International Congress of Aviation and Cosmonautical Medicine, Paris, September 1961
In Revue de Medicine Aeronautique, Vol 2, 1962
See also Industrial Medicine and Surgery 32:30-32, 1963

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von Gierke, H. E. and E. P. Hiatt 1962 BIODYNAMICS OF SPACE FLIGHT
In S.F. Singer, Ed. Progress in Astronautical Sciences, Vol I. (Voorburgwal, Amsterdam, North Holland Publishing Company) 1962
See also WADD - Q-1

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van Liere, E. J. 1957 SPACE MEDICINE
West Virginia Med. J. 53(8): 297-301 Aug. 1957

ABSTRACT: An outline is made of some of the physiologic problems encountered in space flight, including those arising from accelerations, weightlessness, rapid decompression, and hypoxia. As a result of such flights physicians will have to treat such things as radiation sickness, ultraviolet and thermal burns, cosmic ray damage, sterility, accidents due to meteors, and fractures sustained by assuming incorrect position when acceleration begins. Mention is made of the emotional strain and physical and mental fatigue which are conducive to bringing about neuroses in spacemen.

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von Wittern, W. W. 1952 FORCE BALLISTOCARDIOGRAPHY
WADC TR 52-340, November 1952

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von Wittern, W.W. 1953 BALLISTOCARDIOGRAPHY WITH ELIMINATION OF THE INFLUENCE OF THE VIBRATION PROPERTIES OF THE BODY.
American Heart Journal, 46(5):705-714, November 1953

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Wacholder, B.V. & E. Fayer 1960 STUDY OF INSTRUMENTATION AND TECHNIQUES FOR MONITORING VEHICLE AND EQUIPMENT ENVIRONMENTS AT HIGH ALTITUDE INSTRUMENTATION AND MONITORING TECHNIQUES
Wright Air Development Division, Air Research and Development Command, Wright-Patterson AFB, Ohio WADC TN-59-307, Vol. III June 1960
ASTIA AD 268 090

ABSTRACT: Instrumentation techniques are presented which are available within the state-of-the-art; an instrumentation system is proposed for the monitoring of high-altitude environments encountered by typical vehicles. The high altitude environmental effects on typical vehicles and equipment is summarized. The present airborne-instrumentation state-of-the art is presented for measuring temperature, pressure, strain, vibration, acceleration, radiation, meteorite detection, and acoustic noise. A feasible instrumentation system is discussed for monitoring these deleterious environments. In addition, recommendations are made for an extension of this study to cover environments that are outside the scope of the present program, such as the environments created by nuclear and other advanced propulsion systems. Another recommendation is the continuation of the instrumentation study to effect a complete design specification for an environmental monitoring system for a particular vehicle.

992

Walcott, Charles, & W. G. van der Klott 1959 THE PHYSIOLOGY OF THE SPIDER VIBRATION RECEPTOR. Journal of Experimental Zoology 41:191-244, July 1959
See also (Cornell University, Ithaca, N. Y.) Contract Nonr-40128, Proj. NR 140-117; ASTIA AD-244 182

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Walcott, Charles, & W. G. van der Klott 1959 THE PHYSIOLOGY OF THE SPIDER VIBRATION RECEPTOR. (Cornell University, Ithaca, N.Y.) Contract Nonr-40128, Proj. NR 140-117; ASTIA AD-244 182
See also Reprint Journal of Experimental Zoology 41:191-244, July 1959

ABSTRACT: Much of the information that web-spinning spiders receive about the outside world can come only from vibrations--simpel observation bears this out. Both in the capture of insects for food and in the elaborate coutship, vibration is an important stimulus for behavior.

By using electrophysiological techniques, we have been able to locate an extremely sensitive vibration receptor on the leg of the spider. This paper includes data on the threshold, frequency response, frequency discrimination, and other properties of the receptor as well as experiments designed to uncover the mechanism by which the receptor operates.

994

Waldron, D. L., & R. C. McNee 1961 INTRA-AURAL TEMPORARY THRESHOLD SHIFT DIFFERENCES (School of Aerospace Medicine, Brooks AFB, Texas) Rept. 61-95; Aug 1961

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Walsh, James E. 1948 VIBRATION PROBLEMS IN AIRCRAFT
In: Marcus, Henri et al, Shock and Vibration Bulletin No. 7, Naval Research Lab. Rept. No. S-3229 ASTIA ATI 75 153 pp. 13-15

ABSTRACT: The method of vibration isolation of reciprocating engine-propeller combination is described. Present specifications for allowable cockpit vibrations are discussed critically. Finally, a brief comment on the problems of turbo-jet and prop-jet engine vibration isolation is presented.

996

Webb Associates 1962 FORCE FIELDS
In: NASA Life Sciences Data Book (National Aeronautics and Space Administration, Washington, D.C.) Contract NASr-89. June 1962

ABSTRACT: This handbook provides 28 pages of charts and summaries from the various force fields. Areas covered include: Acceleration (experience, impact, transverse G limits, acceleration terminology, variations in G tolerance, G vector and consciousness, direction of force, maximum tolerable acceleration profiles, G protection by water immersion); tolerance to tumbling; deceleration (abrupt transverse, positive and negative G decelerations, tolerance to vertical impact, human impact sensitivity, impact tolerance); G fields in rotating space vehicles; vibration, (response, tolerances, physiological effects, psychophysical factors, performance functions, transmission, oxygen consumption, respiratory ventilation, and tracking performance); resonance of the abdominal wall; oscillations; high dynamic pressures; blast injury.

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Weber, M. 1951 A NEW VIBRATION MEASURING APPARATUS AND ITS APPLICATIONS Schweiz Arch Angew Wiss Tech (German) v. 17, pp. 129-139

ABSTRACT: The mathematical design of a vibration recording apparatus is given briefly with special reference to the measurement of shock waves. Details are given of a piezolectric accelerometer. The natural frequency of the equipment is 3500 c/s, and its output is linear up to 400 c/s.

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Weber, M. and U.A. Corti. 1951 VORVERSUCHE ZUR ENERGETISCHEN ANALYSE BIO-DYNAMISCHER PHÄNOMENE AUF ERSCHÜTTERUNGSMES-STECHNISCHER GRUNDLAGE. (Preliminary experiments in the energic analysis of biodynamic phenomena by measurement of vibration.) Schweiz. med. Wchnschr. 81:194-195

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Webster, W. C., & J. D. Lin 1962 DYNAMIC HEAVING MOTION OF GROUND EFFECT MACHINES. (Hydronautics, Incorporated, Washington, D. C.) Technical Rept. 011-3; ASTIA AD-274 546; March 1962

ABSTRACT: The dynamics of simple ground effect machines undergoing heaving motion over a wavy surface is formulated here. The equation of motion is a third order ordinary differential equation with the coefficients depending essentially on the mass flow into or out of the cavity under the machine and on the geometric characteristics of the machine. The response of machines traveling over a sinusoidal surface is derived as a function of the encounter frequency and mass flow coefficients. Then, mass flow coefficients are obtained for different types of machines. Peripheral jet machines without an exceptionally large volume of concave bottom are found to be stable in the heave mode. The responses of both a peripheral jet machine and a plenum chamber machine are computed. The peak response of plenum chamber machines is generally higher than that of peripheral jet machines. (AUTHOR)

1,000

Weidmann, F. 1940 PHENOMENA OCCURRING WHEN TRANSMITTING MECHANICAL ENERGY FOR SHORT PERIODS OF TIME (VORGANENGE BEI MECHANISCHER ENERGIEUEBERTRAGUNG IN KURZEN ZEITRAEUMEN)
ASTIA ATI 55423

ABSTRACT: A theoretical discussion is given on the phenomena occurring during the mechanical transmission of energy for short periods of time, using a catapult

installation as an example. Three possible means to assure constant acceleration of flying models over the entire length of the catapult are discussed, and the one using a spring as a means for damping the acceleration shock is considered. The substitute for this system is a double pendulum, whose equations are derived for the general solution. The course of acceleration is purely sinusoidal while the velocity is composed of a constant and a cosine term. The application of the spring for shock absorption is also considered.

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Weinert, C. E. 1950 VIBRATION ISOLATOR (DWG. NO. 4391419) LABORATORY STATIC, DYNAMIC AND TEMPERATURE TESTS. (Douglas Aircraft Co., Santa Monica. Calif.) Rept. No. DEV-542, 26 Dec. 1950

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Weitz, J. 1939 VIBRATORY SENSITIVITY AS AFFECTED BY LOCAL ANESTHESIA. J. Experimental Psychology 25:48-64

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Weitz, J. 1941 VIBRATORY SENSITIVITY AS A FUNCTION OF SKIN TEMPERATURE. J. Exp. Psychol. 28:421-436.

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Wendell, G.H. & S.B. Cummings 1938 FATIGUE OF THE VIBRATORY SENSE. J. Exp. Psychol. 22:429-438

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Wendt, G.R. 1958 PHYSIOLOGICAL EFFECTS OF LOW FREQUENCY, HIGH-AMPLITUDE VIBRATION ON THE HUMAN ORGANISM. (Paper read at the 29th Annual Meeting of the Aero Medical Association, Wash., D.C. March 1958)

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Wendt, H.W., E.A. Stark, G.B. Simon, and E. Cohen 1961 THE VALUE OF COCKPIT MOTION IN FLIGHT SIMULATION (Link Division, General Precision Corporation, Presented at American Psychological Association Convention, New York, New York) 4 Sept. 1961

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White, D.C. & M.M. Mozell 1957 WHOLE BODY OSCILLATION; PRELIMINARY REPORT U.S. Naval Air Development Center, Johnsville, Pa. NADC-MA-LR23 April 1, 1957

ABSTRACT: In a study to set the upper limit of endurance to sinusoidal whole body oscillation, two subjects were studied on a vibration table while strapped securely in an A4D seat at 0.34-inch double amplitude and frequency of 10 cps (2-3 G). An intolerable precordial pain radiating to the left shoulder developed in both subjects. At frequency levels of 20-25 cps and the same double amplitude (6-10 G), a lower bowel disturbance was observed which was characterized by discomfort, followed later by bloody, mucloid discharge.

1,008

White, G. H., Jr., K. O. Lange & R. R. Coermann 1962 THE EFFECTS OF SIMULATED BUFFETING ON THE INTERNAL PRESSURE OF MAN. Hum. Factors 4:275-290, Oct. 1962

1,009

White, S.Y. 1948 APPLICATIONS OF ULTRASONICS TO BIOLOGY Audio Eng. 32:42-45

1,010

Whittingham, P. D. G. V. 1962 THE MEASUREMENT OF TISSUE THICKNESS BY ULTRASOUND (Paper, 33rd Annual Meeting of the Aerospace Medical Assoc., Chalfonte-Haddon Hall, Atlantic City, N. J., April 9-12, 1962)

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Wiercinski, F.J. and C.M. Child 1936 DIFFERENTIAL SUSCEPTIBILITY OF LIVING ORGANISMS TO SUPERSONIC VIBRATION Science 83:604-605

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Wilcox, H. H. & W. F. Windle 1950 A CONTROLLED STUDY OF THE EFFECTS UPON THE BRAINS OF GUINEA PIGS OF ULTRASONIC WAVES GENERATED BY TURBO-JET ENGINES. J. Aviation Med. 21:85.

ABSTRACT: A pilot experiment was performed with eight guinea pigs to determine whether exposure to repeated bouts of "noise" generated by turbo-jet engines results in brain damage or impairment of retention of memory of a learned maze problem. No statistically significant alterations in retention were observed. No neuropathological changes were seen. Except for the destruction of the organ of Corti, leading to deafness, results were negative.

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Wilcoxon, H.C., and E. Davy 1954 FIDELITY OF SIMULATION IN OPERATIONAL FLIGHT TRAINERS, PART I: EFFECTIVENESS OF ROUGH AIR SIMULATION (Special Devices Center, Port Washington, New York) SDC Technical Report 999-2-3, 24 January 1954.

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Wilson, W.Ker 1943 VIBRATION IN AIRCRAFT (Oscillation Sub-Committee of the Aeronautical Research Committee, DeHavilland Aircraft Co., Ltd., Hartfield, Herts, England) June 1943

1,015

Winchester, C. F., L. E. Campbell, & J. Bond 1959 EFFECTS OF AIRCRAFT SOUND ON SWINE. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 59-200; August 1959, ASTIA AD-233 449

ABSTRACT: To determine whether or not aircraft sounds affect swine unfavorably, a number of different lines of investigations have been carried out. Direct obser-

vations and motion picture records have been made of animals exposed to reproduced aircraft sounds at high levels of intensity. Heart rate measurements have been made in an attempt to determine possible rate changes due to noise. Feeding trials in which pigs were exposed daily to the sound of random "fly-overs" have been carried out. Possible effects of noise on reproduction have been investigated. In addition, histological studies of the ears and adrenal and thyroid glands of swine after sound exposure have been made. None of these lines of investigation has yielded evidence indicating that swine are influenced significantly by noise.

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Winter, R. S. 1947 PASSENGER SEAT, STRUCTURAL AND VIBRATORY TESTS, MODEL 240 AIRPLANE. (Consolidated Vultee Aircraft Corp., San Diego, Calif.) Rept. 4939, 22 May 1947

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Wolfers, F. 1931 ULTRASONICS AND BIOLOGY (Paris: A. Blanchard)
See Also: Biol. Abstr. 8:19647

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Wood, R.W., & A.L. Loomis 1932 THE PHYSICAL AND BIOLOGICAL EFFECTS OF HIGH FREQUENCY SOUND WAVES OF GREAT INTENSITY Biol. Abstr. 6:24736

See Also: London, Edinburgh & Dublin Philosophical Magazine and Journal of Science 4:417-436 (7th Series)

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Wuff, V.J., Fry, W.J. D. Tucker, F.J. Fry & C. Nalton 1951 EFFECTS OF ULTRASONIC VIBRATIONS ON NERVE TISSUES
(Proc. Soc. of Biol. Med., 1951, 76, 361)

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Wulfeck, J.W., Weisz, A., and Raben, M.W. 1958 EFFECTS OF VIBRATION ON VISUAL PERFORMANCE. In; Wulfeck, J.W., Weisz, J.W., & Raben, M.W., editors, Vision In Military Aviation. (Wright Air Development Center, Wright-Patterson AFB, Ohio) WDAC Technical Rept. 58-399, ASTIA AD-207780, Nov. 1958

ABSTRACT: Vibration has been recognized to impair visual performance in reciprocating aircraft of all kinds. When vibration cannot be avoided, its effects upon visual performance may be reduced by proper design of the visual display and printed materials which must be viewed. However, effective design depends upon an understanding of how vibration influences vision. Research on the effects of vibration on visual performance have taken two directions. On the one hand, the effects of certain kinds of vibration impressed upon the operator's body, through his feet or seat, have been explored. On the other hand, the effects of certain kinds of vibration in the visual-field have been determined. Early research on the effects of vibration imposed upon the body measured human sensitivity to vibration. After bodily sensitivity to vibration was measured and discomfort thresholds were determined, efforts were made to discover the physiological effects upon which judgments of discomfort are based. Results of experiments on visual sensitivity to vibration are reported in this chapter.

VIBRATION

X

VIBRATION

Y

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Yacorzynski, G.K. & M. Brown 1941 STUDIES OF THE SENSATION OF VIBRATION VARIABILITY OF THE VIBRATORY THRESHOLD AS A FUNCTION OF AMPLITUDE AND FREQUENCY OF MECHANICAL VIBRATION. J. Exper. Psychol. 28:509-516

1,022

Yamasaki, S. & R.F. Karls 1962 AN ACCURATE METHOD OF AUTOMATICALLY PLOTTING "g" LEVELS OF VIBRATION SIGNALS. (Institute of Environmental Sciences, Mt Prospect, Ill.) Reprint 62-620

ABSTRACT: This is a report on the development of the vibration Data Reduction System. This new process provides the same quality of reduced data as the previous system. However, UDRS requires a much shorter time period.

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Yarcho, W.B. 1957 ENVIRONMENT TEST FACILITIES OF WRIGHT AIR DEVELOPMENT CENTER. WADC TN-57-27, Jan. 1957. ASTIA AD-110 740

ABSTRACT: The purpose of this report is to provide a compilation of the major environmental test facilities available at Wright Air Development Center for effective utilization. It is concluded that test facilities to meet most environmental conditions are available within Wright Air Development Center and their utilization is limited only by the size or weight of the test specimen.

1,024

Yerg, R.A. 1962 OCCUPATIONAL MEDICINE AT THE LAUNCH SITE
In (School of Aerospace Medicine) Lectures in Aerospace Medicine, 1962, pp. 21-44.

ABSTRACT: Much of the success of a manned space flight depends on the individuals who are operating the ground launch equipment. Human exposure is limited to exposure of fuels used in the vehicles. Therefore, safety rules and alarm systems must be developed to protect ground crew from the hazards of explosion. Moreover, the SCAPE suit (Self Contained Atmospheric Breathing Ensemble) has been designed for the same type of protection. Other sources of medical concern at the launch site is protection from radiation, noise at the hydraulic servicing unit and in the powerhouse.

1,025

Yevskiy, A.A. Arkad 1962 COMBINED EFFECT ON MAN OF VIBRATION AND NOISE
Gig i San, No. 10, 1962, pp. 25-29 FTD-TT-63-292

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Young, W. A., D. B. Shaw et al 1963 EFFECT OF CO2 ON HYPERVENTILATION PRODUCED BY VIBRATION.
J. Appl. Physiol. 18:349-352, March 1963.

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Young, W. R. 1959 WHAT IT'S LIKE TO FLY INTO SPACE. Life 46(15):132-149. 13 April.

ABSTRACT: A description of various research and training for space flight is provided with photographs including weightlessness, vibration, and acceleration studies. He describes Shake table vibration tests at Navy's Bethesda, Md. Laboratories. He was informed that "test animals sometimes die after 10 minutes on this table". "The vibration seems to make various organs hemorrhage." He notes his reactions at 180 and 600 vibrations per minute. A description of the Wright-Patterson equilibrium chair, and the Pensacola, Fla. Human Disorientation Device is also given. (CARI)

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Yudkofsky, P. L. n.d. PRIMATE RESPONSES TO PROLONGED LOW MAGNITUDE ACCELERATIONS AND TO SUDDEN WITHDRAWAL OF THESE ACCELERATIONS. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) Technical Report in preparation

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Zeller, W. 1932 EIN BEITRAG ZUR UNTERSUCHUNG DER MECHANISCHEN ERCHUTTERUNGEN IN IHRER AUSWIRKUNG AUF DEN MENSCHLICHEN ORGANISMUS. (Contribution to the investigation of mechanical vibration and its effect on the human body) Schalltechnik. 5:24-35

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Ziegenruecker, G.H., & E.B. Magid 1959 SHORT TIME HUMAN TOLERANCE TO SINUSOIDAL VIBRATIONS. (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TR 59-391, July 1959. ASTIA AD 227 341.

ABSTRACT: Short time human tolerance criteria for sinusoidal vibration from 1 to 15 cps were determined using 10 healthy male subjects ranging in age from 23 to 34 years. At each frequency, the amplitude was increased at a constant rate from zero to the point where the subject stopped the run because he thought that further increase might cause actual bodily harm. The lower levels of tolerance were found to be between 1 and 2 g at 3-4 cps and at 7-8 cps. The highest tolerance level of 7-8 g was found at 15 cps. Subjective tolerance limits were found to be caused by one or more of seven specific sensations or symptoms. Physiological observations during vibration exposure were also made.

1,031

Ziegenruecker, Gerd H. & Edward B. Magid 1960 SHORT TIME HUMAN TOLERANCE TO SINUSOIDAL VIBRATIONS
Paper: 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960

ABSTRACT: Short time human tolerance criteria for sinusoidal vibration from 1 to 15 cps were determined using ten healthy male subjects ranging in age from twenty-three to thirty-four years. At each frequency, the amplitude was increased at a constant rate from zero to the point where the subject stopped the run because

he thought that further increase might cause actual bodily harm. The lower levels of tolerance were found to be between 1 and 2 G at 3-4 cps and at 7-8 cps. The highest tolerance level of 7-8 G was found at 15 cps. Subjective tolerance limits were found to be caused by one or more of seven specific sensations or symptoms. Physiological observations during vibration exposure were also made.

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Ziengenruecker, G.H. and E.B. Magid. 1960 SHORT TIME HUMAN TOLERANCE TO SINUSOIDAL VIBRATIONS. Aerospace Med. 31 (4): 325-6

ABSTRACT: Short time human tolerance criteria for sinusoidal vibration from 1-15 cps were determined using ten healthy male subjects ranging in age from 23 to 34 years. At each frequency the amplitude was increased at a constant rate from 0 to the point where the subject stopped the run because the thought that further increase might actual cause bodily harm. The lower levels of tolerance were found to the between 1 and 2 G at 3-4 cps and at 7-8 cps. The highest tolerance level of 7-8 G was found at 15 cps. Subjective tolerance limits were found to be caused by one or more of 7 specific symptoms. Physiological observations during vibration exposure were also made.

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Anon. 1945 AERO-MEDICAL RESEARCH: BASIC STUDIES ON VIBRATION. (Rept. Air Techn Intelligence, U.S. Tokyo No. 111 pp. 1-7)

1,033

Anon. 1946 INTERNAL VIBRATIONS EXCITED IN THE OPERATION OF PERSONNEL EMERGENCY ESCAPE CATAPULTS (Frankford Arsenal, Philadelphia, Pa.) Memo. rept. no. MR-340 26 Nov 1946, ASTIA AD-51 792

1,034

Anon. 1947 CONFERENCE ON ULTRASONICS AND EXPLOSIVE DECOMPRESSION. (Comm. on Aviation Med., Div. of Med. Sci., Nat'l Research Council, Washington, D. C.) 17 Dec. 1947

1,035

Anonymous, 1947 PHILIPS VIBRATION MEASURING APPARATUS
(Philips, Endhoven, Holland) Undated, translated 1947
R.A.E. Translation No. 148

1,036

Anon. 1948 LANDING IMPACT VIBRATION STUDIED
Aviation Week, 48:26-27

ABSTRACT: An extensive investigation of vibration of airplane structure as a result of landing impact is in progress at the National Bureau of Standards under the direction of Dr. Walter Ramberg. Craft of earlier and more rigid types were designed for landing condition by treating the airplane as a rigid body subjected to an impact force. Large transport planes designed on this assumption showed a tendency to develop failures in the wing or tail, which could be ascribed only to transient vibration of the structure excited by landing impact. A comparison showed that the values obtained from the theory were 15 to 140 per cent greater than the measured values. It was concluded from the tests that the theory would give a fair estimate for the transient vibration in an airplane subjected to symmetrical landing impact leading to flexural vibration of the wing. Measurements on actual landings of large transport airplanes have failed to substantiate this conclusion.

1,037

ANON 1948 A REVIEW OF SUBJECTIVE RESPONSES TO VIBRATORY MOTION OF THE HUMAN BODY IN THE FREQUENCY RANGE 1 TO 70 CYCLES PER SECOND Project NM 004 001, Report No.1, 16 March 1948.

1,038

Anon. 1949 SYNOPSIS OF THE AERO MEDICAL ASPECTS OF JET PROPELLED AIRCRAFT (Aero Medical Lab., Air Materiel Command) January 1949. ASTIA ATI 56134

ABSTRACT: Brief reviews of recent developments and current practices are presented on the following subjects: requirements and equipment, decompression sickness, cabin pressurization, explosive decompression, long term positive and negative acceleration, pilot's pneumatic suit for positive acceleration, cockpit design and temperatures, flight instruments, psychological limitations, sound problems, the ejection seat, protective helmets, wind-blast protection, and vision. Future research will be concerned with protection under emergency conditions in a vacuum, etc.

1,039

Anon. 1951 GENERAL SYSTEMIC ACUTE AND CHRONIC DISORDERS RESULTING FROM TRACTOR RIDING.
(A complete survey among 1,800 general practioners in Iowa, unpublished ms.)

1,040

Anon. 1954 INJURIES IN AIR CARRIER ACCIDENTS IN TURBULENT AIR
Air Carrier Safety Bulletin, No. 39, 16 March 1954.

1,041

Anon. 1957 GERUIS-EN SCHOKBEVEILIGING VAN ONDERZEEBOTEN 1949: BIBLIOGRAFIE (NOISE AND SHOCK SAFEGUARDING FOR SUBMARINES 1949: BIBLIOGRAPHY) (Technisch Documentatie Centrum voor de Krijgsmacht (Netherlands). 10 Nov. 1957, ASTIA AD-156 155

1,042

Anon. 1958 SOVIETS RECOVER RESEARCH ROCKET DOGS
Aviation Week 69: 61-63, 3 Nov. 1958

ABSTRACT: Izvestia reports two dogs, Belyanka and Pestraya, were recovered from 280 miles altitude in a single-stage research rocket launches from the "middle

latitudes of Soviet European territory" on Aug. 2/, 1958, with a 3,726-lb. payload. This is reported as being the second launching of such a rocket. The felt-lined cabin, which landed "in a selected area," contained "a generation system, a self-contained system for recording the biological functions of the animals, and a special motion picture camera." The rocket was stabilized "during the entire flight, including the inertial part of its flight," to ensure the necessary conditions for the experiment. The rocket also carried instruments for measuring concentration of free electrons, ion composition of the atmosphere, concentration of positive ions, electron temperature, air pressure, micrometeorite impingement, ultraviolet region of the solar spectrum, infrared radiation of the earth, and the earth's atmosphere.

1,043

Anon. 1958 SPUTNIK II THROUGH RUSSIAN EYES
Astronautics 3: 48-49, 62.

ABSTRACT: Although silent on launching vehicle and means of propulsion, these translations from the Soviet press offer hitherto unreleased data on structure of the satellite and the biological experiments performed

1,044

Anon. 1960 ROCKET INSTRUMENTATION BIBLIOGRAPHY NO. 8 SECOND SERIES (U) (ITEMS 786-1000 AND INDEX) (Ministry of Aviation, Gt. Britain. Rept. No. TI1/BIB/9, March 1960. ASTIA AD 318 395L

CONTENTS:

General instrumentation
Accelerometers
Bearings
Combustion
Computing and data reduction
Displacement measurement
Flow and pressure measurement
Recording instruments
Safety and protection
Shock and vibration measurements
Strain gauge techniques
Temperature measurement and control
Velocity measurement

(Unclassified Contents Note) See also ASTIA AD 315 418L

1,045

Anon. 1960 VIBRATION AND NOISE SURVEY REPORTS ISSUED FOR 1960 (Pearl Harbor Naval Shipyard, T.H.) 21 Feb 1961

1,046

Anon. 1960 NONTITLED
Discovery 21:482-486, 1960

ABSTRACT: A concise summary with illustrations of the experiments carried out in Sputnik V, launched Aug. 19, 1960, based on information from official Russian sources. The bio-medical experiments carried out in the 10,000 lb. satellite were designed to provide data on specific features of the vital activity of different animal and plant organisms during a space flight, the biological action of space-flight conditions on living organisms (overstrain, prolonged weightlessness, the transition to and from weightlessness), the action of cosmic rays on the vital activity and heredity of animal and plant organisms, systems for maintaining life and well-being during space flight (air regeneration, temperature, regulations, food and water supply, sanitation, etc.). In addition to dogs, Belka and Strelka, the biological payload included 21 black and 19 white mice, the seeds of different varieties of onions, peas, wheat, and maize, Nigella, actinomycete fungi, Chlorella in liquid and solid nutritive media, sealed ampules of cultures of intestinal bacteria (type KK-12, B, "aerogenes"), butyric fermentation bacteria, a culture of staphylococci, two varieties of phages (T-2 and 13-21), DNA, HeLa cells, and pieces of preserved human and rabbit skin. Also the container carried four automatic bioelements with a culture of butyric fermentation bacteria, two enclosed in a spherical thermostat and two in an unheated container. The various microbiological and cytological specimens were intended to provide data on the effect of space-flight conditions on growth and genetic change. The oxygen concentration was to be maintained at 20 to 25 percent, with a carbon dioxide concentration no higher than 1 percent; the temperature was to be between 15° and 25° C, the relative humidity at 39 to 70 percent, and the pressure at one atmosphere. The feeding method was similar to that used with Laika. The physiological information recorded during the flight included arterial blood pressure, electrocardiograms, frequency of respiration, body temperature, and movements. Data transmitted to earth stations by radio-telemetry included cabin temperature, pressure, humidity, and control data on the functioning of the life-support system. Television was employed to study the motor activity of the dogs, and transducers mounted on each cradle provided additional data on their movements. Ionizing radiation dosimeters placed near the dogs and on their suits measured radiation dose from cosmic rays. Pre- and post-flight studies included metabolism, blood and urine, cardiovascular, immunological, and (for the rats only) nervous activity and their typological peculiarities. The postflight examination showed that the rats, like the dogs, took the trip well. The arknik also investigated cosmic radiation and short-wave solar radiation. Measurement techniques and some experimental results are given

1,047

Anon. 1960 IN THE EARTH'S ATMOSPHERE
Vozdushnogo flota 11:95

1,048

Anon. 1961 DETAILS OF VOSTOK CONSTRUCTION GIVEN
Pravda (Moscow), September 8, 1961

ABSTRACT: With the development of spaceships of the Vostok type, there began the program of regular studies designed to perfect methods for putting man into orbital flight and returning him to earth, studies of the effects of space flight conditions on the human body, for the possibility of maintaining man's work capacity during prolonged weightlessness, and perfection of systems to sustain man's life during space flight. PRAVDA notes that the two Soviet manned spaceflights were preceded by thorough preparations to establish, in particular, the physiological effects of weightlessness. The first special experiments to study the effect of weightlessness on the human body were conducted on a ground test installation in which weightlessness was induced for one or two seconds. An attempt was also made to simulate weightlessness by immersing a man in a special suit into a liquid with specific gravity equal to that of the human body. A substantial step forward in the study of weightlessness was made in plane flight experiments. During high-speed flights, the centrifugal force developing along a parabola compensates the force of gravity. In these conditions it is possible to obtain weightlessness for periods of 40 to 50 seconds. The next phase in the study of the effects of zero gravity were flights of mice, rats, and dogs in sputniks. Positive results obtained in these experiments warranted the conclusion that weightlessness lasting 24 hours would not endanger man's life or health. (CARI)

1,049

Anon. 1961 FLIGHT OF THE SECOND COSMIC SHIP
Vestnik Akademii Nauk SSSR, 10: 10-17

ABSTRACT: On August 19, 1960, the second Soviet cosmic ship, on board which was a group of experimental animals and other living organisms, went into orbit around the earth. On August 20, they all returned safely to earth. A press conference was held on August 24 by the Presiduim of the USSR Academy of Sciences devoted to the new, outstanding achievement in conguering outer space. A.V. Topchiyev related about how the planned program on the second cosmic ship was carried out and described its passengers. He also cited preliminary results of the flight. Academician N.M. Sisakyan described the biological program of the second cosmic ship. V.V. Parin, active member of the Academy of Medical Sciences, U.S.S.R., described the medico-biological part of the program. Then O.G. Gazenko, senior scientific co-worker of the U.S.S.R. Academy of Medical Sciences showed the first cosmonauts who returned to earth -- Belka and Strelka. The rats and mice were also shown. S.N. Vernov and L.V. Kurnosova told about the investigations of cosmic rays which were carried out during the flight.

1,050

Anon. 1961 EL HOMBRE EN EL ESPACIO EXTERIOR (MAN IN OUTER SPACE)
Revista de Aeronautica (Spain) 21(245): 275-282, April 1961

ABSTRACT: A resume of the man-in-space projects being conducted by the U.S. and U.S.S.R. is presented. (JPL)

1,051

Anon. 1961 VOSTOK DETAILS
Flight 79(2721):586, May 4, 1961

ABSTRACT: The Soviet satellite Vostok and Major Gagarin's flight of April 12, 1961 are described. (JPL)

1,052

Anon. 1961 PARIN ON COSMONAUTS, SPACE DOGS
FBIS USSR & East Europe, Nr. 81, April 27, 1961

ABSTRACT: Moscow--The dogs which have taken part in space flights are still in excellent health and their journey into space has had no harmful aftereffects on them, said Soviet medical scientist Vasil Parin today, appearing on Moscow television program devoted to the conquest of space. Parin stressed that Soviet technology had created vehicles capable of placing living creatures into orbital flight and that both the stages of acceleration and deceleration had caused no harmful aftereffects.
Academician Parin said that apparently for some time to come cosmonauts would be selected from among pilots. Outlining the requirements to be met by a cosmonaut, the scientists said that he must possess the same qualities as those possessed by Yuriy Gagarin.
Speaking about Yuriy Gagarin's preparation for the flight, Academician Parin said that it had been carried out according to a big program, and all the tests were carried out with "large endurance margins" exceeding in severity those conditions which Gagarin was likely to encounter during the flight. Parin said that Gagarin's space suit incorporated special transmitters with the help of which all the data on the condition of his body during the flight were transmitted to earth.
Academician Parin said that in future flights into unexplored cosmic regions the first explorers would apparently again be man's four-legged friends - dogs.

1,053

Anon. 1961 INSTRUMENTATION BIBLIOGRAPHY
(Ministry of Aviation, Gt. Brit.) Rept. No. TIL/BIB/50; Jan. 1961;
ASTIA AD 253 346

ABSTRACT: This bibliography contains material on the following subjects: general instrumentation; calibration; combustion; electrical and electronic devices; test facilities; accelerometers; computers; displacement measurements; flow measurement and control; pressure and thrust measurement; recording; shock and vibration; strain gauge measurements; temperature measurement; and time measurement.

1,054

Anon. 1961 DETAILS OF THE LEGENDARY FLIGHT
(Aerospace Technical Intelligence Center, Wright-Patterson AFB, Ohio)
Trans. No. MCL-1035, July 27, 1961, ASTIA AD 261 805
Original Source: Komsomol'skaya Pravda, 91(11031): 1-3, April 16, 1961

1,055

Anon. 1961 SOVIETS INDICATE BIG PROBLEMS IN SPACEMAN'S WAY
Columbus Dispatch March 10, 1961

ABSTRACT: Two Russian scientists indicated that despite Soviet recovery of another space ship with a dog inside, major problems remain to be solved before a Soviet man is shot into space. Ivan Maisky, director for the Experimental Biology Institute, and Vasil Parin of the Soviet Academy of Medical Sciences agreed that weightlessness is a major problem of manned space flight. Parin said Russian scientists have been getting "interesting data" on how living organisms are affected by such unusual irritants as vibration, stress, and the extreme noise of rocket engines. (CARI)

1,056

Anon. 1961 PERIODICAL REPORT ON AEROMEDICINE IN THE USSR: 61-24
(1126th USAF FAG, Arlington Hall Station, Arlington 12, Va.) Rept. 1452577

ABSTRACT: This is a report dealing with:(a) Contents of a book on the psychology of the flying profession, (b) Comparative physiological study of tolerance to radial acceleration, (3) The Sixth Congress of the Ukr. Society of Physiologists, and (d) Astronaut training and manned space flights. (CARI)

1,057

Anon. 1962 SURVEY OF FACILITIES FOR SPACE ENVIRONMENT SIMULATION
(Aerospace Research and Testing Committee, Washington, D.C.)
ARTC Project No. 6-60; ATC Report No. ARTC-30; April 1962.

ABSTRACT: The main body of the report is separated into 11 sections including acoustic test facilities, vibration test facilities, human factors facilities, and general environmental test facilities. These sections explain the function of specific equipment for space environmental simulation. When practical a summary table has been added to the section giving general characteristics of the equipment.

1,058

Anon. 1962 SPACE SIMULATION FACILITIES
J. Environmental Science 5(2): 23-24, April 1962

ABSTRACT: The world's largest combined environmental test facility being built at Edwards Air Force Base, California, features a 30 g centrifuge with a load capacity of 30,000 pounds. The environmental complex is designed to assume any combination of acceleration, vibration, temperature, humidity, and altitude. It integrates in one test system a large centrifuge acceleration test machine, vibration exciter, and temperature and vacuum chamber. Vibration stresses and g forces encountered by missiles and spacecraft during take-off and flight will be simulated by a shaker integrally mounted to the test chamber. A tabulated comparison of thermal vacuum test facilities and the space environment simulator is presented. (Aerospace Medicine 33(10): 1280, Oct. 1962)

WEIGHTLESSNESS

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A

1

Abelson, P.H. 1962 THE VENUS MISSION.
Science, 138(3545):1069, 7 Dec. 1962.

ABSTRACT: The article contains a description of Mariner II including the launching, mission, and future prospects.

2

Adams, C. C. 1958 HUMAN FACTORS IN SPACE FLYING
In: Space Flight (New York, McGraw-Hill). Chapt. 10

ABSTRACT: A review of work being done in Space Medicine with sections on Radiation, Vision, Respiration, Acceleration, Weightlessness, Heat Problems, Space suits and meteors.

3

Adams, C. 1960 ASTRONAUT SUPPORT PROBLEM.
Ground Support Equipment. 2(4):83-85, August-September 1960

ABSTRACT: A study of man's water requirements in space and an analysis of eating and drinking experiments conducted under zero gravity conditions are presented.

4

Adamson. D. 1962 THE GRAVITATIONAL FIELD ENVIRONMENT OF AN EARTH SATELLITE.
NASA-TN-D 1270 August 1962

5

Adey, W.R., J.D. French, R.T. Kado, D.F. Lindsley, D.O. Walter, et al. 1961 EEG RECORDS FROM CORTICAL AND DEEP BRAIN STRUCTURES DURING CENTRIFUGAL AND VIBRATIONAL ACCELERATIONS IN CATS AND MONKEYS
IRE Trans. Military Electronics BME-8(3): 183-188. July 1961.

ABSTRACT: Electroencephalographic records have been taken from ddep regions of the brains of cats and monkeys with chronically implanted electrodes during centrifugal and shaking acceleration comparable to booster forces. Histological and x-ray controls have indicated that displacement of the electrodes does not occur, and that damage to brain tissue is comparable with nonaccelerated animals. A transistorized EEG amplifier suitable for recording in satellite biopack environments has been developed. In centrifuge tests, transverse accelerations up to 8 g were associated with rhythmic "arousal" patterns of slow waves in hippocampal regions of the temporal lobe during increasing or decreasing acceleration. Longitudinal accelerations between 5 and 6 g produced blackouts after 30 to 40 seconds, with flattening of EEG records, and frequently with induction of epileptic seizure activity in temporal-lobe leads. Shaking tests suggested that vibrational acceleration may be associated with the intermittent "driving" of the cerebral rhythms, in a fashion resembling photic driving, at shaking rates from 11 to 15 c.p.s., and from 22 to 30 c.p.s. (Author)

6

Aero Medical Assoc. 1958 AVIATION MEDICINE ON THE THRESHOLD OF SPACE: A SYMPOSIUM. J. Aviation Med. 29(7):485-5[illegible], July 1958

ABSTRACT: This issue deals with:

1) New knowledge of the extra-atmospheric radiation field;
2) Potentialities and ramifications of life under extreme environmental conditions;
3) Experiments during weightlessness: A study of the oculo-agravic illusion;
4) Design considerations of a balloon-borne pressurized capsule for high altitude bailout study;
5) The feasibility of recycling human urine for utilization in a closed ecological system
6) A closed food cycle atomic conservation for space flight

(Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space Medicine Bibliography (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903; ASTIA AD-227 817; Feb. 1959)

7

Aerospace Information Div. 1962 PRINCIPLES OF LIFE SUPPORT IN SPACE BASED ON SOVIET OPEN LITERATURE PUBLISHED IN CONNECTION WITH THE VOSTOK-3 AND VOSTOK-4 LAUNCHINGS
(Aerospace Information Div., Washington, D.C.) 5 Dec. 1962 ASTIA AD 291 910

ABSTRACT: Descriptions of the principles of life support in space used by Soviet specialists at the present time for orbital flights, and those which are being discussed and developed for future long-range missions have been extracted from more than two hundred articles and TASS reports published predominantly in Soviet newspapers in connection with the launching of the Vostok-3 and Vostok-4 spaceships. The articles were written by various specialists in the field of space technology, including academicians, corresponding members of the Academy of Sciences, professors, doctors of biological sciences, doctors of medical sciences, candidates of medical and technical sciences and physics and mathematics, engineers, science reporters, and cosmonauts. Primary emphasis was placed on discussions of data which describe the design elements of equipment used in space application, including the spaceship cabin, automatic devices, equipment used in the cosmonaut training program. Psychological and physiological conditioning and responses and safety factors are included. (Author)

.8

Aerospace Information Div. 1962 SOVIET MANNED SPACE FLIGHT LIFE SUPPORT SYSTEMS: MEDICAL AND BIOLOGICAL ASPECTS OF THE VOSTOK-3 AND VOSTOK-4 FLIGHTS
(Aerospace Information Div., Washington, D.C.) AID Rept. No. 62-191; Nov. 1962 ASTIA AD 291 911

ABSTRACT: The medical and biological aspects of the Vostok-3 and Vostok-4 flight, including selections of orbits, physical and psychological preparation, medical monitoring, radiation protection, diet, cabin ecology, and projected problems for interplanetary flight, were reviewed. The sources are from Soviet open-literature, chiefly newspapers, published in the period from August thru October, 1962.

9

Akulinichev, I. 1962 PROGRESS IN SPACE MEDICINE
(In: "Medical and Biological Aspects of USSR Space Flights", Joint Publications Research Service Translation No. 16,277 ASTIA AD 400 411
Original Source: Russian newspaper, Meditsinskiy rabotnik 17 August 1962, P. 3

ABSTRACT: Experience accumulated in manned space flight permits the conclusion that weightlessness is completely tolerable and has no substantial effect on blood circulation or the motor functions of the gastrointestinal tract. However conclusions and generalizations applicable to mass space flights must be drawn with caution since these flights have been relatively short and the cosmonsuts have been most highly trained athletes. They have been distinguished for great volitional qualities and great functional reserves, particularly of the cardiovascular system.

10

Aleksandrov, A. 1960 MAN AND THE COSMOS
Trans. of Meditsinskii Rabotnik (USSR) 20(105):3, 1957
(Office of Technical Services, Washington, D.C.) 61-27432

11

Aleksandrov, S.G. & R. Ye. Federov 1962 SOVIET SATELLITES AND SPACE SHIPS (SELECTED ARTICLES). (Wright-Patterson Air Force Base), Trans. No. FTD-TT-62-121. From Sovetskiye Sputniki i Kosmicheskiye Korabli, 2nd Edition. (Moscow: Akademiya Nauk SSSR, 1962). Pp. 24-82, 117-124, 144-147, 182-184, 217-242, 256-394, 427-456. ASTIA AD 273 888.

PERTINENT ARTICLES:
The Problem of Descent to the Surface of the Earth and Planets
Biological Investigations
Second Soviet Ship-Satellite
Arrangement of Ship-Satellite
Flight of Ship and its Return to Earth
Medical-Biological Problems of Man's Flight into Cosmic Space
Training of Cosmonauts
First Cosmic Flight
Conclusion

12

Alexander, G., & R. Barany 1905 PSYCHOPHYSIOLOGISCHE UNTERSUCHUNGEN UBER DIE BEDEUTUNG DES STATOLITHENAPPARATES FUR DIE ORIENTIERUNG IM RAUME AN NORMALEN UND TAUBSTUMMEN. (PSYCHOPHYSIOLOGICAL INVESTIGATIONS CONCERNING THE IMPORTANCE OF THE APPARATUS OF THE STATOLITHS FOR ORIENTATION IN SPACE ON NORMALS AND DEAF-MUTES.) Arch. ohr., Nas., u. Kehlkopfheilk. 65:187-192

13

Alexander, G. 1961 FLIGHT PROVES MAN CAN FUNCTION IN SPACE
Aviation Week 70(20): 31-32. 15 May 1961.

ABSTRACT: A description is given of the pilot functions performed and the stresses and loads (weightlessness, peak gravity and re-entry loads) to which pilot and capsule were subjected during the 15 minute Mercury-Redstone flight on May 5, 1961.

14

Alexander, H.S. 1960 BIO-MAGNETICS
1960 Proceedings of the Institute of Environmental Sciences
(Institute of Environment Sciences, Mt Prospect, Ill.) pp. 119-126

15

Annenskii, F. D. 1961 KOSMICHESKAIA PSIKHOLOGIIA (SPACE PSYCHOLOGY)
Nauka i zhizn' (Moskva) 28(2):33-39, Feb. 1961
English Translation:
(U. S. Joint Pub. Research Service, Washington) JPRS 9916.
Aug. 10, 1961

ABSTRACT: Psychological problems that comfront the astronaut in space are reviewed. Absence of the usual environmental timers, lack of gravity, and the enormous rate of speed of his vehicle may create a disorientation in time. Lack of direct information feedback of the outcome of his actions forces the astronaut to evaluate his actions by instrument readings. Lack of support due to zero gravity poses special problems which, however, can be overcome by proper training. Isolation and confinement in the space cabin are not anticipated to have the same effects as sensory deprivation, since the astronaut will take an active part in the flight and therefore his mental set will differ. Neuropharmacologic agents may be used to control sleepiness, anxiety, or fatigue. (Aerospace Med. 33(8):1029, Aug. 1962)

.16

Armstrong, C. R. 1953 SPACE PHYSIOLOGY
J. British Interplanetary Society 12:172-175

ABSTRACT: The sensory-motor system of a man living in a gravity-free state is subjected to abnormal handicaps. The muscle and skin pressure senses are gravi-receptors and would be useless in a gravity-free state. However, the Vater-Pacini corpuscles, being deep pressure receptors in the hands, feet, and joints, would probably continue to function and partially compensate for the loss of the other two receptors. The vestibular apparatus, which controls posture, and is stimulated by gravity, respiration, and circulation, is felt to present lesser problems. Under zero-gravity conditions, oxygen consumption would be low — approximately 500 litres per day per person. By utilizing the upper physiological limit of increased oxygen pressure, which is 415 mm hg, this problem can be minimized. (CARI)

.17

Arnoult, M. D. 1959 PERCEPTUAL PROBLEMS OF A SPACE TRAVELER
(Paper, Annual Meeting of the Southern Society of Philosophy and Psychology, 1959)

18

Askren, W.B. 1959 MAN FUNCTIONS IN SPACE FLIGHT
Paper: Panel on Psychology, of the Armed Forces - MRC Committee on Bio-Astronautics, Washington, D.C. December 2, 1959 ASTIA AD 238 480

ABSTRACT: Duties typical of those to be assigned to future space crews are described. The duties of a three-man crew for a hypothetical seventy-two hour moon flight are presented on a logarithmic time-line. The duties are analyzed to determine the major activities of space crews such as navigation, flight control energy management, etc. The activity of in-flight maintenance is stressed as an essential duty. Finally, the duties are analyzed to determine the criteria that should be used in selecting personnel for a space flight of this type.

19

Augerson, W.S. & C.P. Laughlin 1961 PHYSIOLOGICAL RESPONSES OF THE ASTRONAUT IN THE MR-3 FLIGHT.
In NASA, Results of the First U.S. Manned Suborbital Space Flight
National Aeronautics and Space Administration, pp. 45-51

ABSTRACT: Astronaut Shepard (on his suborbital flight on May 5, 1961) demonstrated physiological responses to 5 minute weightless flight (interrupted by 23 seconds of retrofire) were uneventful. Acceleration-weightlessness transition period produced physiological responses within the limits of intact function. The relative change in pulse rate in going from weightlessness to reentry acceleration was comparable to that in going from 1 g to reentry acceleration on the centrifuge. Special senses, that is, vision, semicircular canal function, and hearing, appeared intact throughout the flight. (Author)

20

Ax, P. 1960 PACAF BASIC BIBLIOGRAPHIES: EXPLORATION OF SPACE
Misawa Air Force Base, Japan Feb. 1, 1960

ABSTRACT: This is a bibliography on the exploration of space, with annotations from various sources, which supersedes the bibliography dated 1 February 1959. Included are 85 references, published between 1953 and 1959, and classified as follows: Rocket History and Research; Space Flight; Satellites; International Geophysical Year Space Programs; Space Medicine; and the Moon and Interplanetary Travel.

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21

Bakh, I., Gorlov, O. et al 1958 MEDICAL-BIOLOGICAL PROBLEMS IN SPACE FLIGHTS (Office of Technical Services, Washington, D.C.) Trans. No. 59-22143 7 Oct. 1959
Trans. from: Chelovek v Kosmose (Moscow) Ser. 8, Vol. 1, No. 20. 1958

ABSTRACT: This popular pamphlet indicates the problems raised by the g effect, weightlessness, cosmic radiation etc. It concludes with the statement that man will eventually adapt himself to space flight.

22

Bakulev, A. 1960 DESTINATION --- SPACE
Meditsinsky Rabotnik (Medical Worker) 1(40):34-36, Jan. 1960

ABSTRACT: Experimental research has shown that man can tolerate acceleration 12 to 15 times greater than the force of the earth's gravity for seven minutes without ill effects if he is conditioned by systematic training, equipped with a special anti-gravity suit to prevent disturbances in cerebral blood circulation and seated in the rocket so that the mechanical forces act perpendicularly to the longitudinal axis of his body. Other experiments have shown that the human organism can easily endure a state of weightlessness lasting 30 to 45 seconds. It has been ascertained that with recurrence of weightlessness man adjusts himself to this state, retains orientation in space and may coordinate his movements accurately. The author also discusses the sealed cabin, oxygen supply, and radiation encountered during a space flight. (CARI)

23

Baker, D. F. 1962 SURVEY OF REMOTE HANDLING IN SPACE
(6570th Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio)
AMRL-TDR-62-100. ASTIA AD-288 863

ABSTRACT: A survey of industrial opinion on remote handling in space was undertaken to document early concepts and to identify areas of agreement, areas of

conflict, and unique ideas relating to the subject. Seven industrial concerns and one military agency provided papers on the role of remote handling in space. These papers are discussed in terms of: (a) remote operations of which there are five major categories---maintenance, assembly, experimentation, transfer operations, and emergency operations; (b) space vehicle design---the manned lightweight capsule, with anthropomorphic gloves, stabilization arms, window ports, and two to three manipulator arms, being representative; (c) manipulator design---concerning actuation, configuration, control, and feedback systems; and (d) space environment factors---vision, weightlessness, temperature fluctuations, high-energy radiation, and micrometeorite collisions. (Author)

24

Balakhovskii, I.S., & V.B. Malkin 1956 BIOLOGICHESKIE PROBLEMY METZHPLANETNYKH PLOETOV. (Biological Problems of Interplanetary Flight) Priroda 1956(8):15-21

ABSTRACT: Numerous experimental investigations, carried out in the USSR and abroad, have established that the influence on the human organism of the mechanical forces resulting from accelerations depend, on one hand, on their magnitude, time of action, rate of increase, and direction relative to the longitudinal axis of the body, and on the other hand, on the functional condition of the organism, i.e., on the state of health. It has been established that the disturbance of a circulation of the blood during acceleration is caused by the displacement of a great mass of blood into the lower half of the body; also, because of the vertical position of the body, the blood pressure is so great that the heart cannot send it into the upper organs, particularly the brain. Furthermore, because of the significant increase in the "weight" of the internal organs, their connective apparatus is subjected to great strain, and the irritation of the receptors of the internal organs caused by this can become a source of pathological reflexes. In order to avoid this, an "anti-overload" costume consisting of a system of rubber chambers connected by some solid material, has been designed. With the appearance of over-loading compressed air is supplied automatically to the chambers of the costume. This costume prevents the accumulation of blood and thus maintains the circulation of the blood to the brain. The stability of the organism can be raised also by systematic training. Investigation carried out with people on centrifugal machines have shown that, in the vertical position, a man can withstand the action of 4 to 5 times the force of gravity, but only for a few minutes. Overloads are withstood best when they are directed perpendicular to the longitudinal axis of the body. In such a position a man can withstand, for a few minutes, forces that exceed his "earth"weight 10 to 12 times. Most investigators consider that life is possible under conditions of "nongravity" and that the human organism will be able to adapt itself to new conditions of existence. (CARI)

25

Balakhovskii, I.S. & V.B. Malkin 1957 BIOLOGICAL PROBLEMS OF INTERPLANETARY FLIGHTS
(USAF Proj. Rand, Santa Monica, Calif.) Res. Memo. RM-1922, 21 June 1957. Pp. 81-86.
Original Source: Priroda 45: 15-21, Aug. 1956
German Translation in Naturwissenschaft Rundschau 10: 173-177, 1957

26

Ballinger, E.R. 1952 HUMAN EXPERIMENTS IN SUBGRAVITY AND PROLONGED ACCELERATION
J. of Aviation Medicine 23(4): 319-321, 372. August 1952.

ABSTRACT: Tests were conducted on human subjects at the Aero Medical Laboratory at Wright-Patterson Air Force B se, Ohio. Results of the zero gravity tests showed that thirty zero gravity runs averaging 15 seconds each gave no suggestion of motion sickness, vertigo or in-coordination attributable to the sub-gravity state. During acceleration tests on the centrifuge, it was observed that vertigo seems to be the result of head motion rather than from any particular position of the head during the accelerations. Second, the dizziness following each run was related more to the duration of the acceleration than to its intensity. Lastly, escape velocities can be tolerated at accelerations at least as high as 10 g in the semi-supine position. However, from the physiological point of view an accelerating thrust below 8 g probably represents the more acceptable acceleration.

27

Banghart, F. and E. Pattishall 1960 HUMAN FACTORS AT EXTREME ALTITUDES: SYNOPSIS AND BIBLIOGRAPHY. (Air Research and Development Command, Wright Air Development Center, Wright-Patterson AFB, Ohio) ARDC-TR 60-7. March 1960. ASTIA AD-242 348.

ABSTRACT: 135 references to 1959 cited and discussed in: space medicine, ecology, behavior and performance, acceleration and deceleration, weightlessness, radiation effects, instrumentation, monitoring and communication, selection and training. Chapters include the following:

Synopsis
Behavior and perf...
Acceleration and d... ...ration
Weightlessness
Radiation
Instrumentation
Bibliography

28

Barker, C. L., Jr. 1959 SPACE FLIGHT SIMULATOR
(Army Ballistic Missile Agency, Redstone Arsenal, Ala.) Rept. No. DSP-TR-1-59; 16 March 1959

ABSTRACT: Objectives of this report are two fold: to examine the problem of rocket flight simulation and possible users of a simulation facility; and to describe a system which is capable of producing repeatable acceleration time histories of any desired booster flight including weightlessness and re-entry. Propulsion calculations for the sled are discussed, and the El Capitan in Yosemite Natl. Park is described as a possible site for this apparatus. A table of characteristics of flight trajectories to produce weightlessness of maximum duration for 8 vehicles is included.

29

Barker, C. L., Jr. 1961 SPACE FLIGHT ACCELERATION SIMULATOR
Planet. Space Sci. 7:335-344. July 1961

ABSTRACT: Discussion of a proposal for a space flight acceleration simulator, a ground-based training and research facility, which produces the acceleration-time history of rocket flight and the gravitational fields of the Moon and planets. The track captured capsule carries several trainers or hundreds of pounds of equipment through programed "flights" which duplicate the conditions of boost, zero-g, and re-entry, or any combination thereof. The track consists of a horizontal circular track of 1,000-ft. diameter connected to a vertical track with a total height of about one mile.

30

Barshev, P. & V. Peskov 1961 FIVE HOURS WITH YURIY GAGARIN
Komsomol'skaya Pravda (Aerospace Technical Intelligence Center, Wright-Patterson AFB, Ohio) Trans. no. MCL-1151 27, July 1961. ASTIA AD 261 825.

31

Bayevskiy, R. 1961 TITOV FLIGHT BODILY EFFECTS VIEWED
FBIS USSR & East Europe, Nr. 168, August 30, 1961

ABSTRACT: Yuri Gagarin's safe return to earth provided an affirmative answer to the question of the possibility of manned space flights. Highly important

was the question of how the cosmonaut would be able to stand up to the overloads on the downward phase of his flight after prolonged weightlessness. Major Titov's flight demonstrated that the stability of the human body to the effects of such adverse factors is high enough with special preliminary training. The reduced pulse characteristic during sleep was characteristic of the space traveler. This, the scientist stressed, indicates that the complex functioning of the central nervous system was not disturbed during the flight. It was also established that the problem of eating in space was not as serious as previously supposed. (CARI)

32

Beckman, E.L., K.R. Coburn, R.M. Chambers, R.E. DeForest, V.G. Benson, & W.S. Augerson 1961 SOME PHYSIOLOGICAL CHANGES OBSERVED IN HUMAN SUBJECTS DURING ZERO G SIMULATION BY IMMERSION IN WATER UP TO NECK LEVEL. (Naval Air Development Ctr., Johnsville, Pa.) NADC MA 6107. ASTIA AD 256 727.

ABSTRACT: Knowledge relative to the effects of prolonged weightlessness is needed in preparing man for space flight. The buoyant force exerted upon immersed bodies effectively simulates the weightless state with respect to proprioceptive sensory responses and perhaps in other ways. An investigation into the physiological effects of emmersing subjects in water up to neck level was undertaken. A series of experiments involving 7 subjects immersed in water up to neck level for periods of 5 to 23 hours (5 subjects for 12 hours) showed a significant weight loss during the period of immersion, which was explained by the diuresis which occurred. Pulmonary volume measurements showed a decrease in the expiratory reserve volume and in the respiratory minute volume during immersion. There was no significant decrement in the performance of a tracking task, attributable to the water immersion, during exposure to a simulated space vehicle reentry deceleration profile. Exposure to 4.5 positive G for 15 seconds following water immersion revealed a decrement in tolerance in most subjects. (Author)

33

Beckman, E.L., R.M. Chambers, K.R. Coburn, R.E. Deforest, W.S. Augerson and V.G. Benson 1961 PHYSIOLOGIC CHANGES OBSERVED IN HUMAN SUBJECTS DURING ZERO G SIMULATION BY IMMERSION IN WATER UP TO NECK LEVEL. Aerospace Medicine 32(11):1031-1041.

ABSTRACT: To ascertain some of the effects of prolonged weightlessness on man, a series of experiments involving seven Ss immersed in water (an effective simulation of the weightless state with respect to proprioceptive responses) up to the neck level for periods of 5 to 23 hours was conducted. Weight changes on a tracking task, during exposure to a simulated space vehicle re-entry deceleration profile, attributable to water immersion were determined. Changes in tolerance to accelerative forces were also measured. (Tufts)

34

Beischer, D.E., & W.C. Hixon 1963 TRIAXIAL HUMAN BALLISTOCARDIOGRAM IN ZERO G ENVIRONMENT. (Naval School of Aviation Medicine, Pensacola, Fla.)

ABSTRACT: The linear and angular accelerations in three perpendicular axes of a free floating man have been telemetered and recorded. The flights were performed on a KC-135 with cooperation of the Aerospace Medical Research Laboratory at Wright-Patterson AFB, Ohio.

The spatial relationship of the cardiovascular forces will be demonstrated and the significance of the results for cardiovascular performance in the gravity free state discussed. The equipment used in this study will be on exhibit and vector-ballistocardiograms demonstrated. (Aerospace Medicine 34(3):248, March 1963)

35

Beletskii, V.V. 1960 MOTION OF AN ARTIFICIAL EARTH SATELLITE ABOUT ITS CENTER OF MASS
In L.V. Kurnosova, ed., Artificial Earth Satellites
(New York: Plenum Press, 1960) Vol. 1, pp. 30-54

ABSTRACT: The motion of an artificial earth satellite about its center of mass under the action of aerodynamic and gravitational perturbations has been investigated taking into account the regression of the orbit due to the oblateness of the earth. It has been assumed that the satellite possesses dynamic symmetry. It has been shown that the motion of the satellite is a combination of the unperturbed motion about the angular-momentum vector and a secular precessional-nutational motion of the angular-momentum itself. This secular motion of the angular-momentum vector takes place about an axis which moves as the result of the regression of the orbit and which lies close to the tangent of the perigee if the influence of aerodynamic perturbations is more important than that of the gravitational perturbations. In all cases the motion is stable with respect to the orbit. The moments of the gravitational forces will be greater than the moments of aerodynamic forces for altitudes above 500 km. In the case of satellites whose altitude at perigee is 200-500 km. the relative importance of gravitational and aerodynamic perturbations will depend upon their construction. 4 refs. (CARI)

36

Belikov, V. 1963 PEOPLE OF RARE PROFESSIONS....PILOTS (NAVIGATORS) OF COSMONAUTS
(Translation Division, Foreign Technology Div., Wright-Patterson AFB, Ohio)
FTD-TT-63-419/1 26 April 1963 ASTIA AD 405 721
Original Source: Russian Newspaper: Izvestiya, Nr. 59, 10 March 1963, P. 6

ABSTRACT: The author relates his observations and conversation with a Russian taking part in a simulated weightlessness test.

37

Benedikt, E.T., ed. 1961 WEIGHTLESSNESS - PHYSICAL PHENOMENA AND BIOLOGICAL EFFECTS. (New York: Plenum Press, 1961)

ABSTRACT: Contents include:

Levine, R.B. "Zero Gravity Simulation", pp. 135-153
Simons, J.C. "Current WADD Weightless Research"
Brown, E.L. "Human Performance and Behavior During Zero Gravity"

38

Benson, O.O., Jr. 1951 THE MEDICAL PROBLEMS OF FLYING
Rivista di Medicina Aeronautica (Rome) 14: 706-753

39

Benson, V. G., E. L. Beckman, et al. 1961 EFFECTS OF WEIGHTLESSNESS AS SIMULATED BY TOTAL BODY IMMERSION UPON HUMAN RESPONSE TO POSITIVE ACCELERATION. (Naval Air Development Ctr., Johnsville, Pa.)
NADC-MA-6132. ASTIA AD 262 329.
See also Aerospace Medicine 33(2):198-203, Feb. 1962.

ABSTRACT: Twelve members of Underwater Demolition Team No. 21 used underwater breathing equipment while completely immersed in water for 18 hours. Their response to positive acceleration was determined by observing the G level at which the limitation of ocular motility under acceleration (LOMA) occurred. This G level is approximately the smae as when loss of peripheral vision or greyout occurs when subjects are exposed to positive acceleration. The period of immersion was well-tolerated. A small but statistically significant decrease in the G level at which LOMA occurred was found following the period of immersion. (Author)

40

Benson, V. G., E. L. Beckman, et al. 1961 WEIGHTLESSNESS SIMULATION BY TOTAL BODY IMMERSION. PHYSIOLOGICAL EFFECTS. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-6134. ASTIA AD-263 194.

ABSTRACT: Attempts have been made to simulate the weightless state by immersing subjects in water up to the neck level for varying periods of time. These subjects were exposed to acceleration forces on human centrifuges before and after immersion. A reduction in the ability to withstand these acceleration forces was noted following the immersion period. Immersion in water to the neck level produces a negative pressure breathing situation which in turn results in a profuse diuresis. An attempt was made to eliminate the negative pressure breathing and the diuresis by equipping the subject with a full face diving mask with a compensating regulator and completely immersing him in water for a period of twelve hours. Of the seven subjects tested, only three were able to tolerate the 12-hour period of water immersion. The remaining four terminated early in the study due to the stress of the underwater environment and were not exposed to acceleration forces following their immersion periods. (AUTHOR)

41

Bergeret, P. 1951 BIOLOGICAL PROBLEMS OF THE EARTH SATELLITE VEHICLE Brit. Interplanetary Soc. J. 10:301, Nov. 1951.

ABSTRACT: The problem of life in interplanetary flight or on an artificial satellite is an extension of the problem of life in high altitude flight. The provision of a breathable atmosphere and maintenance of a tolerable temperature is the same in both cases.

42

Bergeret, P. 1952 IA VIE DANS IN MILIEU SANS PESANTEUR (Life in the Weightless State) A. Tomes 7:219-224

43

Berry, C.A. 1958 THE ENVIRONMENT OF SPACE IN HUMAN FLIGHT
Aeronaut. Eng. Rev. 17(3): 35-39. March 1958
See also: USAF School of Aviation Medicine, Randolph AFB, Texas, Epitome of Space Medicine, Item No. 41

ABSTRACT: The problems presented by space as an environment for human travel

are extensions of those encountered in present day flight. This paper defines "space" as an environment for man. It discusses the problem of space equivalence, oxygen, dysbarism, embolism, ozone, cosmic radiation, and meteors. It also discusses the dangers of solar radiation, weightlessness, and the sealed cabin. (CARI)

44

Best, C. H. and N. B. Taylor 1963 EFFECT OF GRAVITY UPON CIRCULATION In The Human Body: It's Anatomy and Physiology Fourth ed. (New York: Holt, Renehart and Winston) Pp. 273-275

ABSTRACT: A physiological description of fainting and "blackout" is provided, and the effect of centrifugal force upon the circulation is detailed. In the gravity-free state it is noted that the normal circulatory reflexes elicited by the stimulation of pressorecptors in the carotid sinus and other vascular areas will be reduced or suspended. The blood will have no weight, so the work of the heart will be reduced and the skeletal muscles will not be called upon the expend energy upon ponderable objects. These will have no short time effects but would lead to atrophic changes if extended over long periods. (CARI)

45

Biget, P., & H. Boiteau 1957 QUELQUES ASPECTS PHYSIOLOGIQUES DU VOL "SANS PESANTEUR". Fusees (Paris) 161-165, May 1957

ABSTRACT: Review of the physiological aspects of interplanetary flight emphasiz ing problems of the gravity-free state

46

Boeing Airplane Company 1959 KC-135 MODIFICATION FOR ZERO-GRAVITY FLIGHT (Boeing Airplane Company, Aero Space Division, Seattle, Washington) Technical Proposal D2-5358, December 1959

47

Boeing Airplane Company 1959 HUMAN FACTORS LUNAR STUDIES: I. COMMENTS ON SELECTED PROBLEM AREAS. (Boeing Airplane Company, Seattle, Washington) AFBMD-TR-59-9, 30 Sept. 1959. ASTIA AD 232 321L

ABSTRACT: The human factors program supporting the lunar studies is concerned among other items, with the determination of implications of the lunar environment for the establishment of relatively normal human activity cycles in a moon station. Selected problem areas from the overall program are discussed, including lunar gravitational field, human energy requirements, human mechanical efficiency, perception on the moon and physiological reference data.

48

Boeing Airplane Company 1960 INITIAL SYSTEMS EVALUATION OF ZERO-G MODIFICATION (Boeing Airplane Company, Renton, Washington) Flight test report, Document No. D6-5159, 23 June 1960

49

Boeing Airplane Company 1960 DIFFERENCE DOCUMENT, KC-135 ZERO GRAVITY MODIFICATION (Boeing Airplane Company, Renton, Washington) Document No. D6-5353, 1 April 1960

50

Bowring, J.I.R., and B.P. Ebert 1961 A HYPOTHETICAL MISSION TO SPACE IN A THREE-MAN SEALED CABIN. Planet. Space Sci., 7:309-323, 7 July 1961

ABSTRACT: Discusses a 30 day orbital mission: the accelerations during launch, weightless flight, cabin layout, high-acceleration crew seats, restraint systems, feeding devices and human elimination devices.

51

Brannan, P. 1960 DRML SCIENTISTS PROBE MAN'S SPACE LIMITATIONS Canadian Aviation 33(3): 8-11. March 1960

ABSTRACT: The work of the Defence Research Medical Laboratories at Downsview,

Ontario, Canada, towards the solution of the problems of weightlessness and motion sickness in space travel is discussed. Muscular deterioration, circulatory changes, and problems of movement, as results of the weightless conditions, are briefly considered. Experiments on motion sickness resulting from the utilization of angular acceleration to counteract weightlessness are also described

52

Brooks, P. M. 1963 AN ANALYTICAL TREATMENT OF THE FLUID SHIFT IN THE WEIGHTLESS STATE. (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 29-May 2, 1963)

ABSTRACT: If it is assumed on the basis of the relationships, P=hdg and F=Mg, that part of the hydrostatic pressures in the vascular and extravascular compartments are due to gravity, then on the basis of the Starling osmotic-hydrostatic pressure equilibrium, a differential equation can be derived which will relate pressure changes and fluid movement to time in the gravity-free state. Such an equation was derived and was found to describe the fluid shifts of the Landis pleythysmograph data in relation to time and pressure quite accurately. If the time-pressure-constants obtained from the Landis data are applied to man in the gravity-free state, it is found that a fluid shift, from the extravascular to the vascular compartment equivalent to about 20 per cent of the plasma volume occurs and that such a shift is 99 per cent completed within 110 minutes from start of exposure

53

MOTION PICTURE

Brown, E. n.d. ZERO GRAVITY RESEARCH AT WRIGHT AIR DEVELOPMENT CENTER. (Wright Air Development Center, Wright-Patterson AFB, Ohio)

ABSTRACT: Sequence of shots taken aloft during "Keplerian trajectories", aboard a C131B Aircraft; illustrates various problems associated with zero 'g' states

54

Brown, E. L. 1958 ZERO GRAVITY TESTS SHOW MAN CAN ADJUST TO SPACE. Aviation Week 69(25):52-53, 55
See also A. M. A. Proceedings, April 1959

ABSTRACT: Experiments conduted during the past six months both in the laboratory and in actual flight, in which short periods of zero gravity were

achieved, reveal that there is no serious decrement in man's performance under these conditions. The experiments indicated that special provisions such as wider spacing of switches and levers, or springs or other restraints to prevent the arm from overshooting when reaching for objects, need not be considered in future space cabins. Withour exception, the subjects were able to adjust to zero gravity conditions within seconds. It may be that longer periods of zero gravity and further tests may upset the conclusions reached to date, but, as of now, weightlessness does not appear to create as serious a problem for crews as biomedical scientists had predicted. (J. Aviation Med. 30(4): 295, April 1959)

55

Brown, E. L. 1959 RESEARCH ON HUMAN PERFORMANCE DURING ZERO GRAVITY (Paper presented at the 1959 Meeting of the Aero Medical Assoc., Los Angeles, Calif., 27-29 April 1959).

ABSTRACT: This laboratory is conducting research on several aspects of human performance during zero gravity periods. The zero gravity condition is produced by blying a C 131B aircraft through a Keplerian trajectory. Periods of apparent weightlessness lasting from 12 to 15 seconds can be achieved. Several experiments on simple motor tasks are being conducted. One experiment is concerned with the speed and accuracy of humans making vertical, rotary switch, push button switch, toggle switch and horizontal motions. Motion pictures have been taken of human subjects during unrestrained free-floating in the cabin of the aircraft. The motion pictures demonstrate that nearly all subjects tend to use underwater-type swimming motions to assist in the control and locomotion of their bodies during zero gravity periods. These motion pictures will be shown at the presentation of this paper. The pilots on this experiment (including the author) report no greater difficulty in flying the airplane during zero gravity than during normal gravity. The subjects who have experienced free-floating in the cabin during the zero gravity periods report that the feeling of complete weightlessness, with no restraints on the body, is very exhilarating. In as much as the zero gravity experiments are continuing, it is expected that at the time this paper is presented the results of several controlled experiments on human performance during zero gravity will be reportable. (Aerospace Med., 30:177.)

56

Brown, E. L. 1959 RESEARCH OF HUMAN PERFORMANCE DURING ZERO GRAVITY (American Society of Mechanical Engineers, New York) Report 59-AV-10

57

Brown, E. L., 1960 RESEARCH ON HUMAN PERFORMANCE DURING ZERO GRAVITY In Glen Finch, ed. Symposium on Air Force Human Engineering, Personnel, and Training Research (National Research Council, Washington, D. C. Pub. 783). pp. 204-217.

58

Brown, E. L. 1960 RESEARCH ON HUMAN PERFORMANCE DURING ZERO GRAVITY. In (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) PROCEEDINGS OF WADC SPACE TECHNOLOGY LECTURE SERIES, VOLUME 1: TECHNICAL AREAS. WADC TR 59-732; ASTIA AD-235 424; pp. 171-174.

ABSTRACT: The Aero Medical Laboratory, Wright Air Development Center, is conducting research on several aspects of human performance during periods of zero-gravity. The zero gravity condition is produced by flying a C-131B aircraft through a Keplerian trajectory. Apparent weightlessness lasting from 12 to 15 seconds can be achieved. Several experiments on simple motor tasks are being conducted. One is concerned with the speed and accuracy of humans making vertical, rotary switch, push-button switch, toggle switch, and horizontal motions. Motion pictures have been taken of unrestrained human subjects floating freely in the cabin of the aircraft. Nearly all subjects tend to use underwater type swimming motions to assist in the control and locomotion of their bodies during zero gravity periods. The pilots report no greater difficulty in flying the airplane during zero gravity than during normal gravity. The subjects who have experienced free-floating in the cabin during the zero gravity periods report that the feeling of complete weightlessness is very exhilarating. the zero gravity experiments are continuing and it is expected that results of several controlled experiments on human performance will be available. (Author)

A C-131B trnasport airplane was used to study human performance during zero G by flying a Keplerian trajectory. In this study no problems of human performance decrement were evident. Subjects were able to accomodate to the zero G condition in a very few seconds with accuracy similar to that under normal G. It is necessary, however, to have a solid position from which to work in order to maintain performance during zero gravity periods.

Photographs of the pilot's instrument panel, the C-131B, and subjects performing various maneuvers under zero gravity conditions are included. (DACO

59

Brown, E. L. 1960 HUMAN AND SYSTEM PERFORMANCE DURING ZERO G (Paper, SAE-AFOSR, Astronautic Symposium, October 12-14, 1960, Los Angeles, Calif.)

ABSTRACT: Using a C-131 transport aircraft flying in a Keplerian trajectory, about fifteen seconds of zero g was produced. This is a report on the problems encountered during zero g which includes: human perceptive orientation; behavior of liquids; fluid transfer and heat transfer problems; human performance tasks; and locomotion inside and outside large space vehicles.

60

Brown, E. L. 1960 HUMAN AND SYSTEM PERFORMANCE DURING ZERO G. In Vistas in Astronautics--1960, Volume III. Proceedings of Third AFOSR Astronautics Symposium, Los Angeles, Calif., October 12-14, 1960. (Society of Automotive Engineers, Inc., New York, N. Y.) Pp. 85-88, October 1960.

ABSTRACT: A summary of work conducted on a research program on human and system performance during zero g was presented. These studies were made in a C-131B transport-type airplane while it was flying a Keplerian trajectory; about 15 sec. of zero g were produced in each trajectory. The areas investigated and discussed included 1) human performance on motor and mental tasks, 2) locomotion of individual humans inside large space vehicles, 3) locomotion outside space vehicles, 4) human perceptive orientation, 5) behavior of liquids, 6) fluid transfer problems, and 7) heat transfer problems. (Tufts)

61

Brown, E. L. 1961 MAN'S ANTICS DURING ZERO GRAVITY Society of Automotive Engineers J. 69:52-54, Feb. 1961

ABSTRACT: Description of sensations experienced during brief periods of zero g produced in a C-131B transport aircraft. The necessity of magnetic shoes, and of experiences with their use, are mentioned.

62

Brown, J. H. U., ed. 1963 PHYSIOLOGY OF MAN IN SPACE
(New York, London: Academic Press, 1963)

ABSTRACT: Contents include the following papers: "Neuromuscular Aspects of Space Travel" by G. H. Bourne; "Acceleration" by E. F. Lindberg and E. H. Wood; "Stress" by C. E. Hall; 'Human Tolerances" by B. Balke; "Psychological Aspects of Space Flight' by R. M. Chambers and R. Fried; "Biomedical Capsules" by C. D. Green; "Space Flight Dynamics-- Weightlessness" by W. R. Hawkins; and "Ecological Systems" by B. E. Welch.

63

Brown, J. L. 1961 ORIENTATION TO THE VERTICAL DURING WATER IMMERSION.
J. Aerospace Medicine 32:209-217, Mar. 1961

ABSTRACT: Subjects were immersed in water at a depth of either 18 or 25 feet and then rotated in a tucked position on a rod through 3, 4, or 5 revolutions. Rotation was terminated with the head in one of 4 positions: upright, inclined forward, down, or back. Upon termination of rotation subjects were directed to point in the up direction, then to nod the head and correct the direction of pointing if necessary, and finally to swim toward the surface. There were errors in direction of initial pointing of as much as 180 degrees. Errors were greatest with the head down or back and least with the head up or forward. Nodding of the head was followed by consistent improvement in the direction of pointing. There was little indication of any difficulty in swimming in the upward direction Greater density of the legs as compared to the trunk resulted in fairly rapid vertical orientation of the body upon release of the rod. The results are interpreted to reflect the relative inefficiency of the utricles as gravity sensors when the head is in certain positions. The simulation of zero gravity may be enhanced by utilizing these positions with water immersion. (AUTHOR)

64

Buchheim, R. W., and the RAND Research Staff 1959 SPACE HANDBOOK:
ASTRONAUTICS AND ITS APPLICATIONS
(New York: Random House Books, 1959.)

ABSTRACT: A review of astronautics, its technology and its applications, prepared at the request of the Select Committee on Astronautics and Space Exploration, House of Representatives, Eighty-fifth Congress.

65

Bugelski, B. R. 1957 THE BEHAVIORAL ASPECTS OF WEIGHTLESSNESS, PART I (Cornell Aeronautical Laboratory, Inc, Buffalo, New York) Contr. AF 29(600)1334, Rept. no. 0-1186-V-1, Nov. 1957

ABSTRACT: The present report is concerned with an evaluation of the literature pertaining to the capacities of organisms to adjust to space conditions, especially the factor of weightlessness, and its bearing upon behavior. Because of gaps in our knowledge revealed by this evaluation, an experimental program is proposed which would add substantially to the known data. Prior investigations and experience have indicated that various species and classes of animals (turtles, rats, monkeys, and man) can survive brief periods of weightlessness as these are approximated in current aircraft and rockets. Human pilots in aircraft have described varying degrees of effectiveness over periods of up to about 20 seconds of weightlessness. Animals have survived brief rocket journeys, but beyond the survival of anesthetized monkeys and some apparently successful "holding on" behavior in rats, we have no data relating to capacities for successful reactions to signals or displays. The experimental proposals describe a program which should establish the fact that monkeys and rats can cope with such signal situations while under weightless conditions.

66

Burch, G. E., and S. J. Gerathewohl 1959 SOME OBSERVATIONS ON HEART RATE AND CARDIODYNAMICS DURING WEIGHTLESSNESS. (U.S. Army Medical Services Research & Development Command, Bioastronautics Research Unit) Repts. Control Symbol CSCRD-16-5, 13 Nov. 1959, ASTIA AD-234 284.
See also J. Aerospace Medicine 31:661-669, Aug. 1960

ABSTRACT: Considerable efforts were made during the last decade to determine the biomedical effects of subgravity and zero-G. Animals and men were exposed to short and moderate periods of weightlessness; and their behavior, respiration, and cardiovascular functions were recorded during aircraft and rocket trajectories The electrocardiogram was also recorded from subjects during increased and decreased accelerations on the Subgravity Tower. By and large, a marked increase in cardiac rate occurred in almost all of the subjects during the acceleration and deceleration phase; this holds for aircraft trajectories as well as for the lift-off and re-entry maneuver of rockets. However, the EKG generally appeared normal during the free-flight periods and weightlessness, although some slight changes of its elements occasionally were observed. In several cases, the heart rate was somewhat increased and unstable during post-acceleration weightlessness; thereafter, it returned to normal. That psychological factors

entered into the physiological phenomena is clearly evident through an analysis of the data obtained in zero-G experiments. Nevertheless, the entire integrated responses resulted in subjects whose cardiological states remained sufficiently sustained to ensure normal and controlled behavior. (Author)

SECOND ABSTRACT: Experiments on the cardiodynamic effects of acceleration and weightlessness were carried out in the United States, Italy, and Russia. This is a review of the various experiments with special emphasis on tachycardia and changes in the EKG norman range. Throughout the experiments, prolonged and fluctuating tachycardia was observed in the early stage of weightlessness and decreased cardiac activity in later stages. The experiments proved that stresses and loads imposed on subjects during a space flight are well within human tolerance range.

67

Burch, G. E. and S. J. Gerathewohl 1960 OBSERVATIONS ON HEART RATE AND CARDIODYNAMICS DURING WEIGHTLESSNESS
J. of Aerospace Medicine 31(8):661-669 August 1960

ABSTRACT: A generalized survey on the cardiodynamic effects of acceleration and weightlessness encountered in aircraft, rocket, and satellite flights is given in Table III. Tachycardia during radial and linear accelerations was observed in almost all of the human subjects and animals studied. Slight changes in the ECG were found in a few animals; but they seemed to be within the range of normal variations characteristic of their groups. There seems to be a tendency of prolonged and fluctuating tachycardia in the early state of weightlessness, and decreased cardiac activity was observed in its later states, which may be interpreted as the functional adaptation of the heart to the decreased mechanical load. No abnormal manifestations were found in the ECG. The entire series of experiments demonstrate that stresses imposed by acceleration and the episodes of weightlessness encountered in aircraft and biological missile flights are well within the range of tolerance of the human and animals.organism.

68

Burch, G.E., and S.J. Gerathewohl 1959 SOME OBSERVATIONS ON HEART RATE AND CARDIODYNAMICS DURING WEIGHTLESSNESS (Presented at 2nd World and 4th European Congress on Aviation and Space Medicine, Rome, Italy, 27-31 October 1959)

69

Burns, N.M., R.B. Ziegler, R. Noble & E.C. Gifford 1960 A BIBLIOGRAPHY OF PSYCHOPHYSIOLOGICAL STUDIES RELEVANT TO SPACE AND ORBITAL FLIGHT. (U.S. Naval Air Material Center, Air Crew Equipment Lab., Philadelphia Pa.) Report No. NAMC-ACEL-441, 26 Oct. 1960. ASTIA AD 246 414

ABSTRACT: This bibliography contains a total of 582 entries on standard bibliographic file card forms. The entries cover a variety of subjects, but place prime emphasis on the psychological and physiological problems of space flight. Sixteen categories ranging from applied problems to theoretical applications form the basic classification scheme.

70

Bushnell, D. 1948-58 HISTORY OF RESEARCH IN SUBGRAVITY AND ZERO-G AT THE AIR FORCE MISSILE DEVELOPMENT CENTER, HOLLOMAN AFB, NEW MEXICO 1948-1958. (Air Force Missile Development Center, Air Research and Development Command, Holloman AFB, New Mexico) May 1958. ASTIA AD 208 017

ABSTRACT: Weightlessness, the weird condition of subgravity which man has never before experienced and survived--except for the initial split-second of short-distance free fall -- has recently become a major field of serious scientific research. Much of the important basic research in subgravity and zero-g has been performed by men of the Space Biology Branch of the Aeromedical Field Laboratory at the Air Force Missile Development Center. In this monograph Dr. David Bushness, of the Center's Historical Office, has traced the history of local contributions to this field of study. He has also placed this effort into the broader context of subgravity research accomplished elsewhere, especially in the United States, Argentina and the Union of Soviet Socialist Republics. This forms the third of a series of monographic studies by Dr. Bushnell related to the historical evolution of space biology as a field of study.

72

Butz, J. S., Jr. 1961 ALL IN A WEIGHTLESS DAY'S WORK Air Force, 44(4):112-113.

ABSTRACT: The Air Force's increasing research into the problems of weightlessness has resulted in many aids to human performance during subgravity. More than five aids in the form of a separate stability and propulsion system have been the result of research in a modified C-131 aircraft at Wright Air Development Division, Wright-Patterson AFB, Ohio.

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73

Cacioppe, A.J. & M.L. Joppesen 1961 EXPANDABLE SPACE STATIONS, IMPLICATIONS FOR PROLONGED MANNED SPACE FLIGHT. (Goodyear Aircraft Corp., Akron, Ohio) (Paper, 3rd International Symposium on Rockets and Astronautics, September 1, 1961)

ABSTRACT: The thesis of this paper is to develop the rationale for a manned space laboratory specifically conceived to acquire physical and biological data. The concept demands that the manned space laboratory be capable of being deployed in space for increasing periods of time.

74

Callaghan, E. E. 1962 WEIGHTLESSNESS
Mach. Design 34:156-161, October 11, 1962.

75

Campbell, P. A. 1948 POSSIBLE EFFECTS OF STREPTOMYCIN UPON AN AIRMAN'S FUTURE. J. Aviat. Med. 19(5):393-396.

76

Campbell, P. A. 1957 AEROMEDICAL AND BIOLOGICAL CONSIDERATIONS OF FLIGHT ABOVE THE ATMOSPHERE. In Carter, L. J., ed., Realities of Space Travel (London: Putnam, 1957) pp. 251-265
See also J. Brit. Interpl. Soc. 14:1-12, 1955

ABSTRACT: New altitude and speed records indicate everincreasing trends toward the possibility flight above the atmosphere. Basic biological problems group themselves into three primary categories; those associated with the attainment

of high speed and penetration of the a[illegible] those speeds; those resulting from loss of the life-sustaining qualities of the earth's atmosphere; and those resulting from loss of protection afforded by the filtration qualities of the atmosphere. These categories are discussed. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space Medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903; ASTIA AD-227 817; Feb. 1959)

77

Campbell, P. A. 1958 HUMAN PARAMETERS OF SPACE FLIGHT. USAF Med. Serv. Dig. 9(3):2-10

78

Campbell, P. 1958 HUMAN LOGISTICS FROM THE VIEWPOINT OF SPACE TRAVEL. In Alperin M., M. Stern, & H. Wooster, eds., Vistas in Astronautics: Proceedings of the First Annual AFOSR Astronautics Symposium (New York: Pergamon Press, 1958) pp. 285-287

79

Campbell, P. A. 1959 MAN IN SPACE: WHERE WE STAND Air Force & Space Digest July 1959, pp. 65-67.

80

Campbell, P.A. 1959 THE PRESENT SPACE MEDICINE EFFORT AT THE SCHOOL OF AVIATION MEDICINE, USAF.
In U.S. Armed Forces Med. J. 10(4):392-397

ABSTRACT: Describes the four departments of the Space Medicine Division of the School of Medicine. They are Astroecology; biogravics, which is concerned with studies of the effects of weightlessness on man; bioastrophysics; and bioastronautics.

81

Campbell, P. A., & S. J. Gerathewohl 1959 THE PRESENT STATUS OF THE PROBLEMS OF WEIGHTLESSNESS. Texas State Journal of Medicine 55(4):267-274, Apr. 1959

ABSTRACT: Reports weightless orientation studies made by immersing men in water. Man's ability to orient himself depends upon a variety of factors, and during weightless situations the eye becomes the only reliable organ.

82

Campbell, P. A. 1959 A PANEL DISCUSSION. THE UTILIZATION OF A SATELLITE LABORATORY FOR LIFE SCIENCE STUDIES. In Alperin, M., & H. F. Gregory, eds., Vistas in Astronautics II (New York, N. Y.: Pergamon Press, 1959)

83

Campbell, P. A. 1960 RESEARCH PROGRAMS -- II. THE LUNAR COLONY. Lectures in Aerospace Medicine, 11-15 January 1960 (Conducted at the School of Aviation Medicine USAF Aerospace Medical Center).

84

Campbell, P. A. 1961 HUMAN FACTORS: ASPECTS OF WEIGHTLESSNESS In R. I. Ordway, III, Ed., Advances In Space Science and Technology, Volume 3, (New York, N. Y., Academic Press, 1961). Pp. 443-464.

ABSTRACT: The material in this chapter is devoted primarily to considerations of weightlessness insofar as it affects human factors and life-support systems. However, it is not intended to detract from the importance of the phenomenon from the viewpoint of many other disciplines and technologies. Problems of direct interest to engineers undoubtedly are equally important as those of the physician, the psychologist, and the biologist, but are not discussed herein.

85

Campbell, P.A. 1962 THE HUNTING PHENOMENON DURING FLIGHT IN THE WEIGHTLESS STATE (School of Aerospace Medicine, Brooks AFB, Tex.) AF-SAM-Q-2, 6-10 July 1962

86

Cannizzaro, C 1958 OTONEUROLOGICAL ASPECTS OF VERTIGO AND PSEUDOVERTIGO Rass Studi Psichiat 47:445-74, Jul-Aug 1958

87

Caporale, R. 1961 BEHAVIOR OF SOME POSTURAL REFLEXES IN INTACT, DELAPYRINTHIZED OR DECEREBRATED PIGEONS DURING VARIATIONS OF ACCELERATION IN WEIGHTLESSNESS IN SUB-GRAVITY ROTATION.
Rev, Med. Aero (Paris) 2:165-170, Dec. 1961 (Fr)

88

Caporale, R. 1962 BEHAVIOR OF SOME POSTURAL REFLEXES IN INTACT, LABYRINTHECTOMIZED OR DECEREBRATE PIGEONS DURING ACCELERATION VARIATIONS BETWEEN 2 AND ZERO G'S.
In Riv. Med. Aero. 25:243-256, April-June 1962

89

Carter, C.W. 1960 INTERNATIONAL LIST OF HUMAN FACTORS FILMS.
Human Factors. 2(2): 62-69, May 1960

ABSTRACT: This annotated bibliography presents 54 references to films dealing with human factors problems in man-machine design. The subjects covered include emergency escape and survival systems, zero gravity studies, medical aspects of high intensity noise, illumination and dark adaptation, anthropometrical techniques, simulated decompression studies, aircrew fatigue problems, and the effects of whole body vibration on human performance. The references are categorized by source in order to facilitate procurement of certain films desired by the reader.

90

Cates, J.D. 1961 HIGH-CAPACITY TELEMETRY DIGITIZER AND VIBRATION ANALYZER. (Integrated Range Mission, White Sands Missile Range, N.Mex.) ASTIA AD-266 639L, 30 January 1961

ABSTRACT: The logical design, circuitry, and theory of operation is described of the Sub-System A (digitizer) portion of the high capacity telemetry digitizer and vibration analyzer. Sub-System B, a second digitizer, and Sub-System C, the vibration analyzer, will be covered in separate reports. The equipment described includes an Adage Voldicon analog-to-digital (A-D) converter and 5-channel multiplexer, an EPSCO Transicon analog-to-digital converter, a time-code reader, two digital-tape handlers, and the necessary record and contro circuitry to program and record the digitized data. The sub-system will operate at sampling rates up to 1000 samples per second. It has a digitizing error of plus or minus 0.1 percent of full scale. The equipment, with the exception of the time-code reader, is transistorized. (Author)

91

Cawthorne, T., M. R. Dix, C. S. Hallpike, & J. D. Hood 1956 THE INVESTIGATION OF VESTIBULAR FUNCTION. Brit. Med. Bull. 12:131-142

ABSTRACT: The author first gives a short introduction to the vestibular function. The neuro-otologist's approach to the vestibular is stated along with its structure and function. The author then gives a detailed review of caloric tests and rotational tests. Other tests conducted were positional tests of otolith function. Tests for optokinetic nystagmus. A list of references follows the article. (CARI)

92

Chambers, R. M., D. A. Morway et al. 1961 THE EFFECTS OF WATER IMMERSION ON PERFORMANCE PROFICIENCY. (Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.) NADC-MA-6133, 22 August 1961. ASTIA Doc. No. AD-267 665.

ABSTRACT: In an attempt to study a wide range of human performance abilities associated with weightlessness and the transition from weightlessness to a high G reentry environment, the technique of water immersion and centrifugation was used to simulate these conditions. Six male subjects were immersed in water to the neck level for a 12-hour period and one subject for a 23-hour period. Eight selected performance tasks were administered: (1) before immersion, (2) during immersion, (3) after immersion and centrifugation so that gross motor and perceptual behavior could be sampled. It was found that behavior was not apparently affected by prolonged water immersion followed by reentry type accelerations. (Author)

93

Chambers, R. M., D. A. Morway, E. L. Beckman, & V. G. Benson 1961 CHANGES IN PERFORMANCE PROFICIENCY UNDER CONDITIONS SIMULATED BY WATER IMMERSION AND CENTRIFUGATION. (Paper, 32nd Annual Meeting of the Aerospace Medical Assoc., Palmer House, Chicago, Illinois, April 24-27, 1961)

94

Chance Vought Astronautics PROPOSAL FOR A STUDY OF THE EFFECTS OF ZERO GRAVITY ON CELL PHYSIOLOGY. (Chance Vought Astronautics, Dallas, Texas)

ABSTRACT: The study proposal is designed to determine the effect of zero gravity on cell physiology. The study consists generally of the comparison of the change in rate of the reversible sol-gel transformation through a range of gravity force including Zero "g". This test is required to evaluate the postulation that since cells have evolved in an environment of 1 "g" the absence of gravitational force may so alter their physio-chemical equilibrium that they will be unable to carry on their normal metabolism.

95

Chasen, L., E. Colabrese, & D. Himmelstein 1960 SEALED ATMOSPHERES AND PSYCHO-PHYSIOLOGICAL FACTORS: A BIBLIOABSTRACT. (Missile and Space Vehicle Dept., General Electric Co., Philadelphia, Pennsylvania) T.I.S. Rept. R60SD344; ASTIA AD-238 478; Apr. 1, 1960

ABSTRACT: A survey directed toward psychological, physical and biological hazards of space flight; includes literature on the psychological effects of isolation for a prolonged period. 50 references in closed literature; 116 references in open literature.

96

Cherednichenko, V.I. 1960 MAN INTO COSMOS!
Nauka i Zhyttya 1960(8):

ABSTRACT: Discussion of various problems contingent upon a manned space flight, such as the effect of zero gravity on a human organism, action of the solar radiation.

97

Christensen, Julien M. 1963 PSYCHOLOGICAL ASPECTS OF EXTENDED MANNED SPACE FLIGHT
Paper: American Astronautical Society Symposium on the Exploration of Mars, [illegible], 1963 Preprint (15)

ABSTRACT: As is the case with virtually all of the other scientific disciplines, adequacy of available psychological knowledge and principles will receive a severe test from the demands attendant to the development of a successful mission to Mars. This paper offers a sampling of some of the relevant information available in psychology, and an attempt is made to identify areas that will require further attention before predictions in the behavioral area for the Mars trip can be made with confidence. A two-fold thesis is developed. First, psychology has legitimate and important contributions to make to the Mars trip. Second, the advantages, however, are mutual; i.e., it is confidently predicted that participation in this venture will force psychologists to reexamine their traditional principles and theoretical positions and will stimulate an attack on the basic issues of human behavior with refreshing insights gained from new points of vantage.

98

Clamann, H. G. 1959 SEALED CAPSULE STUDIES FOR SMALL ANIMALS.
(Bioastronautics, Advances in Research, Air University, School of Aviation Medicine, Randolph AFB, Texas) Progress Rept. No. 3, March 1959

99

Clamann, H.G 1960 MEDIZIN UND RAUMFAHRT: DER MENSCH IN DER KAPSEL
(MEDICINE AND SPACE FLIGHT: MAN IN CAPSULE)
Flugkorper (Wiesbaden) 2(1): 16-18, Jan. 1960. In German.

ABSTRACT: This is a review of investigations in the medical problems of space flight as the author presented them during a lecture at Dusseldorf, Germany. The subjects under investigation include weightlessness, acceleration tolerance, pressure suits, food requirements and flight feeding, methods of re-cycling water and of CO_2 -O_2 exchange, isolation, and tolerance to high dry-heat temperatures.

100

Clark, R. T., H. G. Clamann, B. Balke, P. C. Tang, J. D. Fulton, A. Graybiel & J. Vogel 1960 BASIC RESEARCH PROBLEMS IN SPACE MEDICINE: A REVIEW Aerospace Medicine, 31(7):553-577.

ABSTRACT: This report includes studies of disorientation in pilots, closed ecological systems, subgravity state during parabolic flight, survival of terrestrial organisms under extreme environmental conditions, and physiological aspects of training and selection for manned extra-terrestrial flights.

101

Clemedson, C. J. 1958 SOME BIOPHYSICAL AND MEDICAL PROBLEMS INVOLVED IN MANNED SPACE FLIGHT: A REVIEW
Astronautik (Stockholm), 1(1):9-36, 1958

ABSTRACT: Medical and biological problems which have to be solved before space flight will be possible are reviewed. Among thsoe reviewed are the following: the effects of loss of life-sustaining properties of the terrestrial atmosphere; the effects of gravitational stress; the problems of food and water supply and of waste disposal during long trips; and effects of the physical stresses of confinement in a narrow cabin under adverse physical conditions. If the crew is properly trained, they will be able to tolerate the necessary acceleration during flight. Although zero gravity causes no abnormal physiological functions of the body, orientation and co-ordination may make the performance of tasks difficult. To solve the problem of storing oxygen and air-purification chemical as well as food and water, photosynthetic air purification and food synthesis from algae material may become necessary. Another risk faced by men in space is exposure to the heavy components of primary cosmic radiation and hits by meteorites.

102

Ifelter, R. G., & R. C. Lewis 1961 FLUID STUDIES IN A ZERO GRAVITY ENVIRONMENT. (Aeronaut. Systems Div., Wright-Patterson AFB, Ohio) TN 61-84, June 1961

103

Cockett, A.T.K., C.C. Beehler, & J.E. Roberts 1961 HYPODYNAMIC UROLITHIASIS: A POTENTIAL HAZARD DURING PROLONGED WEIGHTLESSNESS IN SPACE TRAVEL. (School of Aerospace Medicine, Brooks AFB, Texas) Review 2-62;

SUMMARY: Hypodynamic urolithiasis as a hazard in space travel is discussed in

the light of present-day knowledge. Emphasis has been placed on several etiologic factors in urinary lithiasis that will be present during space flight. Moreover, as urinary stones may be formed during prolonged space travel, prophylactic measures (physical exercises, diet, and schedules) are suggested for the prevention of stone formation. (Author)

104

Cockett, A.T.K., C.C. Beehler & J.E. Roberts 1962 ASTRONAUTIC UROLITHIASIS: A HAZARD DURING PROLONGED WEIGHTLESSNESS
(Paper, 1962 Meeting of the Aerospace Medical Association, April 9-12, 1962, Atlantic City, N.J.)

ABSTRACT: A good physical exercise regime will help prevent muscular atrophy during prolonged weightlessness, but the preservation of the skeletal system is another matter. Weightlessness will remove the stress of gravity which normally provides stimulus for osteoblastic activity with calcium deposition in the bony matrix. Acute osteoporosis (e.g. in polio patients) not infrequently produces urinary stones in young patients, because of immobilization and calcium resorption form long bones. Increased urinary sedimentation during prolonged flight may also contribute to calculus formation. A review of such etiologic factors in urolithiasis and prophylactic measures will be presented.

105

Cockett, A. T., C. C. Beehler & J. E. Roberts 1962 ASTRONAUTIC UROLITHIASIS: A POTENTIAL HAZARD DURING PROLONGED WEIGHTLESSNESS IN SPACE TRAVEL. J. Urol. 88:542-544, Oct. 1962.

106

Cocquyt, P.P. 1950 THE SENSORY ILLUSIONS OF THE AIRMAN
(SABENA, Belgium Report July 1950)
R.A.E. Translation No. 354 ASTIA AD 266614

107

Cocquyt, P. P. 1951 THE SENSORY ILLUSION OF PILOTS
(New York: Flight Safety Foundation, Inc., 1951)

108

Coe, L.A. 1954 SOME NOTES ON THE REACTIONS OF AIRCRAFT PILOTS TO ZERO GRAVITY J. Brit. Interpl. Soc. 13:244

ABSTRACT: Twenty qualified pilots were subjected to near-zero gravity for periods up to twenty seconds by maneuvering a Meteor Mark 7 jet trainer. During the zero gravity state, the typical reaction was an immediate feeling of insecurity which resulted in a reflex action of clutching at something. This was followed by a sense of relief and relaxation. Simple mechanical and mental tasks were performed with great variation. Loose floating articles tended to distract the subject. Most of the pilots enjoyed the experience and none of them felt distress or nausea. Dust normally present in the aircraft's atmosphere was soon felt a considerable nuisance.

109

Cole, D.M. and D.E. Muir 1958 AROUND THE MOON IN EIGHTY HOURS (The Martin Company, Denver, Colorado) August 19, 1958, M-M-P-58-42

ABSTRACT: A conceptual design of a manned circumular vehicle for the early 1960's is presented, showing how early availability and low cost can be achieved by making maximum use of ICBM hardware and facilities. Results of orbit, space medicine, and re-entry studies critical to the circumular flight are included.

110

Combs, N. K. 1962 THOUGHTS ON INTERFERENCE WITH GASTRIC ACTIVITY DURING PROLONGED WEIGHTLESSNESS. (Paper 33rd Annual Meeting of the Aerospace Medical Assoc., Chalfonte-Haddon Hall, Atlantic City, N. J., April 9-12, 1962)

ABSTRACT: During prolonged weightlessness, it is believed that gastric action on food could be seriously impaired. A review of physiology texts reveals a disagreement on the role of gravity in stomach processing of food. The weight of food and liquids, it is felt, plays an important role in their passage from the fundus to the pylorus as peristalsis per se is not considered to take place in the upper stomach. In addition, it is difficult to see how the orderly exposure of food to gastric juices could take place if the food were without weight. Inasmuch as prolonged weightlessnes cannot be simulated, we can only speculate on some of its effects. Gastric difficulties could pose a serious threat to man's well-being and performance. Until more information is obtained from early space ventures, providing personnel with parasympathomimetic or anticholinergic agents might be indicated.

111

Conley, C. 1963 TOWER TO CREATE ZERO - G CONDITION.
Daily Oklahoman. 22 Sept. 1963

ABSTRACT: This article describes the zero-gravity tower nearing completion at the Tulsa Division of Douglas Aircraft Co. The 60 foot high chamber will be used to test space vehicle and rocket stage separation systems under simulated space conditions. It will hold systems up to 7½ feet in diameter. From the top of the tower free-fall will be simulated for 1½ secs. (at simulated 100,000 to 180,000 feet), or in bottom catapults, for 3 secs. (CARI)

112

Conley, Michael 1950 THE MEN WHO CAN MAKE SPACE FLIGHT POSSIBLE TODAY.
J. Space Flight 2:1-3

ABSTRACT: Suggests a crew of six and the things each will need to know.

113

Conley, M. 1952 A METHOD OF SUPPORTING THE HUMAN BODY STRUCTURE DURING SPACE FLIGHT. J. [illegible] 4(9):3-4, N[illegible] 1952

ABSTRACT: Lightweight zippered [illegible] made of [illegible] fabric, are recommended for use in space ships to protect [illegible] of the body from effects of acceleration, deceleration, [illegible] They would be worn underneath the underclothing [illegible], to hold the body's shape and prevent rupturing of [illegible]

114

Convair Astronautics Div. 1960 MAY-JULY PROGRESS REPORT FOR THE COMBINED LABORATORY AND AIRPLANE ZERO-G TEST PROGRAM
(Convair Astronautics Div., General Dynamics Corp., San Diego, Calif.) Aug. 1960

115

Corazzi, U. 1961 POSSIAMO VIVERE NELLO SPAZIO? (COULD WE LIVE IN SPACE?) Oltre il cielo (Rome), 5(90):271-274, Oct. 1961. (In Italian)

ABSTRACT: This is a review of the studies done by Colonel Professor Rodolfo Margaria, director of the Institute of Physiology of the University of Milano. The review includes his studies on high altitude physiology, aviation medicine, protection from accelerative forces, respiration and position sense, space flight physiology, mammalian resistance to acceleration, effects of zero gravity on the otolithic apparatus, and the effects of interplanetary voyages on the central nervous system and mental conditions. There is also a biographical sketch of the author included.

116

Corbin, K.B. and H.L. Williams 1960 DIZZINESS. Med. Clin. N. Amer. 44:941-51, July 1960

117

Corkindale, K. G. 1961 PSYCHOLOGICAL PROBLEMS OF SPACE FLIGHT. New Scientist (London), 10(236):457-459. May 23, 1961.

ABSTRACT: The effects of the following psychological stresses on performance and behavior of the astronaut are summarized: high g forces, weightlessness, isolation, restraint, and sensory deprivation.

118

Cornell Aeronautical Laboratory, Inc. 1958 CORNELL PROBES WEIGHTLESSNESS Aviation Week, 68(2):26-28

ABSTRACT: An outline of work being done at Cornell Aeronautical Laboratory, Inc. for Air Research and Development Command. Investigation of the efficiency of man's intellectual functions as opposed to physiological reactions, during weightless space travel in rockets, satellites or other space vehicles.

119

Cramer, R. L. 1960 THE RESPONSE OF MAMMALIAN GRAVITY RECEPTORS TO SUSTAINED TILT (Paper, 1960 Meeting of the Aerospace Medical Assoc., 9-11 May 1960, Miami Beach, Fla.)
See Also: Aerospace Med. 31(4):301, Apr. 1960

ABSTRACT: Studies were made of the behavior of single cells of the projections of the otolith organs in decerebrate and decellebrate cat as the preparation was maintained for extended times in different positions relative to the earth's gravitational field. In every case studied, it was found that there was a rather vigorous initial response to the tilt and that this response diminished considerably over 15 to 30 seconds; the steady-state signal to tilt was relatively weak. (AUTHOR)

120

Cramer, R. L. 1961 RESPONSE OF MAMMALIAN GRAVITY RECEPTORS TO SUSTAINED TILT. (School of Aerospace Medicine, Brooks AFB, Texas) Rept. 62-21; Nov. 1961 ASTIA AD-272 332

ABSTRACT: Studies were made of the behavior of single cells of the projections of the otolith organs in decerebrate and decellebrate cat as the preparation was maintained for extended times in different positions relative to the earth's gravitational field. In every case studied, it was found that there was a rather vigorous initial response to the tilt and that this response diminished considerably over 15 to 30 seconds; the steady-state signal to tilt was relatively weak (AUTHOR)

121

Crawford, B. M. & W. N. Kema 1961 REMOTE HANDLING OF MASS (USAF Behavioral Sciences Lab., Wright-Patterson AFB, Ohio) Proj. 7184, Task 718406, ASD TR 61 627, Dec. 1961.

ABSTRACT: Three hypotheses are tested: difference limens for masses handled remotely are greater than for masses handled directly under simulated weightlessness; weightlessness will not affect absolute judgments; tendency to under- and overestimate stimuli that follow large and small ones, respectively, will operate for both judgment and handling conditions. Remote-handling (apparatus--an Argonne Model 8 Master-Slave Manipulator) and direct-handling groups of Ss make judgments of mass after moving stimulus objects to and fro on an air-bearing table. Frequencies of "heavier" responses for the comparison stimuli are examined and normal ogives derived. For absolute judgments, the main effects of basis of judgment, handling method, and stimulus magnitude are evaluated by Wilcoxon's two-tailed rank test. (Tufts)

WEIGHTLESSNESS

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122

Danilin, B. S. 1958 VTORZHENIE V KOSMOS (INVASION OF THE COSMOS)
Nauka i zhizn' 1957, No. 12, p. 4-8
English Translation: Soviet Bloc International Geophysical Year Information (13), March 4, 1958, p. 2-10

123

Danilin, B. 1959 LIFE IN THE COSMOS.
Nauka i Zhizn' (Moscow) (7):34-36, July 1959

ABSTRACT: In this article the author discusses the possibility of man flying in space. He states that experiments have shown that the forces of acceleration can be best withstood in a back-to-chest direction. The ability to withstand acceleration increases sharply if a man is immersed in water. The difficulty of controlling the space ship is increased by the state of complete weightlessness which immediately replaces the high G-stresses. The best method to counter the effects of weightlessness is to fasten oneself in the seat at the beginning of the flight. For ensuring the required physical load, rubber tractions in the region of the joints, and special G-suits can be used. Also being studied is the possibility of creating artificial gravitation by rotation of

124

David, H. M. 1961 WEIGHTLESSNESS LOWERS PERFORMANCE
Missiles and Rockets 8(21):36, May 22, 1961.

ABSTRACT: Physiological and psychological studies conducted under conditions of weightlessness have brought to light situations which may pose a serious problem to spaceflight. (JPL)

125

David, H.M. 1962 U.S., REDS SHARE VIEW OF SPACE NAUSEA
Missiles and Rockets, May 14, 1962.

ABSTRACT: The USSR apparently is pursuing the same line of research into the problem of Titov's "space sickness" as is the United States.
U.S. disorientation expert Dr. Ashton Graybiel (Capt. USN) told M/R that the Russian seem to have ruled out the idea that Titov's nausea was caused by some individual defect in his own vestibular mechanisms.
The Soviets indicated that the clue to Titov's illness lies in the otolith apparatus. The Russians also indicated that they believe that the nature of the otolith will probably cause the same symptoms in all astronauts who experience prolonged periods of weightlessness. A highlight of the COSPAR meeting was the appearance of Maj. Gherman Titov and Col. John H. Glenn, both of whom presented reports on their trips into space. (CARI)

126

Davydov, V. D. 1961 DAVYDOV ON ARTIFICIAL GRAVITY
FBIS USSR & East Europe, Nr. 158, August 16, 1961

ABSTRACT: The flight of German Titov made it possible for the first time to study the effect of prolonged weightlessness on the health and capacity of a pilot-cosmonaut. If a prolonged absence of gravity is inconvenient or hinders the normal state of the cosmonaut, it is possible to create artificial gravity on all artificial earth satellites and manned spaceships. The creation of artificial gravity will be brought about by the ship's rotation around its axis. (CARI)

127

Denisov, N. & S. Borzenko 1962 POLET GAGARINA (MATERIALY, OPUBLIKOVANNYYE v "PRAVDE") GAGARIN'S FLIGHT.
(Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio)
FTD-TT-62-844 from Izdatel'stov "PRAVDA", Sept. 1962. ASTIA AD 287 715

ABSTRACT: It was on 12 April 1961 that the Soviet Union carried out the first manned flight into outer space. The spaceship "Vostok," with the USSR pilot-cosmonaut Yu. A. Gagarin on board, was placed into orbit as a satellite of the earth. The satellite vehicle without the last stage of the rocket-carrier, weighed 4,725 kilograms. On the basis of refined data obtained through the evaluation of all measurements, the perigee was at 181 kilometers, and the apogee was at 327 kilometers; the inclination of the orbit was 64° and 57 minutes. Having completed the orbital flight, the satellite vehicle returned to earth successfully, landing in a designated area of our country. This publication contains a detailed account of the flight and relates the great significance of the journey to the entire world.

128

de Pando, M.V. 1958 LOS SATELITES Y LOS VIAJES INTERPLANETARIOS: EFFECTOS FISIOLOGICOS DE LA VARIACION DE LA GRAVEDAD (Artificial Satellites and Interplanetary Travel: Physiological Effects of Change in Gravity) Rev. Real Acad. Cienc. Exact. Fis. Y Nat. Madrid 52(2):141-145. In Spanish.

ABSTRACT: An extended version of an analytical study on the launching of space rockets, (Vol. 52(1):11-61. 1958). An attempt is made of correlating mathematically basic physiological and physical parameters. If j represents the effects of gravity experienced by a space traveler within the space vehicle ("sensible gravity"), the following formula applies:

$$j = \frac{d^2y}{dt^2} + \frac{ga^2}{(a+y)^2}$$

in which y is the altitude, t the time, g the gravitational acceleration on the surface of the earth, and a the terrestrial radius. In this formula the expression $\frac{d^2y}{dt^2}$ represents the effective vertical acceleration and $\frac{ga^2}{(a+y)^2}$ the effects of terrestrial acceleration at the altitude y. The validity of the formula is tested for the following conditions: (1) the vehicle rests on the terrestrial surface; (2) the vehicle travels unaccelerated at a given altitude (this being the case when the upward acceleration equals the weight of the vehicle); (3) the vehicle travels at a given altitude and at a given acceleration.

129

Diefenbach, W.S. 1961 THE ABILITY OF SUBMERGED SUBJECTS TO SENSE THE GRAVITATIONAL VERTICAL
(Cornell Aeronautical Laboratory, Inc., Buffalo, New York) Internal Research No. 993-004, CAL no. OM-1355-v-1, Jan. 1961

ABSTRACT: The ability to perceive the vertical when submerged in a buoying fluid and subjected to varying amounts of body tilt was studied in a series of pilot experiments. Positional cues were minimized by special equipment. Errors in perception of the vertical had a high linear correlation with the amount of body tilt. It was also found that precision in positioning an unseen control may vary with body tilt. Also included is a brief discussion of possible simulation of weightlessness and implications for design of space controls.

130

Dole, S.H. 1958 INTERNAL ENVIRONMENT OF MANNED SPACE VEHICLES
(Rand Corporation, Santa Monica, Calif.) Rept. No. P-1309, 24 Feb. 1958.

ABSTRACT: This is a discussion of the effects on the human occupant in a manned space vehicle by composition and pressure of the atmosphere, gravitational forces, temperature, and radiation.

131

Dole, S. H. 1959 ENVIRONMENTAL REQUIREMENTS FOR EXTENDED OCCUPANCY OF MANNED SATELLITES. (Paper, ASME Aviation Conference, Los Angeles, California, March 9-12, 1959) ASME Paper No. 59-AV-12

132

Dole, S.H. 1960 DESIGN CRITERIA FOR ROTATING SPACE VEHICLES. (Rand Corp., Santa Monica, Calif.) Research Memo No. RM-2668, Contract AF 49(638)700, Proj. RAND, 18 Oct. 1960. ASTIA AD 249 503.

ABSTRACT: Several undesirable physiological side effects can arise from rotating a manned space vehicle in order to provide a simulated gravity field. The phenomena that may produce these side effects are herein analyzed to determine in each case the design restrictions that should be accepted in order to avoid adverse conditions. Based on this set of restrictions, a design envelope, which allows the designer considerable latitude, is based on the following limits: (1) maximum angular velocity, 4 rpm; (2) maximum head-to-foot difference in g's, 15%; (3) minimum rim velocity, 10 ft/sec; (4) maximum simulated gravity field, 1.5 g's; and (5) minimum simulated gravity field 0.01 g. (Author)

133

Dostal, R. and T. Kersey 1960 SPACE MEDICINE. Iowa Engineer. 60(4):26-28, January 1960

ABSTRACT: This is the first of a series of two articles explaining the problems men will encounter when they venture into space. The effects of weightlessness and cosmic radiation are discussed in this issue.

134

Douglas, W. K., C. B. Jackson, Jr., et al 1961 RESULTS OF THE MR-4 PREFLIGHT AND POST FLICHT MEDICAL EXAMINATION CONDUCTED ON ASTRONAUT VIRGIL I. GRISSOM. (Results of the Second U. S. Manned Suborbital Space Flight, NASA Manned Spacecraft Ctr, 21 July 1961)

135

DuBridge, L.A. 1961 ADVENTURES IN SPACE
Calif. Inst. Technol. Quart. 2:2-8, Spring 1961

136

Dvorak, J., P. K. Isakov, & J. Hospodar 1960 CLOVEK V MEZIPLANETARNIM PROSTORU (MAN IN INTERPLANETARY SPACE) (Prague: Orbis, 1960)

ABSTRACT: The book is based mainly on Soviet data and presents the physical aspects of outer space from the biological point of view. Attention is given to the effect of space factors on the body and methods and equipment for human flight in outer space are described. Details of the first experiment with the dog Layka in space flight are given. Return to the Earth, the selection and training of astronauts, scientific results of space flights, and space medicine are treated. No personalities are mentioned. There are 7 references, all Czech. (CARI)

137

Dvorak, J., P. K. Isakov & J. Hospodar. 1960 MAN IN INTERPLANETARY SPACE - A SMALL MODERN ENCYCLOPEDIA (CLOVEK V MEZIPLANETARNIM PROSTORU). Translated by Aerospace Technical Intelligence Center, Wright-Patterson AFB, Ohio, Trans. No. MCL-907 of Ceskoslovenska Spolecnost Pro Sireni Politickych A Vedeckych Znalosti, Prague, pp. 1-160, 169-211, 1960. ASTIA Doc. No. AD-261 786.

138

Dzendolet, E., & J. F. Rievley 1959 MAN'S ABILITY TO APPLY CERTAIN TORQUES WHILE WEIGHTLESS. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 59-94; ASTIA AD-220 363; April 1959

ABSTRACT: The torque that a maintenance man can exert within a space vehicle while weightless, and hence tractionless, is analyzed. Anthropological literature was reviewed to determine the torques a man can apply under normal conditions. Using elementary physical principles the consequences of applying these torques while tractionless were calculated. Certain of the predictions were verified experimentally. It is tentatively concluded that standard anthropometric data can legitimately be extrapolated to the weightless condition. Suggestions are advanced regarding (a) the optimum body position for a simple tightening task without using a handhold, (b) the use and location of handholds, (c) maximum torque limitations, (d) the use of impulses, and (e) the design of hand tools.

139

Dzendolet, Ernest 1960 MANUAL APPLICATION OF IMPULSES WHILE TRACTIONLESS. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 60-129 ASTIA AD-238 021; February 1960

See Also: Human Factors 2(4):221-227, 1960.

ABSTRACT: The percentage of naive subjects who, while tractionless in a horizontal plane and anchored by one handhold, push in or pull out a plunger in one motion against various frictional forces and travel distances, decreases directly as the force and distance required. With large-force impulses, the impulse is linear and the situation can be described by the impulse-momentum theorem: $\int_0^t Fdt = mv_1 - mv_0$. The shape of the impulse is saw-toothed, and its area approximated by taking three-fourths of the area of a rectangle whose base is the duration, and height, the force of the impulse. For this experiment, the maximum duration of an effective impulse for a required force of 40 pounds is 0.5 seconds for a push-in, and 0.3 seconds for a pull-out impulse. A subject, without a handhold, can seat the plunger with a push, and, in spite of the reaction to the impulse, remain attached to the equipment without unseating it. The technique is to allow the reaction to move the subject over as long a distance as possible and, since the total impulse is constant, thus reduce the force. The reduction in force allows the equipment to remain seated since the force is now less than the frictional force needed for seating. (AUTHOR)

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Eckstrand, G.A., M.R. Rockway 1961 SPACECREW TRAINING: A REVIEW OF PROGRESS AND PROSPECTS. (Aeronautical Systems Division, Air Force Systems Command, Andrews AFB, Washington, D.C.) AFSC Project 1710; ASD TR 61-721, ASTIA AD 274190

ABSTRACT: This report reviews current progress and future prospects in the field of spacecrew training. Descriptions of all current astronaut training programs are presented and a number of general conclusions with reference to such training are drawn, based upon the manned space operations which have been conducted to date. In addition to the actual experience which has been gained in training spacecrew personnel, a review is presented of recently completed and current research which is directly relevant to this problem. Several areas in which research should be accelerated are identified.

141

Eckstrand, G. A. 1961 TRAINING OF ASTRONAUTS (National Research Council, Washington, D. C.) Publication No. 873.

142

Edholm, O. G. 1940 EFFECT OF GRAVITY ON THE BLOOD PRESSURE OF THE CAT J. Physiol. 98:79-96.

143

Eggleston, J. M., & H. D. Beck 1961 A STUDY OF THE POSITIONS AND VELOCITIES OF A SPACE STATION AND A FERRY VEHICLE DURING RENDEZVOUS AND RETURN. (National Aeronautics & Space Administration, Wash., D. C.) NASA TR R-87

ABSTRACT: A study is made of the families of nonthrusting ascent trajectories during rendezvous with an orbiting space station and the descent trajectories to the earth's atmosphere. Equations of motion are derived and results are shown for two typical orbits of the station (one circular and one elliptic orbit). Boundaries of launch (at time of booster burnout) and rendezvous conditions are given and the effects of delays in launch time are discussed. (AUTHOR)

144

Ehricke, K.A. 1956 ASTRONAUTICAL AND SPACE-MEDICAL RESEARCH WITH AUTOMATIC SATELLITES
(Journal of the Franklin Institute, June 1956)

ABSTRACT: Technical and scientific research aspects in conjunction with technological satellites are outlined and their correlation with various phases of manned astronautics is shown. The survey of the space-medical researc'. by means of bio-satellites also considers the relevant technical and scientific aspects.

145

Emme, A. 1962 COSMIC EXPLORERS.
Sovetskaya Rossiya, 20 Oct. 1960.
(Translation Services Branch, Foreign Technology Division, Wright-Patterson AFB, Ohio) FTD-TT 62-602/1-4, 8 May 1962.

ABSTRACT: Before flying into space we must know exactly how various representatives of life will react to everything connected with the flight. A branch of science being developed on earth is the science of space ecology. This deals with the relation of man to cosmic surroundings and his life on other planets. During a recent flight, a radio-television system made possible constant visual contact with occupants of the ship. The g-forces at launch greatly affected the heartbeat and respiration. During acceleration the animals required more oxygen than usual. However, they had no trouble eating under weightless conditions. Mice were used to test cosmic radiation. Another object of space study was nucleic acid, the hereditary factor of all organisms. These molecules can be called "bare genes" or "free genes." Impacts by cosmic particle can cause great disturbances in the structure of this acid; these will be studied physicochemically.

146

Engel'gardt, V. 1961 LIFE, REASON AND THE UNIVERSE
(Joint Publications Research Service, New York, New York) JPRS 8518 29 June 1961
Trans. from Izvestiya (USSR) No 92(13638) p. 3, 1961

ABSTRACT: Space flight is discussed, with reference to weightlessness, cosmic radiation, G-forces, and the new area of investigation, "exobiology".

147

Errebo-Knudsen, E.O., et al 1953 VERDENS-RUMMETS EROBRING (CONQUEST OF SPACE)
(Copenhagen: Reitzel, 1953)

148

Errebo-Knudsen, E.O. 1953 MENNESKELEGEMET OG RUMMET (THE HUMAN BODY AND SPACE) In: Errebo-Knudsen, E.O., et al, Verdens-rummets erobring (Conquest of Space) (Copenhagen: Reitzel). Pp. 51-67

149

Escanglon, E. 1950 SPACE-FLIGHT AND ITS CONNECTIONS WITH HUMAN PHYSIOLOGY Astronomie, 64:279-287. July/Aug. 1950.
Abst.: J. Brit. Interplan. Soc., 11:294.

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150

Farrer, Donald N. & Victor Bogo 1962 CHIMPANZEE PERFORMANCE DURING A SIMULATED THREE-DAY SPACE FLIGHT
(6571 st Aeromedical Research Lab, Holloman Air Force Base, New Mexico)
ARL-TDR-62-25 Project No. 6893, Task No. 689302 Dec. 1962

ABSTRACT: Chimpanzee performance during a simulated 97-hour space flight profile environment was evaluated with a pilot study and a crossover design. The response rate on the continuous avoidance task was significantly lower for one subject in the 100% O_2 environment, and both subjects performed at lower rates during night work sessions on all tests. There was no evidence of reaction time decrement for any subject on the discrete avoidance task. Food and water consumption was poor during the simulated space flight, but a chimpanzee could withstand a 97-hour flight profile environment of 100% O_2 at 14.7 psi for 15 hours followed by 100% O_2 at 5 psi, for 82 hours without serious performance changes.

151

Federov, E.K. 1962 THE DECISIVE STEP IN THE CONQUEST OF COSMIC SPACE
Science and Culture (Calcutta) 28(1): 11-14, Jan. 1962

ABSTRACT: Soviet space efforts preparatory to manned space flight included studies dealing with: (1) the conditions encountered during space flight (accelerations, temperature changes, weightlessness, radiations) and means of protecting the astronaut from their effects; (2) providing normal living conditions in the space cabin; and (3) medical selection techniques and training format for astronauts. The system devised for the constant medical supervision of both the pilot's health and working capacity in all stages of flight is discussed. Y.A. Gagarin's orbital flight (April 12, 1961) is briefly mentioned.

152

Fedorov, P. 1960 DOGS ADJUST QUICKLY TO FLIGHT
FBIS USSR & East Europe, Nr. 164, August 23, 1960

ABSTRACT: This article contains dogs reactions to weightlessness during their space flight on Sputnik V. (CARI)

153

Feltman Research and Engineering Labs., tr. Nov. 1959 ROCKET TECHNOLOGY AND SPACE RESEARCH. Raketentechnik und Raumfahrtforschung 3(2): Apr.-June 1959 (Feltman Research and Engineering Labs., Picatinny Arsenal, N.J., PA translation No. 61) ASTIA AD-228 967

CONTENTS:
Observations on the physiology of the senses during the transition from accelerationss to weightlessness
Graphic determination of the main influence parameters and preliminary design parameters of missiles
Further observations on the Russian earth satellites
Technical reports:
The Atlas-Carrier rocket for important space navigation projects
The first artificial planetoid Mechta
Earth satellite Vanguard II with infra-red detectors
Space probe Juno II
Book reviews:
On the thermodynamics of combustion processes
Aviation medicine

154

Fenno, R. M. 1954 MAN'S MILIEU IN SPACE (A SUMMARY OF THE PHYSIOLOGIC REQUIREMENTS OF MAN IN A SEALED CABIN) J. Avia. Med. 25(12):612-622, Dec. 1954
See also (School of Aviation Medicine, Randolph AFB, Texas) Epitome of Space Medicine, Item #26

ABSTRACT: It is clear at this time that more work should be done on all phases of sealed cabin acclimitization. It is recommended that pressurization of very high altitude aircraft cabins by superchargers or compressors be de-emphasized in favor of the sealed cabin approach, since pressurization is dependent upon the presence of an atmosphere, thereby limiting the flight of man in a pressurized cabin to that very narrow range of altitude in which a compressible and non-toxic atmosphere can be found. A self-sustaining "balanced aquaruim" in space should be the ultimate aim of those concerned with this problem. A possible solution lies in a chemical, mechanical, or photosynthetic gas exchanger or combination of these for the maintenance of our gaseous environment. (CARI)

155

Fenno, R. M. 1954 MAN'S MILIEU IN SPACE (A SUMMARY OF THE PHYSIOLOGIC REQUIREMENTS OF MAN IN A SEALED CABIN) In (School of Aviation Medicine, Randolph AFB, Texas) Epitome of Space Medicine, Item #26
See also J. Avia. Med. 25(12):612-622, Dec. 1954

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that very narrow range of altitude in which a compressible and non-toxic atmosphere can be found. A self-sustaining "balanced aquaruim" in space should be the ultimate aim of those concerned with this problem. A possible solution lies in a chemical, mechanical, or photosynthetic gas exchanger or combination of these for the maintenance of our gaseous environment. (CARI).

156

Finney, J. W. 1961 RUSSIANS CONFIRM TITOV WAS SEASICK: CONDITION LAID TO PROLONGED STATE OF WEIGHTLESSNESS. New York Times, Oct. 5, 1961, Sec. C, p. 8

ABSTRACT: Two Russian scientists confirmed the rumor that Maj. Gherman S. Titov felt seasick throughout most of his 25 hr. space flight in August, 1961. The sickness was attributed to prolonged weightlessness. There were indications during the weightless period of "a definite instability of central nervous system reactions." The astronaut experienced a feeling of disorientation and loss of balance normally supplied by the inner ear. The Russian scientists pointed out that the feeling of weightlessness can be removed by creating artificial gravity in the space ship. (CARI)

157

Fisher, A.C. 1955 AVIATION MEDICINE ON THE THRESHOLD OF SPACE
Journal of Aviation Medicine 26: 355
See also: Nat. Geog. Mag. 108(2): 241-278. Aug. 1955

ABSTRACT: A coverage of all aspects of space flight including acceleration, deceleration, and weightlessness.

158

Fisher, A.C., Jr. 1955 AVIATION MEDICINE ON THE THRESHOLD OF SPACE: SERVICE DOCTORS, FACING MEDICAL PROBLEMS UNKNOWN ON EARTH, MAKE POSSIBLE MAN'S EXPLORATION OF THE HOSTILE HEAVENS
The National Geographic Magazine 108(2): 241-278, August 1955

ABSTRACT: The author reports on his visits to several military and civilian institutions that work on research into the human factors of flight. He describes the effects of the centrifuge at Johnsville, Pennsylvania. Escape from aircraft ditched in water is a subject under investigation at Pensacola, Florida. The author discusses a weightless ride during his visit at Edward's Air Force Base, California. Heat resistant and pressure suits for pilots are under development at Wright-Patterson Air Force Base, Ohio, and at Randolph Air Force Base, Texas. Hyperventilation is another field of research at Randolph Air Force Base. Extreme acceleration and deceleration forces are the subject of a conversation between the author and Col. John P. Stapp. Pilot ejection and the effects of fatigue are being studied at Wright-Patterson Air Force Base. The article is very detailed about the research in all of the fields. (CARI)

159

Flaherty, B. E., D. E. Flinn, G. T. Hauty, & G. R. Steinkamp 1960 PSYCHIATRY AND SPACE FLIGHT. (USAF, School of Aviation Medicine, Aerospace Med. Ctr., Brooks AFB, Texas) Research Rept. 60-80, Sept. 1960 ; ASTIA AD-245 416

ABSTRACT: The stresses of altitude, acceleration and dynamic weightlessness, temperature, radiation and meteorites, day-night cycle, and emotional factors are discussed as they relate to the man-machine system and space flight. The reactions of four subjects to thirty-six hours of confinement in the School of Aviation Medicine Space Cabin Simulator are described. Two of the subjects successfully completed the flight despite having experienced perceptual aberrations. The psychiatric evaluation of the two subjects are presented. The effects of isolation and sensory deprivation are discussed as they relate to the experiments.

160

Flecker, J.F. 1958 MAN IN SPACE
Air Force, v. 41, no. 3, March 1958, pp. 109-117, 120-123

ABSTRACT: The series of psychological tests underwent by volunteer airman Donald G. Farrell in a U.S. Air Force space cabin mock-up , and the multi-g acceleration experiment carried out by Colonel John Stapp are the subjects reviewed by this author. The results of experiments indicate that proper training about weightlessness could enhance human performance during zero gravity. There is a discussion of the use of "highchairs" for seats, squeeze tubes for feeding, suction-cup shoes for walking, and a closed biological cycle system to meet oxygen requirements. Problems not yet solved include the hazards of cosmic radiation and meteorites and the psychological problem of the "feeling of detachment" on a space traveler. When the North American X-15 is launched in 1959, the pilots will be required to make quick decisions under zero gravity conditions. They will also be exposed to speeds of Mach 5 to Mach 7. Therefore, the flight should help solve various questions about space flight. The author states his ideas concerning space stations and trips to planets.

161

Flexman, R.E., L.M. Seale, & C. Henderson 1963 DEVELOPMENT AND TEST OF THE BELL ZERO-G BELT. (Aerospace Medical Division, 6570th Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio) Rept. No. AMRL-TDR-63-23, March 1963.

ABSTRACT: The assumption is made that a requirement exists for the development of a self-maneuvering system for orbital workers. Such a system will consist of a life support subsystem, maintenance equipment (tools), and a propulsion and control subsystem. This report discusses the general problem areas and specifically reports on the research, development, and testing of the Bell Zero-G Belt,

a research propulsion and control system for maneuvering a man in weightless environment. The flight tests of the belt took place on a large airbearing platform and in a C-131 cargo-type aircraft during zero-g trajectories. The equations of motion derived during the Bell Aerosystems Company sponsored development of the Small Rocket Lift Device (Rocket Belt) are also presented on the adequacy of the research model of a propulsion system and recommendations are made for additional research and development.

162

Flickinger, D. 1959 RESULTS OF ANIMAL INVESTIGATIONS IN SPACE VEHICLES TO DATE. (30th Annual Meeting Aeromed. Assoc., Los Angeles, Calif., April 27-29, 1959)

ABSTRACT: The material analyzed for this summary was contained in relatively few reports (literature dated 1949 through 1959), since the criteria set forth required that only those experiments be included which utilized rocket-engine thrust to propel the biopack into space equivalent atmospheres. This stipulation was made in order to provide pertinent data on not only the biological effects of the space environment itself but also those induced by the dynamic vehicular forces contained in the total flight. Three Russians (Galkin, et al., Bugrov, et al., and Chernov and Yakovlev) and three American (The Henry Group, Van der Wal and Young, and Army Navy Bioflight Project No. 1) reports of working groups are summarized, with major highlights abstracted in order of their date of publication.

163

Flickinger, D. 1959 ZERO GRAVITY EFFECTS LARGELY UNKNOWN
Aviation Week, v. 70, no. 1, Jan. 1959, pp. 35-39

ABSTRACT: Existing data on the ability of man to function usefully in the weightless state, and other bio-medical aspects of space flight are reviewed in this article. The physiological effects of weightlessness which are discussed include motion sickness, gastrointestinal problems, and skeletal muscle activity problems. The types of equipment needed for weightlessness include all manner of devices for simulators and trainers plus those for food storage and dispensing.

164

Flickinger, D. D. 1961 THE STATUS OF MAN'S ADVANCE ON THE VERTICAL FRONTIER. Lectures in Aerospace Medicine 16-20 January 1961.

165

Fridlender, G.O. 1959 A SYSTEM FOR DETERMINING THE PARAMETERS OF THE MOTION OF A BODY IN SPACE.
Trans. of Akademiy Nauk SSSR. Otdeleniye Teknicheskikh Nauk. Izvestiya: Energetika i Avtomatika, (6):108-117, 1959
(Joint Publications Research Service, Washington, D.C.)
JPRS 3323, 27 May 1960.

ABSTRACT: By using double integration of the error in the reading of the system, which is converted to the position of the optical system, the difficulty of weightlessness in the application of gyrosystems during movement in interplanetary space is bypassed. The method described allows the period of a system to be obtained which is less than the period of stability. It introduces into the system damping effects which prevent the system's being disturbed by the velocities which occur in geosystems.

166

Fukuda, K., T. Tokida, S. Aoki, & T. Takeuchi 1959 JURYOKU NO HENKA GA KINKIN-CHO NI OYOBOSU EIKYO (THE EFFECTS OF VARIATIONS IN GRAVITY ON THE MUSCLE TONE) Nihon Koku Igaku Shinri-Gakkai Kiroku (Tokyo) (Proceedings of the Japanese Society of Aviation Medicine and Psychology) No. 7, p. 3, May 1959

ABSTRACT: The effects of gravitational changes on the tonic labyrinthine reflex in animals were studied. Animals subjected to deceleration, free fall, and motion along a Keplerian trajectory were observed. The effects of an increase in the gravitational forces were studied employing linear and rotational acceleration. The results show that labyrinthine control neck muscle tonus is affected by changes in gravitational forces, and that the rotation and flexion reflex of the neck subsequent to unilateral labyrinthectomy is abolished under conditions of weightlessness (during free fall, Keplerian trajectory) to the point of being difficult to observe.

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Gagarin, Yu. 1961 MATERIAL ON FIRST COSMONAUT'S FLIGHT
FBIS USSR & East Europe, Nr. 72, April 14, 1961

ABSTRACT: The world's first cosmonaut, Maj. Yuriy Gagarin, in an interview with TASS told about himself and his flight into outer space on 12 April 1961. The Soviet cosmonaut said that when weightlessness set in, he felt excellent. It became easier to do everything. While in the state of weightlessness, I ate and drank and everything occurred just as it does here on Earth. I even worked in that condition--wrote, jotting down my observations--Gagarin says. I was convinced, Gagarin stressed, that weightlessness does not at all affect man's fitness for work. The transition from weightlessness to gravitation, to the appearance of the force of gravity, is smooth. (CARI)

168

Gagarin, Y, V. V. Parin, & H. Mielke 1962 GAGARIN, PARIN SPEAK ON GDR TELEVISION. FBIS USSR & East Europe, Nr. 73, April 13, 1962

ABSTRACT: Gagarin briefly discusses the problems of cosmic rays, nutrition during flight. He expresses his hope for the cooperation of all scientists in the research on space flights. Professor Parin discusses three main problems of space flights: length of time of space flights is becoming longer and thus requires a very complex closed ecological system; the danger of radiation; and the extended effect of weightlessness on man. (CARI)

169

Galkin, A.M., A.R. Kotova, A.V. Petrov, et al. 1958 ISSLEDOVANIIA ZHIZNEDEIATEL' NOSTI ZHIVOTNYKH PRI POLETAKH V GERMETICHESKIKH KABINAKH RAKET DO VYSTOY 212 KM (STUDIES ON VITAL FUNCTIONS OF ANIMALS DURING FLIGHTS IN HERMETIC CABINS OF ROCKETS UP TO 212 KM)

In: Preliminary Results of Scientific Researches on the First Soviet Artificial Earth Satellites and Rockets, Articles XIth, Section of IGY Program (Rockets and Satellites) No. 1 (Moscow, Academy of Sciences, 1958) Pp. 112-129. JPRS DC-288: 5-28

ABSTRACT: Medico-biological investigations during rocket flights into the atmosphere have been conducted systematically in the Soviet Union since 1949, for the purpose of studying shifts in certain physiological functions, behavior of the animals during flights, and any bodily changes as a result of the flights. In 1957, 14 dogs (only 5 dogs are listed, although some were flown 2 or 3 times) were flown in pairs (1 anaethetized, the other normal) in hermetically sealed biopacks on 7 distinct flights to altitudes of 62 to 130 miles. Pre- and post-flight examinations included blood, chest X-ray, EKG, blood pressure, respiration and pulse, urinalysis, temperature, and body weight. Blood pressure, pulse, and respiration were registered during 3-hr. training periods in the cabin and during centrifuge training. A telemetric control system registered the compartment shell temperature, thermoinsulating lining, and barometric pressure inside the cabin. Physiological functions were measured by means of pickoffs, amplifying units, automatic pressure devices, electric clocks, and automatic optical recording devices. Motion pictures were taken at intervals during flight. The state of the physiological functions was not successfully registered during all parts of the flight projectory, inasmuch as abrupt changes in the direction of action G-stresses interfered with instrument operation and caused sharp animal movements which were reflected in the quality of the recordings. Some data are illustrated, although data are cited for determining the extent of experimental successes. Conclusions were as follows: (1) The vitally necessary conditions were guaranteed by the hermetically sealed cabin. (2) Acute disorder in the physiological functions did not occur, and no postflight changes in behavior were observed. (3) The pulse and respiration rates and the blood pressure of the conscious animals increased during the active part of the flights. During the period of dynamic weightlessness the registered physiological parameters were maintained at a high level for the first two to three minutes, with a tendency to decrease. The physiological indices returned to their original level within 4 to 5 mins. after dynamic weightlessness had begun. In the anaesthetized animals, the pulse rate, respiration, and blood pressure did not differ from their original values during the period of weightlessness. (4) The recovery system guarantees safe landing, although additional work is necessary to insure stabilization and more favorable deceleration conditions during the nose sections' fall from altitudes of 200 km and higher.

170

Galkin et al. 1959 MEDICO-BIOLOGICAL RESEARCH IN ROCKETS: RESEARCH ON THE LIFE ACTIVITY OF ANIMALS DURING FLIGHTS IN HERMETICALLY SEALED CABINS OF ROCKETS UP TO A HEIGHT OF 212 KM: RESEARCH ON THE LIFE-ACTIVITY OF ANIMALS DURING FLIGHTS IN THE HERMETICALLY SEALED CABINS OF ROCKETS UP TO AN ALTITUDE OF 110 KM. Trans. of mono. Preliminary Results of Research by Means of the First Soviet Artificial Earth Satellites and Rockets (Moscow) p. 109-149. LC or SLA 59-22466

171

Gantz, K. F., ed. 1959 MAN IN SPACE: THE UNITED STATES AIR FORCE PROGRAM FOR DEVELOPING THE SPACECRAFT CREW (New York:, Duell, Sloan, and Pearce, 1959)

ABSTRACT: Contents include: "The Threshold of Space"; "From Aviation Medicine to Space Medicine"; "Basic Factors in Manned Space Operations"; "Biomedical Aspects of Space Flight"; "Biodynamics of Space Flight"; "The Engineered Environment of the Space Vehicle"; "Human Performance in Space"; "Weightlessness"; "Observations in High-Altitude, Sealed-Cabin Balloon Flight"; "Experimental Studies on the Conditioning of Man for Space Crews"; "Escape and Survival During Space Operations"; "Time Dilation and the Astronaut"; "The Spiral Toward Space": "Human Factors Support of the X-15 Program"; "The U. S. Air Force Human Factors Program"; "Blueprint for Space"; and "The Military Impact of Manned Space Operations."

172

Garbell, M.A. 1960 SOVIET RESEARCH ON GRAVITATION: AN ANALYSIS OF PUBLISHED LITERATURE. (Science and Technology Section, Air Information Division, Library of Congress, Washington, D.C.) Rept. No. AID 60-61, Oct. 1960. ASTIA AD 246 700.

ABSTRACT: A survey is given of Soviet research in the field of gravitation with a comparison of Soviet and Western research. The appendix contains a translation of K.P. Stanyukovich's "The Problem of the Physical Nature of Gravity." A correlation is included of Stanyukovich's public statements on weightlessness with views expressed by other Soviet scientists.

173

Gartmann, H. 1957 MAN UNLIMITED. (New York: Pantheon, 1957)

ABSTRACT: Provides information for the layman on some of the psychophysiological stresses man may expect in space flight.

174

Gaspa, P. 1953 PROBLEMES PHYSIOLOGIQUES POSES PAR L'ASTRONAUTIQUE (PHYSIOLOGICAL PROBLEMS POSED BY SPACE FLIGHT) Rev. path. gen. comp. 53:1485-1503

175

Gatland, K. W. 1952 DESIGN FOR ZERO G: A MAN CARRYING ROCKET FOR PHYSIOLOGICAL RESEARCH IN NEAR SPACE. Flight (London) 61:774-775, 779, June 27, 1952

ABSTRACT: The plans for a man-carrying rocket presented by R. A. Smith and H. E. Ross of Great Britain in 1946 are discussed. The rocket, which would be propelled by compressed air and alcohol, would have no tail fins. Its initial thrust would be 60,000 lb., its initial acceleration 9.8 ft/sec^2 (after 110 seconds, the effective acceleration would be 2 g). An automatic device would keep the rocket under control in case the pilot would black out. The essential feature of the missile would be its detachable cabin unit, jettisoned by an automatic compressed-air device shortly before peak altitude would be reached. The cabin would descend by parachute. While outside the effect of the gravitational pull of the earth, various degrees of 'weight' of the pilot may be attained by an axial spin imparted on the cabin by small peroxide-permanganate motors firing tangentially at right angles to its main axis. The range of the rocket has been calculated to be 200 miles, but 180-190 miles is considered the limit of safety. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space Medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag,

176

Gatland, K.W. 1954 PROGRESS TOWARDS ASTRONAUTICS. Journal of the British Interplanetary Society, 13(3):142-166, May 1954

ABSTRACT: Review of achievements and opinions recorded in 1949 and progress made by 1954; aerodynamic research techniques developed in United States; specific research aircraft described; design of pressure suits; human centrifuge; research in high atmosphere; guided missiles.

177

Gatland, K.W. 1956 EXPERIMENTS IN SPACE
Roy. Air Force Flying Rev. 12(3):24-26, Nov. 1956

ABSTRACT: The problems of "weightlessness" (zero gravity) and cosmic radiation which pilots of rocket aircraft will meet in flights outside the atmosphere; some details of American experiments with zero gravity; and description of artificial satellites to be launched in U.S. during the forthcoming International Geophysical Year (1957-58) which will gather data to help throw light on the problems connected with space flight. Diagram showing launching path of the satellites to be launched in 1957, and results of previous launchings.

178

Gatland, K. 1959 MAN INTO SPACE.
Royal Air Force Flying Rev., 14(9):23-25

ABSTRACT: Reviews United States and Russian achievements in space flight in putting animals into space (monkeys and mice in Aerobee rockets in 1952; white mice in Thor-Able rockets; Gordo, the squirrel-monkey, in a Jupiter nose-cone in 1958; and the dog, Laika, in Sputnik II in 1957). Reviews specifications for the payload of the projected Mercury capsule.

179

Gauer, O. H. and H. Haber 1950 MAN UNDER GRAVITY-FREE CONDITIONS. (In Dept. of the Air Force, German Aviation Medicine, World War II, Vol. I.) (Wash., D. C.: U. S. Govt. Printing Office, 1950) Pp. 641-644.

180

Gauer, O. H., & G. D. Zuidema, eds. 1961 GRAVITATIONAL STRESS IN AEROSPACE MEDICINE (Boston: Little, Brown, & Co., 1961)

CONTENTS:

Gauer, O. H., The Physiology of Acceleration,
Gauer, O. H., Historical Aspects of Gravitational Stress,
Gauer, O. H., Definitions: Magnitude, Direction, and Time Course of Accelerative Forces,
Gauer, O. H., The Hydrostatic Pressure,
Lawton, R. W., Arterial Blood Pressure Responses to Positive Acceleration in Animals,

Gauer, O. H., Blood Volume and Gravitational Stress,
Gauer, O. H., The Circulation in Man Under Gravitational Stress and in the Giraffe
Gauer, O. H., & E. W. Salzman, Reflex Responses of the Circulation,
Sieker, H. O., Effect of Acceleration on the Heart,
Gauer, O. H., & S. Bondurant, Effect of Acceleration on Respiration,
White, W. J., Visual Performance Under Gravitational Stress,
Brown, J. L., The Physiology of Acceleration-Performance,
Gauer, O. H., & G. D. Zuidema, The Physiology of Positive Acceleration,
Gauer, O. H., The Physiology of Negative Acceleration,
Edelberg, R., The physiology of Combined Accelerations,
Bondurant, S., Transverse G: Prolonged Forward, Backward, and Lateral Acceleration,
Hessberg, R. R., Escape from High Performance Aircraft,
Stapp, J. P., Human Tolerance to Severe, Abrupt Acceleration,
Simons, D. C., Sub-Gravity and Weightlessness,
Zuidema, G. D., Some Physiological Considerations of Space Flight,
Leverett, S. D., R. U. Whitney, & G. D. Zuidema, Clinical Evaluation of Low G Tolerance,
Gauer, O. H., The Hydrostatic Indifference Level,
Lawton, R. W., The Hydrostatic Pressure in the Arterial Tree,
Leverett, S. D., G. D. Zuidema, Standardization of Human Centrifuge Techniques,

181

Gaume, James G. 1962 PHYSIO-PATHOLOGIC IMPLICATIONS OF CHRONIC WEIGHTLESSNESS (Martin, Denver, Colorado) March 1962.

The effects of chronic weightlessness on the human body are the most difficult to evaluate of all the medical problems which man will encounter in space flight. Much research has been conducted on the effects of weightlessness, but all experiments to date have to do with acute effects, and it is not safe to extrapolate to chronic effects.

182

Gaume, J.G. 1962 THE BIOLOGICAL EFFECTS AND IMPLICATIONS OF WEIGHTLESSNESS (Martin Company, Denver Division) April 1962

ABSTRACT: This research report explores the effects and implications of weightlessness on the human body for extended periods. It cites past research on weightlessness and compares bed rest and water suspension with actual weightlessness in outer space. The document suggests carefully planned muscle exercises as a possible means of preventing ill effects caused to the body by long periods of weightlessness.

183

Gaume, J.G. & W. Kuehnegger 1962 EFFECTS OF CHRONIC LUNAR GRAVITY ON HUMAN PHYSIOLOGY
(Paper, American Rocket Society Lunar Missions Meeting, July 17-19, 1962, Cleveland, Ohio) ARS Paper No. 2469-62

ABSTRACT: Prolonged exposure of man to lunar gravity causes many physiological problems. This is a review of those problems and a proposal for determining the physical exercises in weightlessness. Suggestions are made for methods to approximate chronic weightlessness. One method is water suspension of the body for periods of more than one week. Another method is prolonged bed rest. During both of these conditions, physiological changes occur. For example, bones demineralize and both minerals and nitrogen are removed from the tissues and excreted through the kidneys. Therefore, it is important for a man in space to get exercise to maintain proper function and structural integrity of the subsystems of the body. The exercise must supplement the work/energy expenditure under the lunar activities and levels so that the sum of both will equal the work/energy expenditure on earth. The exercises must make up the daily energy balance per link and joint

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Gazenko, O.G. & V.B. Malkin 1960 BIOLOGIYA KOSMICHESKIKH POLETOV (BIOLOGY OF COSMIC FLIGHTS)
Nauka i zhian' 11: 17-22 (and p. 2 of centerfolds), 1958
See also: Aerospace Technical Intelligence Center, Wright-Patterson AFB, Ohio Trans. No. F-TS-9899, Oct. 1960 ASTIA AD 257 712

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Gazenko, O.G. & V.B. Malkin 1960 BIOLOGY OF COSMIC FLIGHTS (BIOLOGIYA KOSMICHESKIKH POLETOV)
(Aerospace Technical Intelligence Center, Wright-Patterson AFB, Ohio)
Trans. No. F-TS-9899, Oct. 1960 ASTIA AD 257 712
See also: Nauka i zhian' 11: 17-22 (and p. 2 of centerfolds), 1958

ABSTRACT: Tests with animals carried in rockets up to 110 km showed normal reactions, insofar as they withstood acceleration and retardation satisfactorily, and blood pressure, pulse, and breathing increased only slightly. At heights up to 212 km, especially unfavorable effects were noticed at re-entry of the rockets into the atmosphere. However, the problem of re-entry at 450 km has been solved. Soviet researchers are especially concerned with the problem of re-entry of passengers from space ships. Great difficulties have yet to be

overcome in solving re-entry at supersonic velocities. The effects of acceleration are being thoroughly studied, whereby it was found that acceleration of 10 G may be endured for several minutes. However, acceleration should be considerably lower than this to maintain operating ability. The authors describe the different operation of re-entry from a cosmic flight; catapulting of pressure cabin from the space ship, slowing down of descent by means of reactive drives and parachute, and finally landing of the cabin with a parachute

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Gazenko, O. G., & V. I. Yazdovskiy 1961 SOME RESULTS OF PHYSIOLOGICAL REACTIONS TO SPACE FLIGHT CONDITIONS. (Paper, XIIth International Astronautical Congress in Washington, D. C., Oct. 4, 1961)

ABSTRACT: In this discussion of the problems of overload and weightlessness, it is noted that a direct dependence of blood oxygenation on the rate of the blood stream testifies to the active participation of hemodynamics of pulmonary circulation in the oxygenation of the blood in the lungs. Thus, active rearrangement of pulmonary circulation can within certain limits insure the preservation of the necessary blood oxygenation level. However, in view of the apparent inequality of the volumes of blood ejected by the right and left ventricles, and taking into account the progressive storage of blood in the lungs, it is difficult to imagine the possibility of enduring increased gravitation for a lengthy period of time. In the study of the mechanisms of the action of overloads on the central nervous system, tests with aminazine as a means of blocking the impulsation at the level of the reticular formation of the middle brain offer promise. The differences in the frequency of pulse and breathing registered by Gagarin and Titov in centrifugal tests and during actual flight are attributed to emotional stress. With regard to weightlessness, the definite instability which has been indicated in the central apparatus which controls vegetative functions probably results from a change in the afferent impulses. Titov noted unpleasant sensations of vestibular character during the entire period of weightlessness. These require a careful analysis. (CARI)

187

Gazenko, O.G., N.N. Zhukov-Verezhnikov, & V. Ya Kop'yev 1962 TRANSLATIONS FROM NAUKA I ZHIZN' (MOSCOW) (SCIENCE AND LIFE), No. 9, SEPTEMBER 1962.

CONTENTS:

"Five Days Which Shook The World" O.G. Gazenko, Pp. 1-12.
"Biology and Flights To Outer Space" N.N. Zhukov-Verezhnikov & V.Ya Kop'yev (Acad. Med. Sci. USSR) Pp. 13-22

188

Gazenko, O.G. 1962 FIVE DAYS WHICH ELECTRIFIED THE WORLD
(Translation Services Branch, Foreign Technology Div., Wright-Patterson AFB, Ohio)
FTD-TT-62-1518/1+2 10 Dec. 1962. ASTIA AD 294 530
Original Source: Nauka i Zhizn', Nr. 9: 2-10. 1962.

ABSTRACT: The space flight of A. Nikolayeu and P. Popovich made possible the study of such principally important problems, as mans ability to work under coneitions of long lasting weightlessness, cooperation between cosmonauts, their communication with ground observation points and controlling the flight. The problems confronting the cosmonauts have been based on all this. They were required not only to live for several days under conditions of weightlessness, but also to be actively engaged in working operations under the new conditions and also to carry out a program of experimental, in particular medical-biological, investigations. This article describes the extent of the program and the type of functions carried out in the cabin of the ship

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Gazenko, O. 1962 SPACE BIOLOGY
Joint Publications Research Service, Washington, D.C. JPRS-16677
Transl. from Nedelya (Moscow), Aug. 5-11, 1962, p. 6-7

ABSTRACT: This article discusses the role of biology in the space sciences in terms of the effects of the space environment on living organisms, and of the methods for selecting and training the astronaut. The space environment problems covered are weightlessness, overloading, radiation, and psychological stresses. The importance of considering these psychological factors when selecting astronauts is considered, and methods of training under isolated conditions are described.

190

Gazenko, O.G. 1962 SOME PROBLEMS OF SPACE BIOLOGY
Akademiya nauk SSSR. Vestnik (Moskva) 32(1): 30-34, Jan. 1962

ABSTRACT: The General Assembly of the Otdeleniye biologicheskikh nauk Akademii nauk SSSR (Department of Biological Sciences of the Academy of Sciences USSR) met in Moscow in 1961 to discuss problems of space biology. Over 30 reports were made and three films shown. N.M. Sisakyan, V.V. Parin, V.N. Chernigovskiy, and V.I. Yazdovskiy reported on "Problems of Space Biology and Physiology." In the report "Some General Results of Medical and Biological Experiments on Cosmic Earth Satellites", O.G. Gazenko, A.M. Genin, and V.I. Yazdovskiy discussed the main results of the biological experiments. The following three main problems exist at present in space biology: (1) clarification of effect of extremum factors of space on living terrestrial organisms; (2) elaboration of the biological

fundamentals of safeguarding space flight; and life on other planets; (3) investigation of the conditions and forms of life beyond the earth. The factors of space flight affecting living organism may be divided into three groups: (1) overstrain, vibrations, engine noise, weightlessness; (2) ultraviolet, infrared, and visible ranges of radiation, ionizing radiation, concentration of gas and solid matter, temperature conditions, etc.; (3) insulation, restricted space, peculiarities of the microclimate, rhythm of life, nutrition, etc. The cosmonauts Yu. A. Gagarin and G.S. Titov are mentioned. Under the effect of weightlessness, the two Soviet cosmonauts felt a change of heart beat, dizziness, and sickness. The effect of overstrain and protective measures are serious problems. Perfection of biotelemetry is of great importance for the development of space biology. Lately, methods have been elaborated, permitting to study the coordination of arbitrary movements of man and the blood supply to the brain. (CARI)

191

Gebhart, B. 1962 RANDOM CONVECTION UNDER CONDITIONS OF WEIGHTLESSNESS AIAA Journal 1(2):380-384, Feb 1963

ABSTRACT: The nature of the transport process between a fluid and its enclosing surface is considered in the presence of random disturbances and, in particular, for conditions likely to prevail in space devices. The argument is developed that disturbances normally present in the motion of such devices may result in relatively effective transport mechnaisms. On the basis of assumptions regard ing the nuature of the disturbances and their mode of occurrence, a number of circumstances are analyzed. The resulting transport rates generally are much greater than would be calculated for the process that would be expected in the absence of all disturbances. (AUTHOR)

192

Bell, C. F. 1962 LONG TERM WEIGHTLESSNESS---ITS POSSIBLE EFFECT ON CELLULAR METABOLISM (Paper, 33rd Annual Meeting of the Aerospace Medical Assoc., Chalfonte-Haddon Hall, Atlantic City, N. J., April 9-12, 1962)

ABSTRACT: The effect of long-term weightlessness on the metabolic function of cell structures in man have been discussed by physiologists in a casual vein since the early concept of manned space flight. The major interest has been directed to the systemic effects of this stressor as related to its effect on the labyrinth, cardiovascular and skeletal systems. The author believes that there is a possibility of more subtle effects at the cell level which may result in cumulative damage to man in long-term weightlessness. He also believes that observing cells in a weightless state throughout their life cycle of 36 to 72

hours may reveal conclusively whether occult cell physiologic disturbance exists. Knowledge of the effect of weightlessness at the cell level will, if negative, render assurance of the ability of man to withstand long-term weightlessness. Positive evidence of disturbed cellular metabolic processes will influence space ship design. The author discusses methods of accomplishing this type of study and believes it is necessary to avoid mistakes in related design concepts that may prove extremely expensive in the future.

193

General Dynamics Corp. 1960 MAY-JULY PROGRESS REPORT FOR THE COMBINED LABORATORY AND AIRPLANE ZERO-G TEST PROGRAM
(General Dynamics Corp., Convair Astronautics Div., San Diego, Calif.)
August 1960

194

Gerathewohl, S.J. EFFECTS OF GRAVITY-FREE STATE
In: Schaefer, K.E., Ed. Environmental Effects on Consciousness, (The Macmillan Co., New York) pp. 73-85

ABSTRACT: The effects of weightlessness is the subject of this paper. Particular attention is focused on the physical aspects of zero-g; the human-factor aspect of weightlessness; and the ability to function in these states

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Gerathewohl, S. J. 1952 PHYSICS AND PSYCHOPHYSICS OF WEIGHTLESSNESS: VISUAL PERCEPTION. In (School of Aviation Medicine, Randolph AFB, Texas) Epitome of Space Medicine
See also J. Avia. Med. 23(8):373-395, Aug. 1952

ABSTRACT: This is a review of the various factors involved in the visual perception of space and an attempt to analyze the conditions of spatial orientation as they would obtain in the state of subgravity and zero gravity. The circulation of the blood would probably adjust easily to zero gravity, as it does to abnormal postures of the body. Spatial orientation normally relies on two sets of clues, visual and gravitational. Behavior in case of conflicting clues (e.g., the visual and gravitational conflict during various accelerations in flight or on the centrifuge) is discussed in some detail. Nystagmus and visual illusions (oculogravic and oculogyral effects) further interfere with man's control of his environment. The possible hazards of the transition from the gravity state to the gravity-free state are pointed out. A bibliography of 69 references is appended.

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Gerathewohl, S. J. 1952 PHYSICS AND PSYCHOPHYSICS OF WEIGHTLESSNESS: VISUAL PERCEPTION
J. of Aviation Medicine 23(4):373-395 August 1952

ABSTRACT: The rationale of this study was an investigation of the problem, whether and how visual perception will be affected during the transition of man in the sub-gravity and zero-gravity states. In considering the pertinent anatomical and physiological characteristics of the eye it can be concluded that reduction or entire lack of weight of the eyeball will not produce disturbing alterations of the intra-ocular pressure. On the other hand, there is a high probability that visual perception will be affected by psycho-physiological stimulations, which will occur at least during the transition period from the normal state of stimulation (1 g) into the state of weightlessness. It was demonstrated that the pattern of mechano-receptor stimulation will be decisively changed in the gravity-free state. When flying--and especially during blind flying--the mechano-receptor stimulations can be subliminal or subpressed, while the eye can take over the control of position and direction orientation without illusory disturbances. During the transition in the gravity-free state, however, the stimulation of the mechano-receptors is changed in such a way that visual illusions will occur.

197

Gerathewohl, S. 1953 ZUR FRANGE DER ORIENTIERUNG IM SCHWEREFREIEN ZUSTAND (ON THE PROBLEM OF ORIENTATION IN THE GRAVITY FREE STATE)
(In: Space Flight Problems; being a Complete Collection of all Lectures Held at the Fourth Astronautical Congress, Zurich, 1953 (Biel: Laubscher, 1953) pp. 189-195)
English Abstract: Military Surgeon 113: 342-343, 1953

ABSTRACT: The experiments on the problems of orientation during weightlessness are reviewed. Evidence of the disturbance of labyrinthine functioning is presented in the form of photographs of the mice during flights in a V-2 rocket and two Aerobee rockets. The mice with destroyed labyrinths were less confused and had better adaptive behavior than the ones with functioning labyrinths. During experimental flights or reduced gravity, two test pilots, S. Crossfield and C. Yeager, found no serious disturbances of orientation as long as visual reference was possible and the subject was strapped securely to his seat. According to the author, the Weber-Fechner law of the relation between the intensity of sensation and the strength of the stimulus may not hold for conditions of weightlessness.

198

Gerathewohl, S. J. 1953 SOME PROBLEMS OF ORIENTATION IN THE GRAVITY-FREE STATE.
Military Surgeon, 113 (4); 342-343

ABSTRACT: Zero gravity, such as a traveler in a rocket ship would experience in space, has been artificially produced in two series of experimental flights with jet aircraft. One group of flights was made by Test Pilot Burt Crossfield at Edwards Air Force Base, Calif., for the National Advisory Council on Aeronautics. The other was staged by personnel of the Aero Medical Laboratory at Wright-Patterson AFB, Ohio. In both, the weightless condition was achieved for periods up to 42 seconds by flying a predetermined trajectory at very high speed. No ill effects of any consequence were noted in either series of test runs. Pilot Crossfield remarked that 'it did feel unnatural' to be without weight. In some of his earlier trials he noted a sensation of 'befuddlement' which was later overcome. But the flyers found themselves on the whole undisturved by zero gravity. It is now considered unlikely by most aeromedical researchers that the suspension of gravity in space would do severe harm to the mind or body of the astronaut.

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Gerathewohl, S.J. 1954 DIE PSYCHOLOGIE DES MENSCHEN IM FLUGZEUG (THE PSYCHOLOGY OF MAN IN AN AIRPLANE
(Deutsche Aeronautische Gesellschaft e. V.(Munchen: J.A. Barth, 1954) 269 p. In German

ABSTRACT: This work examines the current knowledge of basic forms of perception and reaction, sensorimotor coordination, the means and limitation of integration of such complexity of stimuli as encountered in flight, as well as the effect of changes in motion, in altitude, in spatial relationship to earth, in velocity, in acceleration, and the effect of changed phenomenological space referents in respect to the individual. In the first chapter, the goal of aviation technology is viewed as striving towards a completely automatic operation and control of the aircraft, whereby man would participate only in emergency situations. The author discusses further the aerotechnical concept of man functioning as part of the servomechanism controlling the aircraft, the equipment and instrumentation of the airplane, and the importance of technical aptitude in the pilot, although such aptitude should not be overestimated. Sensory discrimination and reaction processes in flight, orientation as to the position and movement in space, "feel of the airplane", and subjective illusions in blind flying due to false sensory information are investiaged in the next chapter. The last chapter describes the chemistry and physics of the atmosphere, and discusses directional orientation in flight, navigation within and outside the atmosphere, the psychophysiology of high altitude flight, the thermal influence, the psychological effects of speed, the psychophysiology of acceleration, and safety measures.

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Gerathewohl, S. J. 1954 THE PECULIAR STATE OF WEIGHTLESSNESS.
In E. J. Kendricks, et al., "Medical Problems of Space Flight"
Reprint Instructors' Journal, Winter, 1954, Catalogued by ASTIA as AD-144 581
pp. 16-20

ABSTRACT: Weightlessness is a function of speed and trajectory, produced by the equilibrium of gravity and centrifugal force. Actual weight is the result of the gravitational tug of the earth's mass, drawing objects toward its center. Weightlessness is provided when the body moves in a so-called Keplerian trajectory or during a free-fall. Weightlessness can seriously affect the flyer's behavior and his orientation. Several German scientists first investigated the phenomena of weightlessness. Then the United States Air Force conducted several investigations on the same subject. Dr. James P. Henry and other researchers at Wright-Patterson Air Force conducted several experiments. They found that a labyrinth ectomized mouse was less disturbed by weightlessness than a normal mouse. Dr. H. J. H. von Beckh used both turtles and humans in his studies of weightlessness. He also found that the turtle with the damaged labyrinth behaved normally during weightlessness while the normal ones lost all sense of orientation. In both humans and turtles, von Beckh found that after several weightless sessions, the subjects regained their coordination and accuracy. (CARI)

201

Gerathewohl, S. 1954 UNTERSUCHUNGEN UBER SCHWERELOSIGKEIT AN VERSUCHSPERSONEN UND TIEREN WÄHREND DES LOTRACHEN STURZFLUGES (INVESTIGATIONS ON WEIGHTLESSNESS ON RESEARCH PERSONNEL AND ANIMALS DURING VERTICAL FLIGHT) In International Astronautical Federation, Space Flight Problems: Being a Complete Collection of All Lectures Held at the 4th Astronautical Congress, Zurich 1953 (Biel, Switzerland: Switzerland, Laubscher & Cie, 1954)

202

Gerathewohl, S.J. 1954 COMPARATIVE STUDIES ON ANIMALS AND HUMAN SUBJECTS IN THE GRAVITY-FREE STATE. In (USAF School of Aviation Medicine, Randolph AFB, Texas) Epitome of Space Medicine, Item 25
See also J. Aviation Med. 25(4):412-419, Aug. 1954.

ABSTRACT: This paper discusses the psychophysiological aspect of weightlessness These concern mainly the question whether the powers of orientation and sensorimotor coordiantion are disturbed under subgravitational conditions. (CARI)

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Gerathewohl, S.J. 1954 COMPARATIVE STUDIES ON ANIMALS AND HUMAN SUBJECTS IN THE GRAVITY-FREE STATE
J. Avia. Med. 25(4): 412-419, August 1954
Also: USAF School of Aviation Medicine, Randolph AFB, Texas, Epitome of Space Medicine, Item 25 (F)

ABSTRACT: The progress in the field of space medicine on the study of weightlessness during the past five years is the subject of this report.

SECOND ABSTRACT: This paper discusses the psychophysiological aspect of weightlessness. These concern mainly the question whether the powers of orientation and sensorimotor coordination are disturbed under subgravitational conditions. (CARI)

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Gerathewohl, S. J. 1955 THE PECULIAR STATE OF WEIGHTLESSNESS
In USAF School of Aviation Medicine, Randolph AFB, Texas, Epitome of Space Medicine, pp. 16-21
See also USAF Tng. Com. 5:290-296, 1954.

ABSTRACT: Weightlessness is a function of speed and trajectory, produced by the equilibrium of gravity and centrifugal force. Actual weight is the result of the gravitational tug of the earth's mass, drawing objects toward its center. Weightlessness is provided when the body moves in a so-called Keplerian trajectory or during a free-fall. Weightlessness can seriously affect the flyer's behavior and his orientation. Several German scientists first investigated the phenomena of weightlessness. Then the United States Air Force conducted several investigations on the same subject. Dr. James P. Henry and other researchers at Wright-Patterson Air Force conducted several experiments. They found that a labyrinth ectomized mouse was less disturbed by weightlessness than a normal mouse. Dr. H.J.H. von Beckh used both turtles and humans in his studies of weightlessness. He also found that the turtle with the damaged labyrinth behaved normally during weightlessness while the normal ones lost all sense of orientation. In both humans and turtles, von Beckh found that after several weightless sessions, the subjects regained their coordination and accuracy. (CARI)

205

Gerathewohl, S. J. 1956 PERSONAL EXPERIENCES DURING SHORT PERIODS OF WEIGHTLESSNESS REPORTED BY SIXTEEN SUBJECTS. Proc. International Astronautical Congress, VIIth (Rome, Sept. 12-22, 1956) Pp. 313-334
See also Astronautica acta (Wien) 2(4):203-217

ABSTRACT: A series of experiments on weightlessness was conducted using a Lockheed T-33 type aircraft for dives and parabola flights yielding practical weightlessness from 10 to 30 seconds duration. Records of the personal experiences of sixteen subjects during these states were obtained by interviews, pilot reports,

and written statements. The majority of subjects felt very comfortable during weightlessness; several subjects reported sensations of motion with no emotional involvement. A small group of subjects experienced discomfort, nausea, and severe symptoms of motion sickness. Tolerance to weightlessness is discussed with regard to space flight. It is theorized that individuals differ significantly as to their susceptibility to sub- and zero-gravity and their adaptability to weightlessness. If the right persons can be selected and adapted, some earlier concepts about artificial acceleration or "quasi-gravity" of space vehicles can be revised. (AUTHOR)

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Gerathewohl, S. J. 1956 PERSONAL EXPERIENCES DURING SHORT PERIODS OF WEIGHTLESSNESS REPORTED BY SIXTEEN SUBJECTS. Astronautica acta (Wien) 2(4):203-217
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ABSTRACT: A series of experiments on weightlessness was conducted using a Lockheed T-33 type aircraft for dives and parabola flights yielding practical weightlessness from 10 to 30 seconds duration. Records of the personal experiences of sixteen subjects during these states were obtained by interviews, pilot reports, and written statements. The majority of subjects felt very comfortable during weightlessness; several subjects reported sensations of motion with no emotional involvement. A small group of subjects experienced discomfort, nausea, and severe symptoms of motion sickness. Tolerance to weightlessness is discussed with regard to space flight. It is theorized that individuals differ significantly as to their susceptibility to sub- and zero-gravity and their adaptability to weightlessness. If the right persons can be selected and adapted, some earlier concepts about artificial acceleration or "quasi-gravity" of space vehicles can be revised. (AUTHOR)

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Gerathewohl, S. J. 1956 PERSONAL EXPERIENCES DURING SHORT PERIODS OF WEIGHTLESSNESS REPORTED BY 16 SUBJECTS. In (School of Aviation Medicine, Randolph AFB, Texas) Epitome of Space Medicine
See also Astronautica Acta 2:203-217, June 1956

ABSTRACT: A series of experiments on weightlessness was conducted using a Lockheed T-33 type aircraft for dives and parabola flights yielding practical weightlessness from 10 to 30 seconds duration. Records of the personal experiences of sixteen subjects during these states were obtained by interviews, pilot reports, and written statements.
RESULTS: The majority of our subjects felt very comfortable during weightlessness; several subjects reported sensations of motion with no emotional involvement. A small group of subjects experienced discomfort, nausea, and severe symptoms of motion sickness.

Tolerance to weightlessness is discussed with regard to space flight. It is theorized that individuals differ significantly as to their susceptibility to sub and zero-gravity and their adaptability to weightlessness. If the right persons can be selected and adapted, some earlier concepts about artificial acceleration or "quasi-gravity" of space vehicles can be revised. (AUTHOR)

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Gerathewohl, S.J.; H. Strughold, & H.D. Stallings 1957 SENSOMOTOR PERFORMANCE DURING WEIGHTLESSNESS: EYE-HAND COORDINATION. J. Aviation Med. 28(2):7-12. See also (USAF School of Aviation Medicine, Randolph AFB, Texas) Epitome of Space Medicine, Item 34 (F)

ABSTRACT: A series of experiments was performed to study sensomotor performance and adaptation during the weightless condition. Subgravity and zerogravity states were produced by flying dives at high altitudes in a T-33A type aircraft. The results of a simple aiming test obtained from seven subjects show that eye-hand coordination is moderately disturbed by increased or decreased acceleration. The subjects already adjusted to the situation during the first six exposures to weightlessness. (Author)

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Gerathewohl, S. J., H. Strughold, & H. D. Stallings 1957 SENSOMOTOR PERFORMANCE DURING WEIGHTLESSNESS: EYE-HAND COORDINATION. In (School of Aviation Medicine, Randolph AFB, Texas) Epitome of Space Medicine, Item 34 See also J. Avia. Med. 28(2):7-12, Feb. 1957

ABSTRACT: A series of experiments was performed to study sensomotor performance and adaptation during the weightless condition. Subgravity and zerogravity states were produced by flying dives at high altitudes in a T-33A type aircraft. The results of a simple aiming test obtained from seven subjects show that eye-hand coordination is moderately disturbed by increased or decreased acceleration. The subjects already adjusted to the situation during the first six exposures to weightlessness. (AUTHOR)

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Gerathewohl, S. J., & H. D. Stallings, Jr. 1957 LABYRINTHINE POSTURE REFLEX (RIGHTING REFLEX) IN THE CAT DURING WEIGHTLESSNESS. In (School of Aviation Medicine, Randolph AFB, Texas) Epitome of Space Medicine, Item 36
See also J. Avia. Med. 28:345-355, Aug. 1957

ABSTRACT: Experiments on the postural righting reflex were made using (1) four young kittens before the reflex was developed, and (2) four older kittens with the reflex well established. On the ground, the animals were dropped in upside-down position from an altitude of about twenty inches, and later in the air exposed to periods of about twenty to thirty seconds of practical weightlessness. The reflex was studied in T-33 and F-94 aircraft under both blindfold and non-blindfold conditions. The behavior of the cats was recorded on 16 mm. film. The motion pictures were evaluated by repeatedly watching the film, and by an anlysis of the individual frames. On the ground, the younger animals fell straight down; the older ones turned upright immediately after release without exception. In the air, the younger kittens floated upside-down during weightlessness; the older ones turned upright at the beginning of the weightless state, but their reflex failed after several exposures. By and large, it was observed that the postural righting reflex of the cat ceased to function after a period of about twenty seconds of practical weightlessness; and that the available visual cues did not affect essentially the reflex pattern. (AUTHOR)

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Gerathewohl, S.J., and H.D. Stallings 1957 THE LABYRINTHINE POSTURE REFLEX (RIGHTING REFLEX) IN THE CAT DURING WEIGHTLESSNESS.
J. Aviation Med. 28(4):345-355. Aug. 1957.

SUMMARY AND CONCLUSIONS: Experiments on the postural righting reflex were made using (1) four young kittens before the reflex was developed, and (2) four older kittens with the reflex well established. On the ground, the animals were dropped in upside-down position from an altitude of about twenty inches, and later in the air exposed to periods of about twenty to thirty seconds of practical weightlessness. The reflex was studied in T-33 and F-94 aircraft under both blind-fold and non-blindfold conditions. The behavior of the cats was recorded on 16 mm. film.

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Gerathewohl, S.J. 1957 PHYSIOLOGICAL AND PSYCHOLOGICAL TOLERANCE TO WEIGHTLESSNESS
(Paper, American Rocket Society Spring Meeting, April 4-6, 1958, Washington, D.C.)
Preprint No. 390-57

ABSTRACT: During flights in a Lockheed T-33 and F-94 aircraft, 47 subjects were

subjected to 10 to 40 seconds of weightlessness. There were many responses and a variability of the tolerance threshold to physiological and psychological effects. Twenty-two of the subjects enjoyed the weightless period and the author concluded that select personnel can be expected to function properly during weightlessness.

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Gerathewohl, S. 1957 PHYSIOLOGICAL AND PSYCHOLOGICAL TOLERANCE FOR SURVIVAL TO WEIGHTLESSNESS. (School of Aviation Medicine, Randolph AFB, Texas)

ABSTRACT: Experiments on weightlessness were conducted using a Lockheed T-33 and an F-94 type aircraft for parabolic flights yielding virtual weightlessness from 10 to 40 seconds. The responses of the 47 subjects were highly individualistic and indicated a great variability of the tolerance threshold to physiological and psychological effects. The findings suggest that 22 subjects enjoyed the short abaric condition, and that select personnel can be expected to function properly during prolonged exposure to weightlessness. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space Medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903; ASTIA AD-227 817; Feb. 1959)

214

Gerathewohl, S. J. 1957 WEIGHTLESSNESS
Astronautics 2(4):32-34, 74-75, Nov. 1957.

ABSTRACT: Discussion of the phenomenon and reports on experimental studies of weightlessness conducted at USAF School of Aviation Medicine.

215

Gerathewohl, T. 1957 SUBJECTIVE SENSATIONS DURING BRIEF PERIODS OF WEIGHTLESSNESS
Riv. Med. Aeronaut. 20(1) Jan. - Mar. 1957.

216

Gerathewohl, S. J., et al. 1957 PRODUCING THE WEIGHTLESS STATE IN JET AIRCRAFT. (School of Aviation Medicine, Randolph AFB, Texas) Rept. 57-143; August 1957; ASTIA AD-149 703
See also USAF School of Aviation Medicine, Randolph AFB, Texas, Epitome of Space Medicine, Item 10

ABSTRACT: Some simple arithmetic functions were used for computing duration, height, and angle of climb of flight parabolas for producing the weightless state in jet aircraft. The results, based upon certain flying characteristics of the T-33, F-94, and F-104, are in good agreement with the data obtained for the first two types of aircraft mentioned during actual zero-gravity maneuvers. Certain flying safety hazards were noticed in the T-33 but remedied through appropriate measures. The F-94C Starfire proved to be superior to the T-33 with regard to safety and duration of weightlessness obtained. If the F-104 were made available for aeromedical research, weightlessness could be produced for more than 1 minute. (AUTHOR)

217

Gerathewohl, S.J. 1958 PRODUCING THE WEIGHTLESS STATE IN JET AIRCRAFT
In: International Astronautical Congress, Proceedings of the VIIIth, 1957 (Wien: Springer-Verlag, 1958), pp. 533-542

ABSTRACT: In the conclusion it is stated that the pilot had flown all zero-gravity research flights at the School of Aviation Medicine and had experienced weightless 3 minutes each flight or a total of 11 hours with no apparent physiological effects.

218

Gerathewohl, S. J., & H. D. Stallings 1958 EXPERIMENTS DURING WEIGHTLESSNESS, A STUDY OF THE OCULO-AGRAVIC ILLUSION. (Paper, 29th Annual Meeting of the Aero Medical Association, March 24-26, 1958, Washington, D. C.) (School of Aviation Medicine, Randolph AFB, Texas) Rept. No. 58-105; ASTIA AD-203 801; July 1958
See also J. Aviation Med. 29(7):504-515

ABSTRACT: To investigate visual illusions during flight, an F-94C type aircraft was flown through various maneuvers. They included turns, pushovers, pullouts, and aileron rolls producing accelerations of different directions and magnitude, as well as short periods of weightlessness. The observer induced a strong visual after-image and described its apparent motion. Increase of acceleration was found to be associated with an apparent downward movement, and weightlessness with an apparent upward movement of the visual after-image. This latter phenomenon was called the oculo-agravic illusion. (AUTHOR)

219

Gerathewohl, S. J., & H. D. Stallings 1958 EXPERIMENTS DURING WEIGHTLESSNESS: A STUDY OF THE OCULO-AGRAVIC ILLUSION. J. Avia. Med. 29(7):504-516, July 1958

ABSTRACT: To investigate the phenomenon known as the "oculo-agravic illusion", an observer was placed in the rear seat of an F-94C type aircraft, which was then flown through various maneuvers including: turns, push-overs, pull-ups, and aileron rolls. These maneuvers produced accelerations of different directions and magnitudes. Parabolas and double parabolas were performed to produce short periods of weightlessness because the oculo-agravic illusion can be best observed in the zero-gravity state. The observers experienced strong visual after-images, and their descriptions of these after-images were recorded during the maneuver. By this means, the apparent motion and displacement of the after-images were correlated with their associated maneuver.

220

Gerathewohl, S. J., & H. D. Stallings 1958 EXPERIMENTS DURING WEIGHTLESSNESS A STUDY OF THE OCULO-AGRAVIC ILLUSION. (School of Aviation Medicine, Randolph AFB, Texas) Rept. 58 105, July 1958

ABSTRACT: To investigate visual illusions during flight with particular attention to conditions of sub- and zero-gravity, an F-94C type aircraft was flown through various maneuvers. They included turns, push-overs, pullouts, and aileron rolls producing accelerations of different directions and magnitude, as well as short periods of visual after-image and described its apparent motion. There were 15 reliable observers tested. Reports of apparent displacement were analyzed in terms of the condition that produced the illusion. The illusion connected with weightlessness (upward movement) was named the oculo-agravic illusion.

221

Gerathewohl, S.J. & J.E. Ward 1958 PSYCHOPHYSIOLOGIC AND MEDICAL STUDIES OF WEIGHTLESSNESS (Second International Symposium on the Physics and Medicine of the Atmosphere and Space, Randolph AFB, Texas) Nov. 1958

ABSTRACT: The characteristics of flight trajectories for eight types of vehicles to produce weightlessness of maximum duration are shown in Table I. Although over one minute of exposure can be obtained by high performance aircraft, this technique has some shortcomings.

222

Gerathewohl, S. J. 1958 WEIGHTLESSNESS: THE PROBLEM AND THE AIR FORCE RESEARCH PROGRAM. Air University Quarterly Review 10(2):121-141, Summer, 1958

ABSTRACT: Includes table on responses of 47 human subjects to short periods of virtual weightlessness and discussion of psychological aspects.

223

Gerathewohl, S. J. 1958 EFFECTS OF GRAVITY-FREE STATE (1st International Symposium on Submarine and Space Medicine, U. S. Naval Submarine Base, New London, Conn., Sept. 8-12, 1958)

224

Gerathewohl, S.J. and G.R. Steinkamp 1958 HUMAN FACTORS REQUIREMENTS FOR PUTTING A MAN INTO ORBIT. In Hecht, F., ed. IXth International Astronautical Congress, Proceedings, 1958. (Vienna: Springer Verlag, 1959)

225

Gerathewohl, S. J. 1959 WEIGHTLESSNESS In Gantz, K. J., ed., Man in Space (New York: Duell, Sloan, & Pierce, 1959) Chapter 8

226

Gerathewohl, S.J. 1959 PSYCHOLOGICAL PROBLEMS OF SELECTION, HOLDING, AND CARE OF SPACE FLIERS. (Army Medical Services, Research and Development Command) Reports control symbol CSCRD-16-4, 13 Nov. 1959.

ABSTRACT: The psychological requirements for the selection, holding, and care of space fliers is investigated. The selection methods are scrutinized as to their validity and applicability to the problem. Examples of related activities are presented. The main purpose of the preparations must be to establish a natural pattern of conditioning and familiarization, to develop skill and abilities parallel to the development of the hardware, and to maintain the interest and motivation of the astronaut. (Author)

227

Gerathewohl, S.J., & G.R. Steinkamp 1959 HUMAN FACTORS REQUIREMENTS FOR PUTTING A MAN IN ORBIT. Astro. Acta 5:73-84

ABSTRACT: Man's survival and operational capability in an artificial earth satellite depend primarily on the reliability and accuracy of the launching, guidance and recovery operations on the one hand, and on the perfection of his engineered environment, on the other. Although the human organism is more sensitive and vulnerable than that of man other creatures, his greater versatility and higher intelligence assure his survival under new and threatening circumstances. If a physiologically habitable environment is created, and if its functions during orbiting are secured, the human passenger can withstand the stresses involved in manned satellite operations of a limited duration.

228

Gerathewohl, S. J. 1959 SURVIVAL IN SPACE.
Space Journal, March-May 1959

229

Gerathewohl, S. J. 1959 EQUIPMENT FOR MANNED SPACE CAPSULES AND LUNAR BASES.
(Army Medical Research Labs., Bioastronautics Research Unit, Ft. Knox, Ky.)
Special Rept. 28 Feb. 1959

ABSTRACT: The construction of second and third generation boosters developing several million pounds of thrust leads by necessity to manned space flight. This not only requires the advancement of engineering capabilities and space technology, but also demands an acceleration of bioastronautical research and the projection of information already available into the region of outer space. Equip ment variables which are thought to be significant for man's exploration and survival in space are discussed in this first report, and sets of research task necessary for the accomplishment of manned space missions are proposed.

230

Gerathewohl, S.J. 1960 PERSONAL EXPERIENCES DURING SHORT PERIODS OF WEIGHTLESSNESS IN JET AIRCRAFT AND ON THE SUBGRAVITY TOWER
(Paper, Symposium on Motion Sickness in Weightlessness Research, March 1960, Wright-Patterson AFB, Ohio)

231

Gerathewohl, S. J., S. W. Downs, Jr., et al. 1960 BIO-TELEMETRY IN THE NOSE CONES OF THE U. S. ARMY JUPITER MISSILES. Reprint: IRE Trans. MIL-4:288-302 April-July 1960

ABSTRACT: The primary objective of the bio-flights was to demonstrate that animals can survive ballistic flights unharmed, if an adequate life support is provided. The secondary aim was to design, construct and test such a system, to develop countdown and launching procedures, and to recover the specimen after flight. Technical and scientific information on the physiologic and behavior status of the animal was to be gained thru telemetry. Although the first animal was lost, valuable data were obtained on the functioning of the bio-package during flight. They served to improve the second experiment, which added substantially to the understanding of the biomedical requirements for space flight. Able and Baker were the first primates recovered unharmed from an operational IRBM nose cone after reentering the earth's atmosphere. (AUTHORS)

232

Gerathewohl, S.J. 1960 RECENT EXPERIMENTS ON SUBGRAVITY AND ZERO-G STRESS (Paper, 31st Annual Meeting, Aerospace Medical Association, May 1960, Miami Beach, Fla)

ABSTRACT: Subgravity and zero-G have long been considered an unfavorable environmental condition. For about one decade, several experimenters in this country and abroad have studied the stress as involved in actual and simulated weightlessness on both animals and man. Since weightlessness actually produces a stressless situation, the immersion method has attracted special attention. In this case, no particular surface area has to carry the weight of the body, and the internal stress forces seem to be minimized. Moreover, the remaining stress within the body is isotropic, if the difference in hydrostatic pressure remains small. All this is true within certain limits for the homogenous and non-sensoric part of the organism. Gravity and acceleration changes directly act upon the specific gravireceptors. Stimulation of the vestibular system by angular acceleration will not occur in flight parabolas and orbits, if the subject is at rest, since the rotation of a vehicle around its y-axis does not produce vestibular Coriolis effects. Only rotations of the unrestrained subjects cause extreme disorientation after a few revolutions which, in fact, border on severe cases of vertigo, at times. However with a visual frame of reference and experience in unrestrained floating, moving, and performing, the weightless condition does not appear to be a serious obstacle to space flight.

233

Gerathewohl, S. J., & J. E. Ward 1960 PSYCHOPHYSIOLOGIC AND MEDICAL STUDIES OF WEIGHTLESSNESS. In Benson, O. O., & H. Strughold, eds., Physics and Medicine of the Atmosphere and Space (Proceedings of the Second International Symposium on the Physics and Medicine of the Atmosphere and Space, held at San Antonio, Texas, November 10, 11, and 12, 1959, sponsored by the School of Aviation Medicine, Aerospace Medical Center (ATC) Brooks AFB, Texas) (New York: John Wiley & Sons, 1960) Chapter 26, pp. 422-434

ABSTRACT: Reports study of group of 46 men and one woman for weightlessness tolerance at the USAF School of Aviation Medicine. Tabular account of results with psychological reactions.

234

Gerathewohl, S. J. 1961 ZERO-G DEVICES AND WEIGHTLESSNESS SIMULATORS. (National Academy of Sciences, National Research Council, Washington, D. C.) Publication No. 781; Library of Congress Catalog Card No. 60-60044

ABSTRACT: This report concerns the devices, methods, and techniques which have been used for the investigation of the effects of zero-G and weightlessness by many investigators. The report is not a scientific treatise of the problem of weightlessness and the effect of sub- and zero- gravity upon the organism, but rather a description of research equipment techniques.

SECOND ABSTRACT: Concerns the devices, methods, and techniques, which have been used for the investigation of the effects of zero-G and weightlessness by many investigators. Part I deals with devices which can be used for producing sub- and zero- gravity, viz., vertical-motion devices, aircraft, and ballistic missiles. A simple-mathematical treatment of the physical parameters involved in sub- and zero-G conditions precedes the discussion of each of these three methods. In Part II, instruments and techniques for the simulation of weightlessness are described. The objective of this survey is to assure maximum usefulness of such devices and optimum cooperation between agencies and to guarantee that new requirements of the future be incorporated in research proposals on bioastronautics.

235

Gerathewohl, S. J. 1962 EFFECT OF GRAVITY-FREE STATE In Schaefer, K. E., ed., Environmental Effects on Consciousness. (New York: The MacMillan Co., 1962) Library of Congress Catalog Card No. 61-9079, pp. 73-85

ABSTRACT: The effect of the gravity-free state on the organism has been the subject of theoretical speculation ever since the pioneers of rocketry opened the door to space flight. However, only during the last decade were the means available to study the problem experimentally. Scientists of various countries, particularly in the United States and Russia, applied ingenious methods of producing

the gravity-free state for biological research. The purpose of this paper is to survey the present state of the art, and to draw some conclusions about the effects of weightlessness.
This survey tries to focus the three critical problem areas given in Table 1. They concern (1) the physical aspect of zero-G; (2) the human-factor aspect of weightlessness; and (3) the operational implications of these states. Although this table is neither exhaustive nor complete, it is shown here because it summarizes the main subjects of research. (AUTHOR)

236

Gerathewohl, S.J. & B.E. Gernandt 1962 PHYSIOLOGICAL AND BEHAVIORAL SCIENCES
In: National Aeronautics & Space Administration, Wash, D.C.: Bioastronautics
NASA SP-18, Dec. 1962

ABSTRACT: The bioastronautical program of the National Aeronautics and Space Administration is based on the classical disciplines of the life sciences as major areas of research. Since man is a terrestrial organism, he has been studied almost entirely under this aspect. However, with his entry into extraterrestrial space, new conditions arise which warrant intensive investigation. Generally, the physiologic research concerns the fundamental bases of human functions, the determination of man's tolerances, and his protection against stressful alterations of his biological homeostasis. The behavioral studies mainly deals with man's performance capabilities and limitations under normal and extreme conditions In accordance with NASA's mission, the work in these areas is primarily applied and supporting in nature; but there is also a need for basic research. The scope of these investigations reached from such academic problems as biologic pattern formation and localization at the cellular level to the practical application of cybernetic principles for the monitoring of the organism and the complex systems, communication and information theory, and orientation and navigation processes in animal and man. Also included in this program is the blending of the disciplines of biology and physics in such fields as biotechnology and bionics, which are aimed at the development of improved techniques and instruments as well as of the acquisition of new information. The requirements of man in space necessitate those research efforts, which will result in design criteria for various types of equipment, protective devices, life support systems, communication channels, displays, and controls for space flight and planetary explorations. However, in many ways is the life scientist not yet in a position to inform the engineer, which conditions he must produce in order to accommodate the man or what systems must be made available for his protection. This paper will describe some of the NASA's efforts to answer this question. The bioastronautics program of the NASA will cover a much wider range of subjects in which the universities can play a major role. (Author)

237

Gil'bert, L. 1961 BEFORE A MANNED FLIGHT
Znaniye-Sila (Moscow) 10:6-8
(Air Force Systems Command, Foreign Tech. Div., Wright-Patterson AFB, Ohio)
Trans. No. MCL-1280/1; 17 Aug. 1961; ASTIA AD-269 651

ABSTRACT: A discussion is presented of the effects of g-forces, (acceleration and deceleration), and of weightlessness.

238

Gillings, W.H. 1950 THE EFFECTS OF INTERPLANETARY FLIGHT Brit. Interplan. Soc. J 9:105-107, May 1950

239

Golikov, A. & N. Smirnov 1960 INTERSTELLAR TRAVELLERS
(Air Information Division, Wright-Patterson AFB, Ohio) AID Rept. No. 61-72
ASTIA AD 260 501
Original Source: Ogonek 35: 2

240

Golikov, A. & N. Smirnov 1960 FOUR-LEGGED ASTRONAUTS
(Air Information Division, Wright-Patterson AFB, Ohio) AID Rept. No. 61-72
ASTIA AD 260 501
Original Source: Ogonek 49: 2

241

Goodman, B. D. 1961 THE PSYCHOLOGICAL AND SOCIAL PROBLEMS OF MAN IN SPACE: A LITERATURE SURVEY
(System Development Corporation, 2500 Colorado Ave., Santa Monica, Calif.) Field Note 5220, March 2, 1961 ASTIA AD 252 434.

ABSTRACT: What type of man will be able to endure the silence and loneliness of space, with no human voice to speak to him, no human ear to listen? What type of man can remain alert and maintain his performance, removed from ordinary sensory stimuli, enclosed in the cramped quarters of a space capsule as it leaves the earth and all that is familiar?

A review of space literature shows that the primary emphasis in research has been on engineering--designing the space vehicle to get man into space, and providing the proper closed ecological system, the necessary controls, displays, and equipment to make it possible for him to survive there. This phase of research has involved studying man and his physiological needs, and analyzing human tolerances to environment variances. An accompanying, but less emphasized phase has been concerned with the study of the psychological and social problems of man in space.

It is the purpose of this bibliography to bring together the reports, books, and periodical articles published through January 1961 in the specific area of behavioral science related to space flight, or as it is sometimes called "space psychology." This area includes social and sensory isolation, psychological assessment and training, fatigue, confinement, performance under stress, work schedules, motivation, weightlessness, disorientation, emotional stability, and the day-night cycle.

Citations listed are unclassified unless otherwise noted. All titles are unclassified. To facilitate ordering items listed in the Technical Abstract Bulletin (TAB) of the Armed Services Technical Information Agency, ASTIA documents (AD) numbers have been given when available.

242

Goodman, B.D. 1961 PSYCHOLOGICAL AND SOCIAL PROBLEMS OF MAN IN SPACE - A LITERATURE SURVEY
American Rocket Society Journal 31(7): 863-872, July 1961

ABSTRACT: What type of man will be able to endure for months or even years the vast silence and loneliness of space, far removed from the sounds and sights of his natural environments? What type of man can remain alert and maintain his performance, deprived of ordinary sensory stimuli, enclosed in the cramped quarters of a space capsule as it leaves Earth and all that is familiar? It is the purpose of this bibliography to bring together the reports, books, and periodical articles published thru the early part of 1961 dealing with the specific area of behavioral science related to space flight, or as it is sometimes called "space psychology." This area includes problems of confinement, isolation, sensory deprivation, weightlessness, psychological assessment and training, motivation and morale, emotional stability, boredom and fatigue, performance under stress, and work load. (Author)

243

Gougerot, L. 1952 WILL MAN BE ABLE TO LIVE ON BOARD A SPACE SHIP?
Science et Vie, Special Astronautical Issue, 116-133

244

Gourgerot, L. 1953 LOI DE WEBER-FECHNER ET VARIATIONS DE LA PESANTEUR APPARENTE (The Weber-Fechner Law and Variations of Apparent Weight) Med. aeronaut. (Paris), 8:119-125.

245

Grandpierre, F.A.F. 1959 ETAT ACTUEL DES RECHERCHES ET ETUDE CRITIQUE DES TROUBLES PHYSIOLOGIQUES POUVANT APPAITRE AU COURS DES ETATS DE SUBGRAVITE (THE PRESENT STATE OF RESEARCH STUDIES OF PHYSIOLOGICAL PROBLEMS DURING THE STATE OF SUBGRAVITY) 2nd World and 4th European Congress on Aviation and Space Medicine, Rome, Italy, 27-31 October, 1959

246

Grandpierre, R., F. Biolette, R. Loubiere & G. Chatelier 1960 PHYSIOLOGIE DU VOL SPATIAL (Physiology of Space Flight)
Forces aeriennes francaises 14(159): 789-823, May 1960 and 14(160): 969-986, June 1960.

ABSTRACT: The following subjects are reviewed: Acceleration and deceleration tolerances, weightlessness, radiation, prolonged life in a space cabin, oxygen regeneration, utilization of urine and collection of water vapor, and the nutritional requirements of astronauts. (Aerospace Medicine 31(10): 873, October 1960)

247

Grandpierre, R., R. Angiboust, G. Chatelier and L. Leitner 1962 THE EFFECTS OF THE ABSENCE OF WEIGHT ON THE ELECTRICAL ACTIVITY OF THE CENTRAL NERVOUS SYSTEM OF THE RAT.
In C. R. Soc. Biol. (Paris) 156:121-122, 1962

248

Grant, L.J. 1956 LIFE UNDER LOW GRAVITY CONDITIONS.
J. Space Flight 8(8):3-5. Oct. 1956.

ABSTRACT: The low-gravity conditions which will be encountered on space flights, e.g., to the moon, present different problems from those associated with zero gravity. First, the dichotomy between mass and weight, nonexistent on the earth, has serious implications for the construction of space suits for exploration on

the moon, locomotion of the explorers, and transportation on the moon surface. If low gravity is accompanied by low pressure it will cause an increase in capillary siphonage, evaporation problems due to high vapor pressure and low boiling point, a high rate of evaporation, and poor sound conduction. Several prophylactic measures are suggested to counteract muscular atrophy during a long-term stay at low gravity.

249

Grantham, W.D. EFFECTS OF MASS-LOADING VARIATIONS AND APPLIED MOMENTS ON MOTION AND CONTROL OF A MANNED ROTATING SPACE VEHICLE. (National Aeronautics and Space Administration, Washington, D.C.) Technical note D-803; ASTIA AD- 255 528; May 1961

ABSTRACT: An analytical study has been made to determine the effects of mass-loading variations on a hypothetical earth-satellite space station, rotating to provide an artificial gravity. Results indicate that the shifting of masses within the rotating craft could bring about large oscillations in the attitude angles and in some cases the craft could even diverge about an axis other than the axis of initial rotation. Constant-rate inertia wheels and jet-reaction moments can be used to minimize the undesirable motions. (Author)

250

Graveline, D. E., & B. Balke 1960 THE PHYSIOLOGIC EFFECTS OF HYPODYNAMICS INDUCED BY WATER IMMERSION. (School of Aviation Medicine, Brooks AFB, Texas) Research Rept. 60-88; ASTIA AD-247 163; Sept. 1960

ABSTRACT: Body immersion in water was used to produce an experimental situation in which the normal weight sensation was altered and in which slow movements were effortless. The hypodynamic effects of such immersion on orthostatic tolerance, on cardio-respiratory adaptability to physical stress, and on other biologic and psychophysiologic parameters were studied on one human subject in experiments of 2 and 7 days duration, respectively. Pronounced functional deterioration resulted from the hypodynamic situation in both experiments; cardiovascular reflexes were severely disturbed and muscular tone was diminished. The extensive biochemical studies on blood and urine showed marked deviations from the normal. Psychomotor effectiveness, tested on a complex systems task, was impaired noticeably. The need for sleep appeared to be markedly reduced during the periods of water immersion.
This area of research is vital to the man-in-space program. Weightless or near-weightless conditions in space flight are expected to produce a similar hypodynamic effect on the organism as was caused by water immersion. Such loss of functional reserves may severely interfere with the astronaut's capability to adjust adequately to returning gravitational forces. (AUTHOR)

251

Graveline, D.E. 1961 MAINTENANCE OF CARDIOVASCULAR ADAPTABILITY DURING PROLONGED WEIGHTLESSNESS
(Air Force Systems Command, Aeronautical Systems Div., Biomedical Lab., Wright-Patterson AFB, Ohio) Project 7222, Report No. TR 61-707, Task 722201, Dec. 1961. ASTIA AD 273 605

ABSTRACT: During zero gravity, special techniques must be used to help the astronaut maintain cardiovascular adaptability and provide optimum tolerance during reentry. An experiment has been completed using an arrangement that would initiate compensatory cardiovascular reflexes much like those initiated by the hydrostatic pressure effects of standing. The experiment used multiple tourniquet arrangements to intermittently obstruct venous return from the periphery. Subjects were first immersed for six hours with no protection. Later, the same subjects were immersed for five hours with protection. During both tests, the orthostatic tolerance of the subjects was recorded and compared. In all subjects, the tourniquet arrangement maintained average or above average cardiovascular adaptability

252

Graveline, D. E., & G. W. Barnard 1961 PHYSIOLOGIC EFFECTS OF A HYPODYNAMIC ENVIRONMENT SHORT TERM STUDIES. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 61-257; ASTIA AD-262 992; March 1961
See also Aerospace Medicine 32(8):726-736, Aug. 1961
ABSTRACT: By a technique involving complete immersion in water, a hypodynamic situation was produced in which normal weight sensations were altered and movement was relatively effortless. Four subjects were evaluated after 6, 12, and 24 hours of this environment. Tilt table, centrifuge, and heat chamber studies demonstrated significant cardiovascular deterioration even after the 6-hour runs, becoming more severe with the 12- and 24-hour experiments. Pertinent psychomotor evaluations, anthropometric measures, and urine and blood studies also were done. The results of this study indicate that the cardiovascular adaptation to a hypodynamic environment of this type occurs early and the deterioration from even a 6-hour exposure is apparent. (AUTHOR)

253

Graveline, D. E. & M. M. Jackson 1961 DIURESIS ASSOCIATED WITH PROLONGED WATER IMMERSION. Report on Biophysics of Flight. (Aerospace Medical Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio) ASD TR 61-651, December 1961. ASTIA Doc. No. AD-273 201.

ABSTRACT: Utilizing complete water immersion, balanced respiration, and unrestricted activity, the diuretic response of five human subjects to 6-hour periods in this environment was studied. The results indicate that the low specific gravity diuresis which occurs in this situation is of the water-diuresis type, with decreased urinary concentrations of sodium, potassium, urea, and creatinine. (Author)

254

Graveline, D. E., & G. W. Barnard 1961 PHYSIOLOGIC EFFECTS OF A HYPODYNAMIC ENVIRONMENT SHORT TERM STUDIES. Aerospace Medicine 32(8):726-736, Aug. 1961
See also (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 61-257; ASTIA AD-262 992; March 1961

ABSTRACT: By a technique involving complete immersion in water, a hypodynamic situation was produced in which normal weight sensations were altered and movement was relatively effortless. Four subjects were evaluated after 6, 12, and 24 hours of this environment. Tilt table, centrifuge, and heat chamber studies demonstrated significant cardiovascular deterioration even after the 6-hour runs, becoming more severe with the 12- and 24-hour experiments. Pertinent psychomotor evaluations, anthropometric measures, and urine and blood studies also were done. The results of this study indicate that the cardiovascular adaptation to a hypodynamic environment of this type occurs early and the deterioration from even a 6-hour exposure is apparent. (AUTHOR)

255

Graveline, D. E. 1961 EFFECTS OF POSTURE ON CARDIOVASCULAR CHANGES INDUCED BY PROLONGED WATER IMMERSION. Rept. for Mar-May 61, on Biophysics of Flight. (Aerospace Medical Lab., Aeronautical Systems Div., Wright-Patterson AFB, Ohio) ASD TR 61-563, October 1961. ASTIA Doc. No. AD-270 869.

ABSTRACT: Previous hypodynamic research using water-immersion techniques was done with the subjects in a semi-reclining position. To evaluate the possible influences of posture and negative immobilization on the cardiovascular deterioration associated with prolonged water immersion, a technique was employed which allowed complete freedom of activity, position, and attitude. Five subjects were evaluated for functional change after 6 hours in this environment. The results indicate that postural factors play an insignificant role in the mechanism of cardiovascular alteration induced by water immersion. (Author)

256

Graveline, D. E., B. Balke, R. E. McKenzie, & B. Hartman 1961 PSYCHOBIOLOGIC EFFECTS OF WATER-IMMERSION-INDUCED HYPODYNAMICS Aerospace Medicine 32(5): 387-400, May 1961

ABSTRACT: A weightless environment in which movement was effortless was produced by whole body immersion in water. One subject was immersed for seven days. The data collected during that time indicated that serious functional impairment was

a result of immersion. The urine showed significant changes and there was a gross disruption of psychomotor effectiveness. In conclusion, the author states that during weightlessness in space flight the organism may undergo critical deconditioning which will attenuate his tolerance for re-entry stress and the normal gravitational environment.

257

Graveline, D.E. 1962 MAINTENANCE OF CARDIOVASCULAR ADAPTABILITY DURING PROLONGED WEIGHTLESSNESS
Paper: 33rd Annual Meeting of the Aerospace Medical Association, Chalfonte-Haddon Hall, Atlantic City, N.J., April 9-12, 1962

ABSTRACT: It is expected that during prolonged zero gravity because of the absence of hydrostatic pressure influences, special techniques will be necessary to maintain cardiovascular adaptability and provide the orbiting astronaut with optimum tolerance for re-entry stresses. The author has devised a multiple tourniquet approach to intermittently obstruct venous return from the periphery, simulating the hydrostatic pressure effects of standing and thereby "triggering" compensatory cardiovascular reflexes. Following 6-hour periods of water immersion with tourniquet protection, the orthostatic tolerance of 5 subjects was determined and compared with that obtained following previous 6-hour immersion tests with no protection. The results are presented and discussed.

258

Graveline, D. E., & M. McCally 1962 BODY FLUID DISTRIBUTION: IMPLICATIONS FOR ZERO GRAVITY. Aerospace Medicine 33(11):1281-1290, Nov. 1962

SUMMARY: In a weightless environment hydrostatic pressure effects are eliminated. In the situation of recumbency in which hydrostatic pressure influences are minimized by the horizontal position, significant redistribution of body fluids occurs. In recumbency blood volume initially increases and is redistributed cephalad with increased intrathoracic filling. Atrial volume receptors are presumably stimulated reflexly inhibiting the release of ADH, causing a water diuresis. Renal blood flow is augmented and glomerular filtration is increased. The urine excreted in this circumstance is characterized by decreased osmolarity and by decreased concentration but increased output of sodium, potassium and urea. This response appears to be directly related to hydrostatic pressure influences and suggests the possibility that in a weightless state significant redistribution of body fluids can be expected with a compensatory diuretic response having the above characteristics. (AUTHOR)

260

Graveline, D. E. and M. M. Jackson 1962 DIURESIS ASSOCIATED WITH PROLONGED WATER IMMERSION J. Appl. Physiol., May 1962 17(3):519-524

ABSTRACT: Utilizing complete water immersion, compensated respiration, and unrestricted activity, the diuretic response of five human subject to 6-hr. periods in this environment was studied. The results indicate that the low specific gravity diuresis which occurs in this situation has characteristics of both a water and an osmotic diuresis. Possible physiologic mechanisms are discussed

261

Graveline, D. E., & M. McCally 1962 SLEEP AND ALTERED PROPRIOCEPTIVE INPUT AS RELATED TO WEIGHTLESSNESS: WATER IMMERSION STUDIES. (6570th Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio) AMRL-TDR-62-83; ASTIA AD-286 022

ABSTRACT: The "free-floating" condition of immersion is associated with substantial alterations in mechano-receptive feedback to the central nervous system in a manner similar to the free-floating condition of weightlessness. One area having rather immediate operational application concerns sleep under these conditions. In this study electroencephalographic and electrooculographic recordings were made during sleep of completely immersed, neutrally buoyant subjects. Sleep records were obtained while using both tether and clamshell sleeping facilities and were compared to each subject's normal bedrest sleep records. The results are presented and their possible application to prolonged weightlessness is discussed. (AUTHOR)

262

Graybiel, A. and B. Clark 1960 SYMPTOMS RESULTING FROM PROLONGED IMMERSION IN WATER: THE PROBLEM OF ZERO G ASTHENIA. (US NAVAL School Aviat. Med. Res., Pensacola, Fla.) Juny 15, 1960 Rep. MR005.15-2001, Subtask 1, Rep. 4:1-27

263

Graybiel, A., & B. Clark 1960 SYMPTOMS RESULTING FROM PROLONGED IMMERSION IN WATER: THE PROBLEM OF ZERO G ASTHENIA. (Naval School of Aviation Medicine Pensacola, Fla.) Proj. MR005.15-2001.1.4., 25 July 1960 ; ASTIA AD-244 932
See also, Aerospace Medicine 32(3):181-196, Mar. 1961

ABSTRACT: In order to reduce the effects of G on the body, three subjects were floated in tanks of physiological saline solution for ten hours per day for two weeks while systematic attempts were made to eliminate any effects of sensory deprivation. Tests of cardiovascular function and muscular strength and

coordination were given before, during, and after the experiment. The results indicated little or no systematic change in the tests of muscular strength and coordination, but all three subjects showed marked postural hypotension on the tilt-table during and following the period of immersion. These results are discussed in terms of possible implications for space flight.

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Graybiel, A. & B. Clark 1961 SYMPTOMS RESULTING FROM PROLONGED IMMERSION IN WATER: THE PROBLEM OF ZERO G ASTHENIA
Aerospace Medicine 32(3):181-196, March 1961.

ABSTRACT: To evaluate changes in fitness of Ss while the effects of gravity on the body were reduced, three healthy young men were floated in tanks of physiologic saline solution for ten hours a day during a two-week period. When not immersed, they remained in bed, and great care was taken to minimize both muscular activity and sensory deprivation. A series of tests of muscular strength and coordination and of physiological function were given. Some of these were given only before and after immersion and others at periodic intervals during immersion. Analysis was made of the test data and of observations relating to psychological stresses. Implications of the findings for the zero-g state were discussed. (Tufts)

265

Graybiel, A. 1962 ORIENTATION IN SPACE, WITH PARTICULAR REFERENCE TO VESTIBULAR FUNCTIONS. In Schaefer, K.E., ed., Environmental Effects on Consciousness. (New York: The MacMillan Co., 1962) Pp. 64-72

ABSTRACT: In man the sensory organs in the vestibular labyrinth contribute little to orientation in space if comparison is made with the otolith apparatus in fishes and the semicircular canals in birds. Persons who have lost the function of these vestibular sense organs are scarcely handicapped by day and, for all ordinary activities, are little handicapped at night. Indeed, the great importance of these organs rests in the fact that they are potentially capable of causing disorientation. This may result from pathological factors or from circumstances in which persons are exposed to unusual patterns of stimulation. Such patterns may be encountered in flight, and the conclusion is reached that under certain conditions it would be advantageous to the space traveler if these sensory organs, especially the semicircular canals, were non-functioning.
DISCUSSION: It is not unreasonable to postulate that the semicircular canals and otolith apparatus will contribute very little to the orientation of a

traveler in space and may prove to be a decided handicap. The chief difficulties will arise from the visual disorientation and canal sickness if persons are subjected to Coriolis accelerations. If it should be found desirable to generate an artificial gravitational field by means of rotation, persons with normal semicircular canals would suffer unless the rate of rotation was very slow. In view of this possibility more studies are needed with regard to screening large populations to determine if otherwise healthy persons are relatively insensitive to stimulation of the canals, to determine the limits of adaptation, and to explore means of reducing or abolishing the function of the canals. The absence of this function would not handicap the person aloft and limit him very little under all ordinary conditions.

The role of the otolith apparatus is less well understood than that of the semicircular canals but, in all likelihood, it is less important for good or bad (Lansberg, 1958). If it were impossible to abolish the function of the canals without also destroying the function of the otolith apparatus, the loss might be appreciable but not great. (Author)

266

Graybiel, Ashton 1962 THE SIGNIFICANCE OF THE VESTIBULAR ORGANS IN THE PROBLEMS POSED BY WEIGHTLESSNESS (Committee on Space Research (COSPAR), The Hague(Netherlands) NASA Grant R-47, NASA N62-15219

ABSTRACT: An attempt is made to define the symtomatology which may be specifically ascribed to the semi ircular canals and to the otolith apparatus or to any interaction between the two; and thus to define canal sickness, otolith sickness and vestibular sickness. The two force environments discussed are weightlessness and the inertial forces generated in the effort to overcome weightlessness. The two sensory organs involved, collectively termed the vestibular organs, are the semicircular canals which are stimulated by angular and coriolis accelerations, and the otolith apparatus, stimulated by linear accelerations. Evidence is presented that the syndrome canal sickness occurs when the semicicular canals are exposed to unusual patterns of angular accelerations of sufficient magnitude and duration. Cardinal symptoms are visual and postural illusions, sweating, nausea and vomiting, somnolence, apathy, and difficulty in walking. A specific syndrome analogous to canal sickness has yet to be ascribed to the otolith apparatus; on the other hand, the otolith apparatus has not been ruled out as a possible cause of symptoms during exposure to zero g. Difficulties are encountered partly because weightlessness affects all gravireceptors, and partly because prolonged weightlessness has not been simulated under terrestrial conditions. An experimental program is under way with human subjects and squirrel monkeys to determine whether otolith sickness may result from bizarre stimulation of these sensory organs under terrestrial conditions.

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Graybiel, A. 1962 THE SIGNIFICANCE OF THE VESTIBULAR ORGANS IN THE PROBLEMS POSED BY WEIGHTLESSNESS
(Paper, Third International Space Science Symposium and Fifth COSPAR Plenary Meeting, April 30-May 9, 1962, Washington, D.C.) NASA N62-15219

ABSTRACT: In defining the symptoms ascribed to the semicircular canals and to the otolith apparatus or to any interaction between the two, the author also describes canal sickness, otolith sickness, and vestibular sickness. The environment is one of weightlessness or the inertial forces generated to overcome weightlessness. The semicircular canal is stimulated by angular and coriolis acceleration and the otolith apparatus is stimulated by linear acceleration. Canal sickness is stimulation of the semicircular canals by angular acceleration. Symptoms of canal sickness include sweating, nausea and vomiting, apathy, illusions, and difficulty in walking. An illness like canal sickness has not yet been ascribed to the otolith apparatus. However, it may be a possible cause of symptoms during exposure to zero g. The difficulty in experimenting with weightlessness is that it cannot be simulated under terrestrial conditions. At the present time a program is experimenting with humans and squirrel monkeys to determine whether otolith sickness might result from stimulation of these sensory organs under terrestrial conditions.

268

Green, F. H. 1958 CO2 DISPOSAL, LEAKPROOFING, ZERO GRAVITY: PROBLEMS FOR SPACECRAFT AIR CONDITIONING. Aviation Age. 29: 174 - 179, May 1958

269

Grether, W. F. 1962 PSYCHOLOGY AND THE SPACE FRONTIER
Amer. Psychologist 17(2):92-101, Feb. 1962

ABSTRACT: The contribution of psychologists to space flight work is summarized according to its historical progression with emphasis on engineering psychology. The work of a few outstanding psychologists in the Project Mercury is cited, e.g., in astronaut selection, training, and performance data. Others contributed analysis of work load during Mercury flights, development of a new type of attitude indicator, analysis of equipment failure, simulator design, and research on the effects of weightlessness. Future areas for research deal with overcoming effects of prolonged confinement to a small space vehicle, human performance in zero-g conditions, perceptual problems in space, and diurnal cycle adjustment.
(Aerospace Medicine 33(8):1034, Aug. 1962)

270

Griffith, R., W. Nordberg, & W. G. Stroud 1956 THE ENVIRONMENT OF AN EARTH SATELLITE. (U. S. Army, Signal Corps Engineering Labs., Fort Monmouth, N. J.) SC Proj. 172A, DA Proj. 3 99 07 021, Tech. Memo. NR M 1747, March 1956, Rev. Nov. 1956

ABSTRACT: This report is a collection of graphs, tables, and other data relevant to the environment of an earth satellite during both the launching and in-orbit phases. The information was assembled from recent sources and to some extent unpublished. The major topics include mechanical-thermal considerations composition of the atmosphere, properties of the atmosphere, radiation at high altitudes, cosmic rays, variation of g with height, the earth's magnetic field, temperatures, pressures, densities, and winds, micrometeorites and meteorites.

271

Grishina, M. 1960 OTVAZHNAYA' IN OUTER SPACE AGAIN. Meditsinskiy Rabotnik, (Moscow) p. 3, 17 July 1960. (translation)

ABSTRACT: Animal training is described for a female rabbit named Zvezdochka, and dogs named Malek and Otvazhnaya (the latter of whom has made five previous flights into outer space), and the subsequent space flight results are briefly given. During the training period a high-speed centrifuge was utilized and physiological data was obtained from medical devices attached to the animals. "The centrifuge is set at a definite rate of rotating motion. The effect of G-forces on the animal organism can be observed on the screen of the apparatus. Training was also conducted on the vibration platform, where the animals were subjected to vibration similar to that experienced in a rocket flying through space. "During the actual flight cardiovascular and respiratory observations were made on the dogs with pulse rate, respiration, arterial pressure, and "cardiac biocurrents" being recorded. The telemetry system also provided information concerning changes in muscular tonus during weightless of the rabbit. "They did not suffer any kind of injury; there were no signs of even slight hemorrhages. No serious disturbances in physiological functions were noted in the animals. Otvazhnaya and Malek feasted on beefsteak and Zvezdochka ate radishes with fresh grass".

272

Gurfinkel, V. C., P. K. Isakov, V. B. Malkin, & V. I. Popov 1959 KOORDINATSIIA POZQ I DVIZHENII CHELOVEKA V USLOVIIAKH POVYSHENNOI I PONIZHENNOI GRAVITATSII (COORDINATION OF POSTURE AND MOVEMENTS OF MAN IN CONDITIONS OF INCREASED AND DECREASED GRAVITY) Biul. Eksperimental Noi Biologii I Med. (Moscow) 48(11):12-18, Nov. 1959

ABSTRACT: The effect of rapidly alternating phases of increased and decreased gravitational force on motor coordination and posture was studied in seven human subjects. Experiments were conducted in the elevator of Moscow University, which permits changes in gravity ranging from 2 G to 0.3 G within two to three seconds.

Positional changes of body and extremities and motor coordination were recorded graphically. Under the experimental conditions no significant disturbances were registered either in coordination of positioning of the body and limbs or in the adequacy of motor performance. The role of the visual analysor in maintaining equilibrium does not increase significantly under conditions of subgravity, as shown by analysis of equilibrium reactions of subjects with their eyes closed or open. It is concluded that a 50 per cent increase or decrease in gravity does not materially affect the system which regulates posture and movement on the basis of proprioceptive afferentation. (AUTHORS)

273

Gurovskiy, N. N., & M. A. Gerd 1962 IN THE SPACEFLIGHT LABORATORY
Nauka i Zhizn' (10):21-28 (Translation Services Branch, Foreign Technology Division, Wright-Patterson AFB, Ohio, Trans. No. FTD-TT-62-652-1+2+4; ASTIA AD-286 201; 8 June 1962)

274

Gurovskii, N. and M. Gerd 1962 THE STATE OF WEIGHTLESSNESS
Trans. from Komsomol'skaya Znamya (USSR) (21):1 and (22):4, 1962.
(Joint Publications Research Service, New York, N. Y.)
April 30, 1962 JPRS: 13619

ABSTRACT: General conclusions about the effect of weightlessness (or rather its lack of effect) on the human body are drawn from the flights of the space dogs and from the flights of Gagarin and Titov. When Titov's body became weightless he temporarily lost his orientation in space and felt that he was flying upside down. The orientation was quickly reestablished when he looked around his cabin. Cessation of signals from the vestibular apparatus was compensated for by means of vision and muscle sensation.

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Gurovskiy, N.N. & M.A. Gerd 1962 WEIGHTLESSNESS
Translation Services Branch, Foreign Technology Division, WP-AFB, Ohio
FTD-TT-62-1310/1+2+4 October 30, 1962 ASTIA AD 292 227
(Original Source: Nauka i Zhizn', No. 11, 1961, pp. 86-91)

ABSTRACT: A detailed report is given of Titov's reactions to weightlessness during space flight. Both an electrocardiogram and an electromyogram were recorded during the flight. Also, the physical action of his heart and the depth and frequency of his respiration were registered. During the flight, it was found that the cosmonaut had normal muscular movements; he was able to work and carry out complicated tasks; and he ate, drank, slept, and used the toilet facilities.

WEIGHTLESSNESS

H

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Haber, F. & H. Haber 1950 POSSIBLE METHODS OF PRODUCING THE GRAVITY-FREE STATE FOR MEDICAL RESEARCH.
J. Aviation Med. 21(5):395-400.

277

Haber, F., & H. Haber 1951 POSSIBLE METHODS OF PRODUCING THE GRAVITY-FREE STATE FOR MEDICAL RESEARCH. In (School of Aviation Medicine, Randolph AFB, Texas) Epitome of Space Medicine, Item #2, Jan. 1951
See also J. Avia. Med. 21(5):395-400, 1950

ABSTRACT: The purpose of this paper is to present some theoretical considerations as to the procurement of means suitable for studying the medical phenomena associated with the lack of weight. The following requirements must be met in eliminating gravity: (1) The means must be equipped with a controllable force in order to make it capable of overcoming and eliminating the support originating in friction from the air. (2) The means must be able to cope with high velocities which it must attain and subsequently break down. The modern aircraft is such a means. It is more suitable than the elevator method. The aircraft, in contrast to the elevator, is not limited to a single dimension, namely the vertical in its motion. The aircraft-method also affords the possibility of producing certain values of sub-gravity. Furthermore, the zero-g aircraft affords durations of the gravity free state more than twenty times as long. (CARI)

278

Haber, F. 1952 STUDY ON SUBGRAVITY STATES
In USAF School of Aviation Medicine, Randolph AFB, Texas, Epitome of Space Medicine, Item 4
See also (School of Aviation Medicine, Randolph AFB, Texas) Project No. 21-34-003; Rept. No. 1, April 1952

ABSTRACT: Equations are derived for calculating the duration of gravity-free or subgravity states as functions of gravity and initial speed or gravity and elevation. Plots are given for (1) minimum speed required as a function of gravity for different initial angles of climb and an initial velocity of 450 m.p.h. (2) speed as a function of time for 0.0 and 0.5 g, (3) duration of sub gravity flights for various initial angles of climb at an initial speed of 450 m.p.h., and (4) two trajectories of flight for 0.0 and 0.5-g states, at an initial angle of climb of 45 degrees and initial speed of 450 m.p.h. An airplane with an initial speed of 450 m.p.h. makes possible the maintenance of zero gravity for 35 seconds. (TIP ABSTRACT)

Haber, F. 1952 STUDY ON SUBGRAVITY STATES
(School of Aviation Medicine, Randolph AFB, Texas) Project No. 21-34-003; Rept. No. 1, April 1952
See also USAF School of Aviation Medicine, Randolph AFB, Texas, Epitome of Space Medicine, Item 4

ABSTRACT: Equations are derived for calculating the duration of gravity-free or subgravity states as functions of gravity and initial speed or gravity and elevation. Plots are given for (1) minimum speed required as a function of gravity for different initial angles of climb and an initial velocity of 450 m.p.h. (2) speed as a function of time for 0.0 and 0.5 g, (3) duration of sub gravity flights for various initial angles of climb at an initial speed of 450 m/p.h., and (4) two trajectories of flight for 0.0 and 0.5-g states, at an initial angle of climb of 45 degrees andinitial speed of 450 m.p.h. An airplane with an initial speed of 450 m.p.h. makes possible the maintenance of zero gravity for 35 sec. (TIP abstract)

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Haber, F. 1953 HUMAN FLIGHT AT THE LIMITS OF THE ATMOSPHERE: G-FORCES AND WEIGHT IN SPACE TRAVEL. Sky and Telescope 12(4):97-98, 114
See also J. Brit. Interplanetary Soc. 12:32-34

ABSTRACT: This is a general discussion of the problem of body weight with respect to human subjects traveling in rockets to the upper limits of the atmosphere and beyond. In a rocket take-off, the acceleration (and weight) will increase toward the end of the propulsion period. The human body can, for a maximum of 3 minutes, tolerate 11 g in the prone position and 14 g in the supine position. These tolerances will effectively limit the acceleration of a rocket with human cargo. Assuming that the initial stage of rocket flight is achieved with the passengers still in good condition, the problem of weightlessness must next be overcome. It is expected, on the basis of animal experimentation, that no major circulatory disturbances will develop; but there might be some difficulty in orientation and muscular coordination. The effects of prolonged weightlessness, are however, unknown---either with regard to animals or humans.

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Haber, H., & F. Haber 1950 POSSIBLE METHODS OF PRODUCING THE GRAVITY-FREE STATE FOR MEDICAL RESEARCH. J. Avia. Med. 21:395-400
See also (School of Aviation Medicine, Randolph AFB, Texas) Epitome of Space Medicine, Item #2, Jan. 1951 (F)

ABSTRACT: The purpose of this paper is to present some theoretical considerations as to the procurement of means suitable for studying the medical phenomena associated with the lack of weight. The following requirements must be met in eliminating gravity: (1) The means must be equipped with a controllable force in order to make it capable of overcoming and eliminating the support originating in friction from the air. (2) The means must be able to cope with high velocities which

it must attain and subsequently break down. The modern aircraft is such a means It is more suitable than the elevator method. The aircraft, in contrast to the elevator, is not limited to a single dimension, namely the vertical in its motion. The aircraft-method also affords the possibility of producing certain values of sub-gravity. Furthermore, the zero-g aircraft affords durations of the gravity free state more than twenty times as long. (CARI)

282

Haber, H. Nov. 1951 GRAVITATION AND WEIGHT. (Symposium on the Physics and Medicine of the Upper Atmosphere, San Antonio, Texas, 6-9 Nov. 1951)

283

Haber, H., & S. J. Gerathewohl 1951 ON THE PHYSICS AND PSYCHOPHYSICS OF WEIGHTLESSNESS. J. Avia. Med. 22(6):180-189, June 1951
See also (School of Aviation Medicine, Randolph AFB, Texas) Epitome of Space Medicine, Item #14 (F)

ABSTRACT: In an analysis of the effects of weightlessness on the human organism, two possible situations may be assumed: (1) the subject is adapted to g=1, and (2) the subject adapts himself to g-0. In the first instance the subject will experience a continuous sensation of falling, while the second condition will give rise to sensations of being lifted upwards. Some of the ensuing sensations will be overcome by the visual sense when observing objects which are stationary in respect to the body. However, if one accepts the validity of Fechner's law for the highly complex sense of gravity, serious consequences may result from the weightless state. Thus the intensity range for sensations from 0 to infinity corresponds to a stimulus range from g=1 to g 00. However, the intensity range for sensations from 0 to -00 will correspond to a stimulus range of g=1 to g=0. Therefore, in reducing the gravity to zero, the same range of sensations is obtained as in an unlimited increase of acceleration. The sensation of gravity becomes particularly critical when values of g approximate 0. At this point very minor changes in acceleration will result in highly intense sensations. At zero gravity self-induced accelerations through voluntary or forced movements of the organism become critical, because of the intensity of sensations evoked. These sensations are not experienced at normal gravity, since according to Fechner's law normally the small additional accelerations remain below the sensory threshold

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Haber, H., & S. J. Gerathewohl 1951 ON THE PHYSICS AND PSYCHOPHYSICS OF WEIGHTLESSNESS. In (School of Aviation Medicine, Randolph AFB, Texas) Epitome of Space Medicine, Item #14
See also J. Avia. Med. 22(6):180-189, June 1951

ABSTRACT: In an analysis of the effects of weightlessness on the human organism,

two possible situations may be assumed: (1) the subject is adapted to g=1, and (2) the subject adapts himself to g=0. In the first instance the subject will experience a continuous sensation of falling, while the second condition will give rise to sensations of being lifted upwards. Some of the ensuing sensations will be overcome by the visual sense when observing objects which are stationary in respect to the body. However, if one accepts the validity of Fechner's law for the highly complex sense of gravity, serious consequences may result from the weightless state. Thus the intensity range for sensations from 0 to infinity corresponds to a stimulus range from g=1 to g=00. However, the intensity range for sensations from 0 to -00 will correspond to a stimulus range of g=1 to g=0. Therefore, in reducing the gravity to zero, the same range of sensations if obtained as in an unlimited increase of acceleration. The sensation of gravity becomes particularly critical when values of g approximate 0. At this point very minor changes in acceleration will result in highly intense sensations. At zero gravity self-induced accelerations through voluntary or forced movements of the organism become critical, because of the intensity of sensations evoked. These sensations are not experienced at normal gravity, since according to Fechner's law normally the small additional accelerations remain below the sensory threshold.

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Haber, H. 1951 THE HUMAN BODY IN SPACE
Scient. Amer. 184:16-19, Jan. 1951
See also (School of Aviation Medicine, Randolph AFB, Texas) Epitome of Space Medicine, Item 12, (F)

ABSTRACT: Article discusses the measures which must be taken to enable men to survive in the alien environment of the void beyond our atmosphere.

SECOND ABSTRACT: This article discusses the measures which must be taken to enable men to survive in the alien environment of the void beyond our atmosphere The first problem to be dealt with is acceleration. Another problem is weightlessness. Control of cabin temperature and oxygen supply is another consideration. Meteors are a field of real danger for astronauts. The author discusses each of the preceding problems. (CARI)

286

Haber, H. 1952 PHASING AND CO-ORDINATION OF MEDICAL RESEARCH WITH TECHNICAL AND ENVIRONMENTAL DEVELOPMENT
In C.S. White, et al (Eds.) Physics and Medicine in the Upper Atmosphere: A Study of the Aeropause. (Alburquerque: Univ. of New Mexico Press, 1952) pp. 575-581

ABSTRACT: The basic environmental changes resulting from human flight beyond the earth's atmosphere are briefly outlined. These changes will impose on space medicine the task to overcome the following basic problems: (1) the problem of explosive decompression, temperature control, and bottled air; (2) problems arising from ionizing radiation (cosmic rays) and meteors; and (3) problems arising from the occurrence of weightlessness. A projected phase schedule is presented in diagrammatic form.

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Haber, H. 1952 MANNED FLIGHT AT THE BORDERS OF SPACE. THE HUMAN FACTOR OF MANNED ROCKET FLIGHT. In (School of Aviation Medicine, Randolph AFB, Texas) Epitome of Space Medicine, Item no. 18
See also J. American Rocket Society 22(5):269-279, Sept.-Oct. 1952

ABSTRACT: A functional border between atmosphere and space is defined as a level at which the atmosphere fails as a supporting medium, and space-equivalent conditions begin. Depending upon a particular kind of function the corresponding limit is located at a certain altitude. The major functions of the atmosphere for man and craft are the following: Contributing to respiration, preventing boiling of body fluids, sustaining combustion of fuel, absorbing heavy primaries of cosmic radiation, absorbing solar UV-daylight, absorbing meteors, interacting thermally with the craft, and interfering by air drag over long periods of time (permanence of satellite orbits). Depending upon the nature of a particular function, the functional borders so defined are more or less extended regions. The various functional borders of space lie in the region between 10 and 120 miles of altitude. The significance of the above mentioned factors for manned rocket flight is discussed with special emphasis upon problems of aero-medical and space-medical nature. The use of the term "aeropause" for the border region between atmosphere and space is proposed. (AUTHOR)

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Haber, H. 1952 STUDY ON SUB-GRAVITY STATES (USAF School of Aviation Medicine, Randolph AFB, Texas) Project No. 21-34-003, Report No. 1, April 1952.

289

Haber, H. 1952 MEDICAL RESEARCH IN THE DEVELOPMENT OF MANNED ROCKET FLIGHT
Technical Data Digest 17(2):12-13

ABSTRACT: A tentative schedule of present and future aviation- and space-medical research tasks is presented. The establishment of an artificial satellite would be the next step in line, with animal experiments preceding the employment of humans. Future studies will have to concentrate particularly on problems resulting from conditions in an environment without gravity and atmosphere (supply of climate and breathing air, filtering of radiation, and supply of mechanical support). (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space Medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept No. TDCK-16903; ASTIA AD-227 817; Feb. 1959)

290

Haber, H. 1952 ON SPACE MEDICINE PROBLEMS
(Hayden Planetarium Symposium on Space Travel, Oct. 12, 1951)
J. Brit. Interpl. Soc. 11:3-9

Haber, H. 1952 CAN WE SURVIVE IN SPACE?
In Ryan, C., ed., Across the Space Frontier
(New York: Viking, 1952) Pp. 71-97

ABSTRACT: A popular presentation of physiological and psychological problems arising in space travel from high acceleration, lack of atmosphere, from cosmic and solar radiations, lack of gravitational forces, and from hazards like meteorites and inadequate temperature regulation.

292

Haber, H. 1952 PROBLEMS OF SPACE TRAVEL
Science News Letter 62(12):180

ABSTRACT: An analysis of psychological, physiological, and physical problems of space travel, presented by the author in an address before the American Society of Mechanical Engineers, is summarized. Meteors constitute a danger above 90 miles; cosmic rays are a health hazard between 13 and 23 miles; and ozone and ultraviolet light require protective measures. Frictional heat and extreme temperature differentials between lighted and shaded parts of the rocket present an additional problem. Weightlessness in free space merely creates slight physiological disturbances; little is known, however, about the psychological consequences of subgravitational flight. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space Medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903; ASTIA AD-227 817, Feb. 1959)

293

Haber, H. 1952 DER MENSCH IM WELTALL (Man in Space)
Weltraumfahrt (Frankfurt), (1):13-16.

ABSTRACT: Space medicine cannot be considered merely a matter of the future. Human flight has reached heights which, for all practical purposes, approximate conditions of interplanetary space. The paper summarizes briefly and in general terms problems of temperature regulation in the space ship, the dangers of cosmic radiation, and neuromuscular difficulties arising from the lack of gravitational pull.

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Haber, H. 1952 THE CONCEPT OF WEIGHT IN AVIATION
J. Aviation Med. 23(6):594-596, Nov. 1952.

ABSTRACT: For purposes of aviation engineering and medicine, the concept

of weight is redefined. The principle of d'Alembert states that the sum of the force of gravity, the force of inertia, and the external forces acting upon a body is zero. The weight of the body is then the resultant external force exerted upon the body by a restraining agent in response to forces of gravity and inertia. Six dynamic situations are illustrated, in which the three forces are represented as vectors

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Haber, H. 1952 GRAVITY, INERTIA, AND WEIGHT
In C. S. White and O. O. Benson, Jr., Ed., Physics and Medicine of the Upper Atmosphere, (Albuquerque, New Mexico; Univ. of New Mexico Press, 1952) pp. 123-136.

ABSTRACT: To evaluate properly the physiological processes in flight, a new formulation of the concept of weight is required. In reversing and implementing the classical definition of weight (or the force of attraction which the earth exerts on a body, with its direction toward the center of the earth) the following definition is proposed: weight is the resultant external force exerted upon a body by a restraining agent in response to forces of gravitation and inertia. This definition makes it evident that weight of a body is not a constant nor a property of the body but depends upon the dynamic conditions to which the body is subjected (e.g. inertia, drag, or propulsion in an aircraft). On the basis of this definition a formula is developed to determine the weight of a pilot under all conditions of propelled and unpropelled flight. The possibility of prolonged weightlessness is a factor to be counted on in future flight and is going to become an outstanding aviation-medical problem. While no major distrubances in the normal physiological functions (such as digestion, breathing, etc.) are foreseen, normal orientation might be impaired.

296

Haber, H. 1953 THE MECHANICAL ENVIRONMENT IN THE FUTURE AIRCRAFT
in Haber, H., ed., Frontiers of Man-Controlled Flight.

297

Haber, H. & S.J. Gerathewohl 1953 PHYSIK UND PSYCHOPHYSICK DER GEWICHTSLOSIGKEIT (Physics and Psychophysics of Weightlessness) Weltraumfahrt 4(2):44-50

ABSTRACT: During weightlessness, the human subject is adapted to g = 1 during which the subject experiences a continuous sensation of falling. The subject can adapt himself to g = 0 during which he experiences the sensation of being lifted upward. Observation of stationary items will overcome many of these sensations. The weightless state is very serious if one accepts the validity of Fechner's law for gravity. By reducing gravity to zero, the same sensations are obtained as those experienced during an increase in acceleration. When the values of g approximate 0, very small changes in acceleration will evoke highly intense sensations. At zero gravity, self-induced acceleration evokes extremely intense sensations not experienced at normal gravity.

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Haber, H., ed. 1953 PROCEEDINGS OF A SYMPOSIUM ON FRONTIERS OF MAN-CONTROLLED FLIGHT, INSTITUTE OF TRANSPORTATION AND TRAFFIC ENGINEERING, UNIVERSITY OF CALIFORNIA, LOS ANGELES, 3 APRIL 1953

CONTENTS:

Lippert, S., Limitations to Noise and Vibration Control
Haber, H., The Mechanical Environment in the Future Aircraft
Roth, H. P., Impact and Dynamic Response of the Body
Blockley, W. V., Combined Physiological Stresses
All Speakers, Panel Discussion on Frontiers of Man-Controlled Flight.

299

Haber, H. 1954 FROM HIGH-ALTITUDE FLIGHT TO SPACE FLIGHT.
In Kendricks, E.J., et al., "Medical Problems of Space Flight"
Reprint Instructors' Journal, Winter, 1954.

ABSTRACT: High-altitude flight will eventually become space flight as a natural result of our continual efforts to extend our vertical freedom of movement. During flight, high-altitude and high-speed go together. Several ways of avoiding the dangers of overheating are as follows: better structural materials which are more heat resistant than present ones; and, of course, flying at greater altitudes where the air is thinner. As high-altitude flight will eventually blend with actual space flight, the man in the rocket must be protected against the various hazards of space. The crew must sit in a pressurized cabin and wear a pressure suit. The crew will experience up to six minutes of weightlessness. It is the task of space medicine to help pilots avoid the disturbing effects of weightlessness. (CARI)

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Haber, H. 1955 FROM HIGH-ALTITUDE FLIGHT TO SPACE FLIGHT.
In USAF School of Aviation Medicine, Randolph AFB, Texas,
Epitome of Space Medicine, Pp. 13-16. ASTIA AD-144 581.

ABSTRACT: High-altitude flight will eventually become space flight as a natural result of our continual efforts to extend our vertical freedom of movement. During flight, high-altitude and high-speed go together. Several ways of avoiding the dangers of overheating are as follows: better structural materials which are more heat resistant than present ones; and, of course, flying at greater altitudes where the air is thinner. As high-altitude flight will eventually blend with actual space flight, the man in the rocket must be protected against the various hazards of space. The crew must sit in a pressurized cabin and wear a pressure suit. The crew will experience up to six minutes of weightlessness. It is the task of space medicine to help pilots avoid the disturbing effects of weightlessness. (CARI)

301

Haber, H. 1955 CAN MAN SURVIVE IN SPACE
Flying Review 10: 15-16

ABSTRACT: Phenomena man will experience in space flight and his physiological reactions to them; hazards to space flight; use of space suits. Article is condensed from the author's. Man in Space (New York: Bobbs-Merrill, 1953)

302

Haber, H. 1959 THE PHYSICAL FACTORS IN THE SPACE ENVIRONMENT
In: Seifert, H.S., ed. Space Technology (New York: T. Wiley and Sons, 1959) Chapter 27

303

Haldane, J. B. S. 1951 BIOLOGICAL PROBLEMS OF SPACE FLIGHT
J. British Interplanetary Soc. (London) 10:154-58, July 1951

ABSTRACT: A report on an informal talk in which the speaker discussed how man would live in a spaceship and on another planet, and the kind of life to be expected on another planet.

304

Hammer, Lois R. 1961 AERONAUTICAL SYSTEMS DIVISION STUDIES IN WEIGHTLESSNESS: 1959-1960.
(USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio) Proj. 7184, Task 71585, WADD TR 60-715

ABSTRACT: This report documents the more informal, early observations on weightlessness which did not warrant separate publication because of their limited scope and summarizes data from the more rigorous investigations during this period. For each "study" the intent and method of investigation, findings, and references are given. The C-131B, KC-135, free-floating test capsules, camera technique, F-104B, frictionless devices, and water submersion tank are described. The topics of the two heading are: aerospace medical--physiological phenomena, stress, sensory processes, gross motor performance and locomotion, fine motor behavior; and aeromechanics --power generation and heat transfer problems, fluid orientation, Able-5 vehicle stability. (Tufts)

305

Hammer, L.R. 1962 PERCEPTION OF THE VISUAL VERTICAL UNDER REDUCED GRAVITY (Behavioral Sciences Lab., Aeronautical Systems Div., Wright-Patterson AFB, Ohio) MRL TDR 62-55, ASTIA AD 284 059.

ABSTRACT: Judgements of the vertical in an unstructured visual field were obtained in flight under four levels of gravity ranging from 0 G to 1 G. Reduced and zero-gravity conditions were produced in a cargo aircraft flying a parabolic trajectory. Each of 16 subjects made 6 judgments under each of the 4 G-conditions. Results indicate that, although error of judgment of the vertical is not large, it does increase as the G-level decreases, from 1.8 degrees at 1 G to 3.5 degrees at).G. (Author)

306

Hanrahan, J.S. 1958 HISTORY OF RESEARCH IN SUBGRAVITY AND ZERO-G AT THE AIR FORCE MISSILE DEVELOPMENT CENTER, HOLLOMAN AIR FORCE BASE, NEW MEXICO, 1948 1958 (AFMDC, Holloman AFB, N. Mex., 1958)

307

Hanrahan, J.S., & D. Bushnell 1960 SPACE BIOLOGY: THE HUMAN FACTORS IN SPACE FLIGHT. (New York: Basic Books, Inc., 1960)

ABSTRACT: The book is a survey of the research accomplishments in the field of space biology. Included in the survey are the following topics: (1) man's motivation for space travel; (2) the development of a suitable vehicle; (3) the hazards of acceleration and weightlessness; (4) potentially dangerous Van Allen and cosmic radiation. The social, religious, and political implications of space travel are also included

308

Hardy, J.D. and C.C. Clark 1960 GRAVITY PROBLEMS IN MANNED SPACE STATIONS Aerospace Engineering 19:36-39

ABSTRACT: It is shown that more human experience at zero g must be available before one can conclude whether it is better while in space to stay at zero g, or, by rotation, to maintain certain centrifugal acceleration, or to have alternate periods at zero g and at higher g; table showing animal and man ascents above 100,000 feet

309

Harrower-Erickson, M.R. 1941 PSYCHOLOGICAL FACTORS IN AVIATION. Canad. med. Ass. J., 44:348-352

310

Hart, E. M. 1961 EFFECTS OF OUTER-SPACE ENVIRONMENT IMPORTANT TO SIMULATION OF SPACE VEHICLES
(USAF Behavioral Sciences Lab., Wright-Patterson AFB, Ohio)
Contract AF 33(616) 6858, Proj. 6114, Task 60806, ASD TR 61 201, Aug. 1961. ASTIA AD 269 014.

ABSTRACT: The results of a literature survey undertaken to define the effects of the outer space environment important to the simulation of space vehicles are presented. Specific vehicles and trajectories are not included. Only the natural environment of space is considered and the survey is limited to the solar system with particular emphasis on the region in the near vicinity of the earth-moon system at heights greater than 80 kilometers above the earth's surface. To specify those effects that need to be incorporated into a space training simulator, the exterior environment, its effect on vehicle and crew, and the malfunctions that may result are considered. Recommendations for further study are made. (Tufts)

311

Hartman, B., R.E. McKenzie, and D.E. Graveline 1960 AN EXPLORATORY STUDY OF CHANGES IN PROFICIENCY IN A HYPODYNAMIC ENVIRONMENT.
(School of Aviation Medicine, Brooks Air Force Base, Texas)
Report No. 60-72 July 1960. ASTIA AD 244 121

ABSTRACT: Simulated weightlessness for a prolonged period was produced by the body immersion technic. Changes in psychomotor efficiency was assessed during immersion and after return to the normal environment of 1 G. Systematic changes in a relatively simple task were obtained during immersion. Gross disruptions in psychomotor behavior on return to the normal environment were observed. Accompanying this were increased response times on three different kinds of tasks in a systems operator simulator. These results suggest that the functional capabilities of a man, while adequate during prolonged weightlessness, will be seriously impaired during the reentry phase of space flight.

312

Hartman, B.O. 1961 EXPERIMENTAL APPROACH TO THE PSYCHOPHYSIOLOGICAL PROBLEM OF MANNED SPACE VEHICLE. In (School of Aviation Medicine, Brooks AFB, Texas) Lectures in Aerospace Medicine, 16-20 January 1961.

313

Hauty, G. T., & R. B. Payne 1958 FATIGUE, CONFINEMENT, AND PROFICIENCY DECREMENT. In Alperin, M., M. Stern, & H. Wooster, eds., Vistas in Astronautics: Proceedings of the First Annual AFOSR Astronautics Symposium (New York: Pergamon Press, 1958) pp. 304-309
See also In (Air University, School of Aviation Medicine, Randolph AFB, Texas) Reports on Space Medicine - 1958 Feb. 1958 (F)

ABSTRACT: Beginning at 0800, different experimental groups of volunteers were required to perform for 30 consecutive hrs. a task which consisted of monitoring several simulated aircraft indicators and, upon the detection of departures from null, executing corrective action. With the exception of short and infrequent periods for lunch, relief, and exercise, they remained confined to this task situation and were not permitted to sleep.
While urinalyses revealed little or no temporal change in physiological function, task proficiency followed a highly regular pattern of change. Initial proficiency levels were maintained up to 2400 at which time decline set in and progressed until 0600. At this point proficiency began to increase until from 1200 to the termination of work, it was one-half that of initial levels. Dextro-amphetamine (5 mg) was found to exert a substantial restoration of proficiency and with no evidence of a 'letdown' effect. Nearly all subjects reported perceptual disturbances ranging widely in degree of bizarreness and presumed adverse effect upon proficiency.
Since these aberrations occurred within a normal sensory environment, it may be that such will occur to a greater degree in the closed ecological system of a space vehicle.

314

Hauty, G. T. 1958 HUMAN PERFORMANCE IN THE SPACE TRAVEL ENVIRONMENT (Air University, Maxwell AFB, Ala.) Air University Quarterly Review 10(2):

See also In (Air University, School of Aviation Medicine, Randolph AFB, Texas Reports on Space Medicine - 1958, Feb. 1958 (F)

ABSTRACT: By necessity, man will have to be incorporated as an integral component in systems designed for extended space operations. Together with the other principal components, he will be subjected to extensive and systematic testing for reliability determinations. The need for such testing is occasioned not so much by a lack of information on human limitations as by the lack of information on the interactions of these inherent limitations with the conditions man will experience in space. Since these interactions are somewhat unique, a brief discussion of the presently obvious conditions peculiar to a closed ecological system in space and of certain relevant human limitations will serve to indicate what man's performance will have to tolerate.

315

Hauty, G. T. 1959 HUMAN PERFORMANCE IN SPACE
In Gantz, K. J., ed., Man in Space
(New York: Duell, Sloan, & Pierce, 1959) Chap. 7

316

Hauty, G.T. 1960 PSYCHO-PHYSIOLOGICAL PROBLEMS OF MANNED SPACE VEHICLES. In (School of Aviation Medicine, Brooks AFB, Texas) Lectures in Aerospace Medicine, 11-15 January 1960

317

Hawkes, R. 1958 WEIGHTLESSNESS CRUCIAL SPACEMAN FACTOR. Aviation Week 68(5):50-51, 53, 55, 57; Feb. 3, 1958

ABSTRACT: Describes work being done at the Aero Medical Field Laboratory's Biodynamics Branch - Holloman AFB, New Mexico.

318

hawkes, R. 1958 WEIGHTLESSNESS CRUCIAL SPACEMAN FACTOR Space Technology 1:8-10, April 1958

319

Hawkins, W.R. 1960 SPACE FLIGHT DYNAMICS -II. ZERO "G". In (USAF School of Aviation Medicine, Brooks AFB, Texas) Lectures in Aerospace Medicine, 11-15 January 1960

320

Hellebrandt, F. A., & E. Brogdon 1938 THE HYDROSTATIC EFFECT OF GRAVITY ON THE CIRCULATION IN SUPPORTED, UNSUPPORTED AND SUSPENDED POSTURES. Amer. J. Physiol. 123:95-96

321

Helvey, T. C. 1959 PROBLEMS OF GROUND SIMULATION OF LONG-RANGE SPACE FLIGHT ENVIRONMENTAL CONDITIONS. IRE Trans. Space Electronics and Telemetry SET-5 (2):57-60, June, 1959

322

Helvey, T.C. 1960 MOON BASE, TECHNICAL AND PHYSIOLOGICAL ASPECTS (New York: John F. Rider, Inc.)

323

Hendler, E. & L.J. SantaMaria 1961 RESPONSE OF SUBJECTS TO SOME CONDITIONS OF A SIMULATED ORBITAL FLIGHT PATTERN
Aerospace Medicine 32(2): 126-133

ABSTRACT: Some of the physiological responses of subjects wearing ventilated full pressure suits and exposed to pressure and thermal profiles characteristic of extreme conditions of orbital flight patterns were presented. No significant physiological stress was evidenced in subjects exposed to a modified thermal profile, except for the sweating response of one subject. Exposure of experienced subjects to long duration thermal loads simulating relatively severe post-landing and full thermal profiles resulted in premature test termination when ventilating air temperature was more than a few degrees above initial mean skin temperature. (Author)

324

Henry, John 1948 SPECULATIONS ON SPACE TRAVEL: PART A
Rocket News Ltr. 2:6-9, Oct. 1948

ABSTRACT: Discusses the problems of acceleration, oxygen, gravity, cosmic rays, ultra-violet rays, food and water.

325

Henry, J. P., E. R. Ballinger, P. J. Maher & D. G. Simons 1952 ANIMAL STUDIES OF THE SUBGRAVITY STATE DURING ROCKET FLIGHT.
J. Aviation Med. 23:421-432, Oct. 1952.

SUMMARY: 1. Pulse, respiration, electrocardiogram and arterial and venous pressures have each been telemetered from one or more of seven anaesthetized primates in four V_2 and three Aerobee rockets during subgravity periods lasting for two to three minutes. There was no evidence of a significant disturbance of the cardiovascular or respiratory systems.

2. Photographic records of the performance of five mice have been made through two to three minute periods of subgravity. As long as a foothold was available to the animals they did not appear seriously disturbed. In all cases the animals ran and jumped normally immediately following resumption of an orienting gravity stress.

3. The weight of evidence suggests that in currently attainable durations of two to three minutes the subgravity state will not lead to any serious psychophysiological difficulties.

4. Investigation of the effects of subgravity states lasting for hours or days must await the development of orbital rockets

326

Henry, J.P. 1955 PHYSIOLOGICAL LABORATORIES IN ROCKETS.
Astronautics, 2:22-26
See also Bull. Med. Res. 10(3):2-4, 1956

ABSTRACT: Photos and descriptions of the equipment installation in an Aerobee rocket used for upper-air research with live monkeys and mice.

327

Henry, J. P. 1956 PHYSIOLOGICAL LABORATORIES IN ROCKETS
Bull. Med. Res. 10(3):2-4
See also Astronautics 2:22-26, 1955

328

Henry, J.P., G.A. Eckstrand, R.R. Hessberg, D.G. Simons, et al. 1957 HUMAN FACTORS RESEARCH AND DEVELOPMENT PROGRAM FOR A MANNED SATELLITE. (Air Research and Development Command, Baltimore, Md.) ARDC TR 57 160, Oct. 1957. ASTIA AD-136 410.

ABSTRACT: This report presents a brief summary of the "state-of-the-art" in human factors research and development in providing a functioning man in space flight. An estimate that man can now be sent out into space for two hours is based upon present knowledge of such factors as: habitable atmosphere; accelera tion; weightlessness; thermal radiation; escape; isolation and confinement; presentation and processing of information; work place layout; crew skills; selection and training; and motivation. In the above factors, areas of the unknown are indicated and estimates of time needed to achieve significant progress are made.

329

Henry, J. P. 1960 PROJECT MERCURY, STATUS OF THE ANIMAL TEST PROGRAM
NASA Project Mercury Working Paper No. 158, NASA Space Task Group, Langley Field, Va.

ABSTRACT: Outlines the origin and purposes of the animal test program, details of the Mercury capsule animal program underway at AMFL, HAFB, prelaunch facilities at Cape Canaveral, operational aspects, information anticipated from the animal flights, and future research possibilities of the program. Appendices contain the animal-monitoring and flight-data plans and list the personnel involved in the animal program

330

Henry, J.P. & J.D. Mosely 1961 THE MERCURY ANIMAL PROGRAM
(Paper, IAS-ARS Joint Natl. Meeting, June 13-16, 1961, Los Angeles, Calif.)
Paper no. 61-158-1852, 17 pp.

ABSTRACT: A report is presented on several aspects of the MR-2 flight. Included are the dynamic considerations and the physiological and psychological responses of the subject to flight stress.

331

Henry, J. P., W. S. Augerson, R. E. Belleville et al 1962 EFFECTS OF WEIGHTLESSNESS IN BALLISTIC AND ORBITAL FLIGHT.
Aerospace Medicine 33(9):1056-1068, Sept. 1962.

ABSTRACT: This is a statement of conclusions made by the authors after studying data on weightlessness. The weightless state was observed during aircraft and ballistic and orbiting rocket flights and related to the results of the Mercury MR-2, 3, 4, MA 5, 6, and 7 flights. The authors state the following conclusions: (1) Orientation is no problem if stationary objects can serve as references. (2) If a subject is attached to his work area, he can perform complex visual-motor coordination tasks for long periods of time. (3) The weightless state does not affect respiration, digestion, eating, and micturition. (4) The weightless state does not affect the circulation system to a very great degree.

332

Herrick, R.M. 1959 AMAL BIOPROBE PROJECT: EFFECT OF SIZE OF REINFORCEMENT UPON OPERANT RESPONSE RATE
U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR83 April 14, 1959

ABSTRACT: In order to study the physiological and psychological effects of prolonged exposures to the weightless state, the orbital and space flight project included plans for exposing small mammals (white rats) to zero gravity in an orbiting satellite. In working toward this goal, one of the principal areas of study is the evaluation of animal performance. This report presents a study undertaken to determine how the response rate of water-deprived rats varies as a function of the amount of water procured by each response. The data of this study will help in providing an estimate of the number of reinforcements of a given size that can be delivered to a rat in various operant conditioning experiments before the rat's response rate decreases as a result of approaching satiation.

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Herrick, R.M. 1959 AMAL BIOPROBE PROJECT: FEASIBILITY OF USING DAILY LONG-DURATION PERFORMANCE PERIODS FOR RATS IN BIOPROBE (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR85 May 13, 1959

ABSTRACT: The bioprobe program is designed to evaluate the effects of the zero G condition of an orbiting satellite upon the behavior of two rats within the satellite. Because of the two-three week term of the proposed outer space experiment, it would be desirable to increase the daily experimental period in the satellite beyond that ordinarily used in animal behavior experiments on the earth and thereby obtain more data within the alloted time. Thus, instead of the usual daily experimental period of an hour or two, a daily period of six or eight hours would be preferable. The experiment described in this report was performed in order to (a) determine the feasibility of a six or eight-hour daily experimental session with positive reinforcement provided under a variable-interval limited-hold schedule of reinforcement and (b) to uncover the characteristics of such long-duration experimental sessions. The results imply (a) that it will be possible to require a rat to perform under a variable-interval limited-hold schedule for several hours daily and (b) that it would probably be desirable to space the performance periods to correspond as closely as possible to the "normal" cyclical periods of the rat.

334

Herrick, R.M., G.H. Kydd, & R.L. Fenichel 1959 BEHAVIORAL AND PHYSIOLOGICAL EFFECTS OF EXPOSURE TO A SIMULATED JUNO II ACCELERATION PATTERN. (Aviation Medical Acceleration Laboratory, Naval Air Development Center, Johnsville, Pa.) Rept. NADC-MA-5913, 21 Sept. 1959, ASTIA AD 230 005.

ABSTRACT: The purpose of the present experiment was to determine how exposure to a simulated acceleration pattern of the Juno II missile system affected the subsequent behavior of rats. The findings of the experiment indicate that, within the limits of the simulation, exposure to the acceleration pattern will not detrimentally affect rats either physiologically or behaviorally. This means that in an analysis of the results of a biosatellite study designed to evaluate the influence of zero G upon behavior the fact that the rats were exposed to the Juno II acceleration pattern may be ignored. (Author)

335

Herrick, R. M., & P. Karnow 1961 A DISPLACEMENT-SENSING CONSTANT-TORQUE RESPONSE LEVER DESIGNED FOR USE IN SATELLITES. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-6105, 3 Apr. 1961. ASTIA AD 255 595.

ABSTRACT: This report describes an animal response lever mechanism which (a) senses the displacement of the lever resulting from each press, (b) requires a constant torque throughout the total excursion of the lever arm, and (c) maintains the same torque characteristics under G. Calibration devices and techniques developed to evaluate the lever mechanism indicate its usefulness as a tool for the study of the effects of acceleration -- including zero G -- on behavior.

Sample data on (a) lever-pressing rate, (b) frequency-displacement distributions, (c) characteristics of individual responses, and (d) the order of occurrence of different responses indicate the variety of data obtainable and the depth of analysis possible with the response mechanism.

336

Herrick, R.M. 1962 LEVER DISPLACEMENT DURING CONTINUOUS REINFORCEMENT AND DURING A "DISCRIMINATION"
(Naval Air Development Center, Aviation Medical Acceleration Lab., Johnsville, Pa. Rept. no. NADC-MA-6209, July 23, 1962

ABSTRACT: In order to evaluate the influence of zero g or above-normal g on motor behavior in an animal, the normal motor behavior is required as a basis for measurement. Measurement was taken by the displacement of the T-bar handle during continuous reinforcement and during a discrimination. Although decreased motivation reduced the rate of lever-pressing, it had negligible effects on the distance the lever was pressed.

337

Hersey, I. 1957 DOG IN SPACE.
Astronautics, 2(5):30-31,84. Dec. 1957

ABSTRACT: The launching of a 1120 pound Sputnik II satellite carrying a dog is discussed. Aside from the data which the satellite can accumulate at very high altitudes, studies of the dog may produce significant information about cosmic ray effects and weightlessness once it is successfully returned to earth. The experiments involving the dog are largely physiological, and directed toward learning the mechanics of protecting living beings in space.

338

Hersey, I. 1959 THEY FLOAT THROUGH THE AIR.
Astronautics 4(2):42, 7 Feb. 1959.

ABSTRACT: In studying the effects of short periods of zero gravity on human performance and behavior, the Air Force Aero Medical Laboratory, Wright-Patterson Air Force Base, Ohio, has used a Convair C-131B transport plane to permit human subjects to float freely, without restrain of any kind, for weightless periods lasting from 12 to 15 sec. The C-131B provides space a little over 6 feet high, 10 feet wide, and about 25 feet long, and permits study of such problems as human orientation and movement, as well as studies of manipulative performances, under zero-G conditions.

339

Hertzberg, H.T.E. 1960 THE BIOMECHANICS OF WEIGHTLESSNESS
Aircraft and Missiles 3:52-53, July 1960

340

Hess, W.H. & E. Konnecci 1961 APPROACH TO REDUCED GRAVITY STUDIES FOR HUMAN EXPERIMENTATION
In: Proceedings of the IAS Aerospace Support and Operations Meeting, p. 76. (Instit. of Aerospace Sciences, In. New York; Assisted by IAS Aerospace Technology on Support, Orlando, Fla.) Dec. 4-6, 1961

ABSTRACT: A series of tests was devised to measure performance in some areas in which the effects of reduced gravity could be most realistically simulated by balloon suspension. These tests required the positioning of the arm and hand with limited visual feedback and the application of force in a variety of body positions in which traction between feet and floor was a limiting factor on the amount of force that could be applied. The tests were administered to a variety of subjects under both simulated reduced gravity and normal gravity conditions.

The feasibility of the approach described was clearly demonstrated. Because the studies covered were of a pilot nature based upon a limited number of subjects and a restricted sampling of tasks, further studies using these techniques should yield broadened-base data for comparison with the data already obtained by this and other techniques.

341

Hess, W. H., & E. B. Konecci 1961 APPROACH TO REDUCED GRAVITY STUDIES FOR HUMAN EXPERIMENTATION. (Douglas Aircraft Co., Inc., Santa Monica, Calif.) Engineering Paper No. 1189, Sept. 14, 196[illegible]

ABSTRACT: An apparatus for simulating reduced gravity is described. The subjects were attached by a harness and suspended from three helium-filled balloons. This effectively reduced the force of the subject against the floor. Tests that were given are as follows: (1) marking a target by blind positioning, (2) pulling against reduced traction, (3) pushing against reduced traction, (4) pulling with the body against reduced traction, and (5) applying torque against reduced traction. Results showed that in marking a target the mean positioning error increased with the number of trials under simulated reduced gravity. The results of the force and torque tests show a decrease in efficiency under simulated reduced gravity, and it appears that the results under normal conditions may be useful to predict performance under reduced gravity. The significance of these results to extraterrestrial activities is discussed. (Aerospace Medicine 33(11):1397-1398, Nov. 1962)

342

Hill, P.R. & E. Schnitzer 1962 ROTATING MANNED SPACE STATIONS
Astronautics, 7 (9): 14-18. Sept. 1962.

ABSTRACT: There are many potential uses of manned space stations, including the following: (1) gravity research, (2) launch-platform experiments, (3) space-systems environmental research, (4) communications, (5) earth observation, and (6) astronomical observation. This list shows that few applications involve a requirement for artificial gravity. Presented is a graph defining the rotational characteristics needed in conjunction with interpretation of physiological responses (comfort zone). Elementary forms (cross, rim, flywheel, cylinder, axial modules, in plane modules) considered for space stations are evaluated and diagrammed.

343

Hillaby, J. 1957 FLYERS DESCRIBE FLOATING IN AIR
Sci. Digest, Vol. 41, Feb. 1957

344

Hitchcock, F.A. 1956 PRESENT STATUS OF SPACE MEDICINE.
J. Astronautics 3(2):41-42, 51-52

ABSTRACT: In addition to suitable environment in cabin of space ships, there are certain unavoidable physiologic stresses which must be tolerated, including accelerative forces incident to take-off from earth, effects of gravity free state, hazards involved in exposure to cosmic radiation and possibility of collision between space ship and meteorite; from physiologic and medical standpoints there seems to be no insuperable obstacles to space flight

345

Hitchcock, F. A. 1956 SOME CONSIDERATIONS IN REGARD TO THE PHYSIOLOGY OF SPACE FLIGHT. Astronautica Acta 2:20-24

ABSTRACT: The physiological stresses that will be encountered in space flight are considered. Exposure to barometric pressures lower than 47 mm Hg (63,000 feet) will produce all of the harmful effects that would occur in a vacuum. Therefore from a physiological viewpoint any flight above 63,000 feet may be considered as space flight. In such flights sealed-cabins provided with an air conditioned artificial atmosphere must be used. While compressed, liquid or chemical oxygen might be satisfactory for flights of short duration the biological method of providing such atmospheres is probably the best. Thermal stresses, Accelerative forces and cosmic radiation are some of the other factors which must be considered. The physiological responses of living animals to a vacuum are discussed. It is concluded that none of these physiological problems is unsurmountable. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space Medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903; ASTIA AD-227 817; Feb. 1959)

346

Hitchcock, F. A. 1959 SPACE MEDICINE
Modern Med., 27(18):210-218,222,226-228. 15 Sept 1959.

ABSTRACT: A brief historical survey of early research of space medicine in the United States is presented. The engineer and the physiologist will both have an important function in the development of space travel. The engineer must develop three distinct types of space craft, all of which will be different in structure and function. The physiologist must concentrate his efforts on the ypes of stress that passengers and crew will experience. These stresses include: excessive acceleration, weightlessness, extreme heat, explosive decompression, supply problems, and composition and pressure of atmosphere.

347

Holden, G.R., J.R. Smith, & H.A. Smedal 1961 PHYSIOLOGICAL INSTRUMENTATION SYSTEMS FOR MEASURING PILOT RESPONSE TO STRESS AT HIGH G AND ZERO G. (Paper, 32nd Annual Meeting, Aerospace Medical Assoc., 24-27 April 1961, Chicago, Ill.)

ABSTRACT: An airborne physiological instrument system reported in NASA TN D-351 has been modified and additional tests have been made in the University of Southern California and AMAL centrifuges and in an F-104B airplane. These tests covered various levels of acceleration from zero to 8 g. The measurements made were, in part: ECG, blood pressure, pulse wave, respiration rate and volume, and carbon dioxide content of expired air. The data from a three-lead electrocardiograph were recorded, using a unique balance transistor amplifier. Systolic and diastolic blood pressures were measured using an automatic sequencing occluding arm cuff and microphone stethoscope. Pulse wave on the wrist was obtained with a vasochromograph and a.c. amplifier. Several methods were used to measure respiration rate, and respiration volume was measured with a wedge spirometer. The expired air was analyzed for CO2 content with a very much modified Bechman LB-1 gas analyzer. The quanitative effects of short term periods of zero g on pilot control performance were determined by measuring the tracking accuracy, the equivalent analytical transfer function and the physiological condition of a subject in the rear seat of an F-104B airplane being flown in a 60-80 second zero g trajectory. A tracking task played back from a tape recorder was presented to the subject on an oscilloscope. The subject used a sidearm controller to attempt to wipe out his tracking error. A small airborne analog computer computed the simulated airplane's response to the control motion and changed the tracking display accordingly. The experiment was repeated and thus affords a direct comparison with a study of pilot control behavior previously conducted on ground-based simulator and centrifuge. (Aerospace Med. 32(3):235, March 1961)

348

Holden, G. R. et al 1962 PHYSIOLOGICAL INSTRUMENTATION SYSTEMS FOR MONITORING PILOT RESPONSE TO STRESS AT ZERO AND HIGH G
Aerospace Medicine 33(4):420-427, April 1962.

SUMMARY: A physiological instrumentation system capable of recording the electrocardiogram, pulse rate, respiration rate, and systolic and diastolic blood pressures during flight has been developed. The recording of respiration volume and exhaled carbon-dioxide percentages as well as the nitrogen content of the expired breathing air has been added for centrifuge use. This instrumentation was designed for use during control studies at varied levels of acceleration in order to monitor the well-being of the pilot and at the same time to obtain data for study of the relationship between his various physiological functions and his performance capability.

349

Holmes, B. 1962 MANNED SPACE FLIGHT
AIBS Bulletin 12(5):56-59, Oct. 1962

ABSTRACT: Four National Aeronautics and Space Administration programs, Mercury one-day missions, Gemini, and Apollo, are discussed together with expected problem areas. The final phases of the Mercury program (orbital flight of short duration) are intended to amplify and expand the basic data obtained during the Glenn and Carpenter flights. The one-day missions program will extend the time of weightlessness and allow further assessment of the physiological effects of this phenomenon. This extension is of prime importance since during the lunar mission the astronauts will be weightless for some five days. The Gemini program will extend capability to orbital flight for two men for approximately 10 days. Aims of this program are to develop rendezvous techniques and gain further insight on the effect of prolonged weightlessness. The fourth major program, Project Apollo, will be the logical culmination of the previous three programs. It is aimed at landing men on the Moon and returning them to Earth. The problems raised by these programs are not insurmountable and many of them can be recognized far enough in advance to perform the research and development necessary to solve them.

350

Hozak, J. 1960 RECENT DEVELOPMENTS IN AVIATION MEDICINE
South African Med. J. 34(28):582. July 9, 1960.

ABSTRACT: This is a summary of a paper presented at the Staff Scientific Meeting of the South African Institute for Medical Research. The meeting was held at Johannesburg on March 8, 1960. The three important factors affecting space ships are presented and discussed. Those three factors are as follows: the physical environment of space; speed of space craft in relation to linear, anbular, and radial acceleration; and distance space craft will travel over and away from the earth. There is also a discussion of medical problems during a flight including weightlessness, orientation, and the "break-off" phenomenon.

351

Horak, J. 1960 SPACE MEDICINE.
South African Med. J. (Cape Town) 34(53):1117-1122, 31 Dec 1960

ABSTRACT: Current space travel may be classified as being in a phase of global space-equivalent flight, as defined by the combined factors of the physiological and mechanical properties of the space environment, the speeds attained in space flight, and the distances rockets travel over and away from the earth. The attendant medical problems are basically those of high altitude flight as we know it today, and most of the problems involved in true space flight are encountered in the stage of global space-equivalent flight.

352

Houbolt, J. C. 1960 CONSIDERATIONS OF THE RENDEZVOUS PROBLEMS FOR SPACE VEHICLES. (Preprint No. 175A, Soc. Automotive Eng., Apr. 1960)

353

Howard, P. 1961 PHYSIOLOGICAL PROBLEMS OF SPACE FLIGHT
New Scientist (London) 10(231):106-108. April 1961.

ABSTRACT: This is a presentation of the problems of acceleration, deceleration and weightlessness during space flight. Centrifuge studies have been the source of most acceleration studies. Controlled parabolic flight studies in which the weightless state was sustained for about forty seconds have yielded information on feeding, drinking and excreting waste products during weightlessness and the effects of the weightless state on the nervous system. Because deceleration and acceleration have the same properties, the same precautions must be taken to avoid exceeding the limits of tolerance. Deceleration limits during re-entry is discussed.

354

Humphries, J. 1957 SOME IDEAS IN ASTRONAUTICS
Aeronautics, 35:41-42, Jan. 1957

ABSTRACT: Summaries of papers presented at the 1956 Congress of the IAF in Rome. The papers were concerned with solar power for propulsion, biological hazards of space flight, and effects of weightlessness

WEIGHTLESSNESS

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Iazdovskii, V. I., E. M. Iuganov and I. I. Kasian 1960 USTANOVOCHNYI REFLEKS INTAKTNYKH ZHIVOTHYKH V USLOVIIAKH NEVESOMOSTI (Postural Reflexes of Intact Animals Under Conditions of Weightlessness) Izvest. Akad. Nauk S.S.S.R. Ser. Biol. (Moscow) 25(5):762-767, Sept. - Oct. 1960. (In Russian).

ABSTRACT: The postural reflexes were studied in two white rats and two white mice during a rocket flight involving a sevenfold increase in gravity and a nine-minute period of weightlessness. The animals were enclosed in a sealed cabin of the regenerative type with normal atmospheric conditions. Food and drink were freely accessible. Individual and species differences were shown for motor activity during weightlessness. Within 40-45 seconds of weightlessness the movements of the animals became less discoordinated, slower, and smoother. Although the length of time necessary for full adaptation of postural reflexes to weightlessness cannot be estimated at this time, the first signs of adaptation are manifested after 40-45 seconds

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IGY Satellite Panel 1958 IGY SATELLITE PANEL PROPOSES NATIONAL SPACE FLIGHT PROGRAM
Astronautics 3:132, May 1958

ABSTRACT: Recommendations for a five-year program costing about $150 million a. nually include projects "centering on biological experiments crucial to the eventual attainment of space flight; investigations of lunar gravity or mass, magnetic field and atmosphere; planetary and interplanetary probes; determination of the astronomical unit (A.U.) now estimination of planetary masses and their effects of the path of nearby space vehicles; and observation of an instrumented re-entry body as it plunged into the planet's atmosphere."

357

Ingram, W. T. 1957 ENVIRONMENTAL PROBLEMS CONNECTED WITH SPACE SHIP OCCUPANCY In The Proceedings of the 3rd Annual Meeting of The Society of the American Astronautical Society, New York

358

Ingram, W. T. 1958 ORIENTATION OF RESEARCH NEEDS ASSOCIATED WITH ENVIRONMENT OF CLOSED SPACES. (New York University College of Engineering, N. Y.) Rept. No. AFOSR TN-58-106; Contract AF 18(603)71; ASTIA AD-152 015 (Paper, American Astronautical Society in New York, Jan. 30, 1958)

ABSTRACT: A study is being made of closed ecological systems and the engineering techniques requisite to the handling, treatment, and disposal or recycling of materials appearing as wastes and by-products of human occupancy of the closed space. The study indicates that temperature control, air motion development, removal of particulate matter, elimination of odors and control of microorganism populations may be feasible with modifications of present day commercial equipment. A train of materials can be established such that turbulent air from the confined cabin would be drawn through an activated carbon filter, a millipore, or deep bed filter, and chemical train for specific materials such as CH_4, H_2S, etc. By the time the air has passed through the train most of the gross impurities will have been removed. This leads to the assumption that the room air may provide the purest source of water available in the confined ecological system. The human body itself, may act as a purification plant and receive these materials through inhalation, skin, or oral intake, and detoxify them, if necessary, passing them out as waste products.

359

Isakov, P. K. 1955 PROBLEMS OF WEIGHTLESSNESS. Nauka i Zhizn 22:17-20 Translated in Krieger, F. J., ed., A Casebook on Soviet Astronautics, Appendix XX, pp. 229-239, RAND Research Memo RM-1760, ASTIA AD 108 750, June 1956

360

Isakov, P. 1958 ON LAUNCHING A SINGLE-STAGE GEOPHYSICAL ROCKET TO AN ALTITUDE OF 450 KM ON AUGUST 27, 1958 Kr. Zvezda (USSR) Sept. 2, 1958 (Air Technical Intelligence ctr., Wright-Patterson AFB, Ohio, Rept. No. IR-1612-58, 1958)

ABSTRACT: This paper discusses the flights of dogs in non-hermetic chambers up to altitudes of 110 km, and in hermetically sealed cabins to an altitude of 212 km.

361

Isakov, P. 1958 LIFE IN SPUTNIK Astronautics 3(2):38-39, 49-50

ABSTRACT: Problems involved in keeping living organisms in space-examined by Soviet biologist, preventing escape of gases from liquids in organisms by combination of two methods-namely maintaining necessary barometric pressure in chamber and use of specially designed clothing or space suits. Solar and cosmic radiation studied; effects of acceleration on organisms of animals and humans.

362

Isakov, P. I. 1959 LIVING CONDITIONS ON ARTIFICIAL SATELLITES OF THE EARTH. Iskusstvenn'vye sputniki Zemli (Artificial Earth Satellites). Chap. IV:44-59. Moskva. (translation)

ABSTRACT: This chapter of the monograph presents in the form of questions and answers information on biological data of space flight. Under discussion of the medical and biological problems of man in space flight a basic problem is that of acceleration and weightlessness

363

Isakov, P. 1961 PROBLEM OF WEIGHTLESSNESS (USSR)
Meditsinskiy rabotnik, 15 Aug. 1961, p. 3, cols. 1-4

ABSTRACT: Subjected to weightlessness, mice were found to suffer loss of coordination in movement. However, with the vestibular nerve removed, the animals showed no disruption of movement while in a state of weightlessness. The role played by vestibular stimulation "indicated what form the training of astronauts should take to lessen the effect of disorientation."

364

Iuganov, E. M., I. I..Kasian and V. I. Iazdovskii 1960 O MYSCHECHNOM TONUSE V USLOVIIAKH NEVESOMOSTI (Muscle Tone During Conditions of Weightlessness)
Izvest. Akad. Nauk S.S.S.R. Ser. Biol. (Moscow) 25(4):601-606, July - Aug. 1960. (In Russian with English Summary).

ABSTRACT: The nature and degree of change in the eye muscle tone of a rabbit was investigated during alternating super- and sub-gravitational conditions. Movements of the left eye were filmed during rocket flight (with accelerations up to 6.5 g. and a weightless period of 5 minutes) from the moment of take-off throughout the flight. Control experiments were done under laboratory conditions employing a centrifuge, whereby the acceleration forces attained were analogous to those in flight. The vertical displacement of the eyeball during flight suggests a decrease of the tonic tension of eye muscles during weightlessness. Displacement of the projection of the visual after-image into distance during alternating super- and subgravitational states (oculogravic and agravic illusion) is apparently caused by the vertical displacement of the eyes, brought about by reflex stimuli from the otolith apparatus.

365

Iuganov, E. M., P. K. Isakov et al 1962 MOTOR ACTIVITY IN INTACT ANIMALS IN CONDITIONS OF ARTIFICIAL GRAVITY.
In Izv. Akad. Nauk. SSSR (Biol) 3:455-460, May-June 1962 (Russian)

366

Ivanova, M. P. and A. S. Barer 1962 SOVIET STUDIES IN THE EFFECTS OF WEIGHTLESS AND PHYSICAL EXERTION
(Joint Publications Research Service, Office of Technical Services, Dept. of Commerce, Washington, D. C., 10 Aug. 1962) Rept. No. JPRS-14796.

ABSTRACT: Ivanova, M. R., "Changes in the Biopotentials of the Human Brain in Connection with Physical Work," pp. 1-15.
Barer, A. S., "The After-Effect of Singly and Repeatedly Acting Antripetal Accelerations on the Higher Nervous Activity of Animals,"pp. 15-30.

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367

Jacobs, H.L. 1960 THE LACK OF BEARING CONTACT AND THE PROBLEM OF WEIGHTLESSNESS: THE EFFECT OF PAST EXPERIENCES ON HUMAN PERFORMANCE ON A FREE-ROTATING, LOW-FRICTION TURNTABLE
Ann. N.Y. Acad. Sci., v. 84, Art. 9, Sept. 30, 1960, pp. 308-328

ABSTRACT: Investigations were conducted on the performance of liberal art students, swimmers, and engineers in the absence of bearing contact was investigated on a low-friction, oil-bearing turntable. Selection of the subjects was made on the basis of differences in past experiences and training considered relevant to the performance of the tasks. Consequently, the liberal arts students were considered naive because they had not had any college or high school physics courses. The swimmers also had no training in physics but had experience with the type of arm and leg control of body movements generally applicable to the no bearing contact situation. Because the engineering students had completed one year of college physics plus courses in statics and dynamics, they were classified as conceptually sophisticated. During the test, each subject was required to perform the following tasks: (1) in the standing position with the turntable stationary, but free to rotate, make one complete turn without shifting the feet or jumping; (2) in the standing position with the turntable spinning, to stop the rotation as quickly as possible. A hand-held gyroscope was available for use by the students. After observing the performance of the students, it was concluded that (a) college students learned to perform equally well in this situation; (b) engineering students were not able to make efficient use of their familiarity with mechanics to aid in the performance or understanding of the tasks; and (c) engineering students were able to use their knowledge of mechanics to understand the use of a hand-held gyroscope as a tool in these tasks

368

Jacobs, H.L. & E. Burgess, eds. 1960 ADVANCES IN THE ASTRONAUTICAL SCIENCES Vol. VI (New York: Macmillan, 1961)

ABSTRACT: Proceedings, AAS Sixth Annual Meeting, New York, Jan. 18-21, 1960. Contents include: White, S.,D.D. Flickinger, T.V. Helvey, A. Mayo and B. Rowen, "Panel Discussion: Man in Space, When?", Pp. 37-69.

369

Jakubski, Z. 1962 THE WORLD'S FIRST TANDEM FLIGHT IN SPACE (BASIC RESULTS) (PERVYI V MIRE GRUPPOVOI POLET V KISMICHESKOE PROSTRANSTVO ((OSNOVNYE ITOGI)))
(Space Technology Laboratories, Inc., Redondo Beach, Calif., Trans. no. 70, Nov. 1962)
In: Pravda, no. 295(16151), Oct. 22, 1962, pp. 1-3

ABSTRACT: During the Vostok 3 and 4 space flights, experiments in weightlessness were conducted. Nikolaev floated in the capsule for a total of 3.5 hours and Popovich for about 3 hours. During that time, they felt fine, conducted observations, and communicated with the ground by means of microphones. They also conducted several experiments within the capsule.

370

Johns,T. R. and S. Thesleff 1960
EFFECTS OF MOTOR INACTIVATION ON THE CHEMICAL SENSITIVITY OF SKELETAL MUSCLE

Acta physiol. scand., 51:136-141, 1961
ASTIA AD 262 290

ABSTRACT: In order to determine whether the lack of motor nerve impulses without denervation per se, alters the chemically sensitive area in skeletal muscle, the size of the ACh-sensitive areas in muscle fibres of cat tenuissimus were measured after isolation of the motor neurones by severence of the dorsal roots below a lower lumbar cord transection. The sensitivity of the individual muscle fibre to ACh was determined by iontophoretic micro-application of the drug, and by intracellular recording of the potential charge. The frequency of miniature end-plate potentials, their amplitude, and their time course, were unaffected by the isolation procedure. The procedure also caused little increase in the size of the ACh-sensitive surface. Therefore, inactivation per se did not alter the chemically sensitive area. (AUTHOR)

371

Johnson, G.E., J. Serrano, and E.Z. Levy 1959 APPLICATION OF SKIN RESISTANCE IN PSYCHOPHYSIOLOGICAL STUDIES. (Wright Air Development Center, Aerospace Medical Lab., Wright-Patterson AFB, Ohio)
WADC TR 59-688, Dec. 1959.

ABSTRACT: The usefulness of measuring changes in skin resistance as a device to detect the impairment of consciousness in personnel whose work requires maximum alertness was investigated during isolation, in flight, under acceleration, under the influence of drugs, and other conditions. These experiments have determined that the use of skin resistance for monitoring of consciousness is promising, however, further studies are necessary before this method may be used as an operational tool. The effects of temperature and environmental changes must be eliminated, and the patterns of skin resistance must have better quantification.

372

Johnson, S.P. 1960 PLANT GROWTH UNDER NEAR-ZERO GRAVITY
Paper: 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960

ABSTRACT: Closed ecological systems of space vehicles or stations will probably make use of algae or broadleaf plants for food and oxygen production. Apparently, plants in general do not have a special requirement for a gravitational field. The algae are largely oriented by the light source. The broadleaf plant above ground is oriented by light in the blue end of the spectrum. Root systems seem to respond more to oxygen tension and moisture levels in the soil than to gravitational fields. Several cabinets have been designed to study the plant requirements for gravity. Germinating seeds and plants are illuminated with blue, red and white light from below. Results of these experiments are presented. The problem of moisture supply appears to be a major one. A cabinet has been designed to study this problem. Preliminary studies have shown that pressurized aerosol feeding of the root system overcame the problem of supplying moisture to the root system. However, return of the aerosol spray to the system has not been solved.

373

Jones, D.C., J.H. Shaw, et al 1961 PRELIMINARY INVESTIGATION OF INTERPLANETARY LUNAR AND NEAR PLANET ENVIRONMENTS AND METHODS OF SIMULATION
(Aeronautical Systems Division, Wright-Patterson AFB, Ohio) ASD TR 61-267
July 1961 ASTIA AD 268 791

ABSTRACT: Summaries of the natural environments of Mars, Venus, the Moon and interplanetary space are presented. The primary induced environmental stresses associated with thermal radiation, cosmic atomic and subatomic radiation, meteoroid particles, vibration, shock, acceleration, and low pressure are described for operation near the above bodies including range of anticipated values and methods of simulation. Additional simulation techniques associated with temperature, heat flux and atmospheric composition are discussed. An environmental test philosophy and a summary of heat transfer characteristics of high speed vehicles are included. Important areas not covered in this report are combined, induced environments associated with atmospheric entry and biological effects and nuclear reaction radiations. (Author)

374

Jones, E. W. 1962 WHAT DOES "WEIGHTLESSNESS" REALLY MEAN
Space Aeronautics 38(5):65-67, Oct. 1962

ABSTRACT: A discussion is presented of the dynamic aspects of suborbital, orbital and escape flight in relation to weightlessness and gravity, with detailed calculations and formulas. When a body is exposed to the gravitational acceleration towards the Earth's center, and the rate of change of the velocity of fall is equal to g, the body is in free fall and in a state of null gravity. In a suborbital flight during re-entry, the body of a 161 pound astronaut may reach a weight of 1760.9 pounds. If the rate of change of velocity exceeds acceleration due to gravity the astronaut may take on negative weight. In an orbital on a

true spherical path there is a weightless state because there is no net stress or strain on the body in respect to the Earth's center or a point along the orbit path. Zero gravity can not occur in these circumstances, but can only be found at a point where the gravitational field of one body cancels that of another such as between the Moon and Earth. Problems of orientation of the astronaut in relation to gravitational forces are discussed. (Aerospace Medicine 34(3):276, March 1963)

375

Jongbloed, J. 1963 MEDICAL PROBLEMS RELATED TO SPACE TRAVEL. V. WEIGHTLESSNESS.
Nederl T. Geneesk 107:1086-1087, 15 June 1963 (Dut)

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Kalitinsky, A. 1963 NOVA LAUNCH VEHICLE DESIGN STUDIES (Paper, American Astronautical Society Symposium on the Exploration of Mars, Denver, Colorado, June 6-7, 1963) Preprint No. 5.

ABSTRACT: The NOVA design studies currently being conducted under the direction of the Marshall Space Flight Center are aimed at defining the most desirable launch vehicle for the heavy space missions of the 1970's. To help make these missions technically and economically feasible, NOVA must achieve a big step forward in payload capability and cost effectiveness. The task of assembling, in Earth orbit, manned Mars expeditions weighing several thousand tons favors launch vehicles in the million pound payload class. Significant cost reductions can be achieved by recovery and re-use of high cost components or complete stages. Representative NOVA configurations developed by General Dynamics/ Astronautics and Martin/Baltimore, the NOVA Study contractors, are described in this paper.

377

Kama, W. N. 1961 SPEED AND ACCURACY OF POSITIONING WEIGHTLESS OBJECTS AS A FUNCTION OF MASS, DISTANCE, AND DIRECTION. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 61-182; ASTIA AD-260 131; March 1961

ABSTRACT: Human performance in positioning weightless objects was investigated experimentally using an air-bearing frictionless table. The subjects moved each four masses (1000, 3000, 5000, and 7000 gram) various distances (10,20, and 40 cm) in each of two directions over this frictionless table in response to paired light stimuli. The responses were accomplished in complete darkness after the lights were extinguished. Results were analyzed in terms of constant and absolute errors of positioning, and response time. From the investigation, we concluded that:
(1) Mass has little effect on the accuracy of positioning. There is some evidence, however, that response time increases with increase in mass.
(2) Distance is a significant variable affecting the direction of error, accuracy, and speed of positioning responses. Response time increases, and accuracy decreases with distance.
(3) Direction of movement is a significant variable affecting constant error, absolute error, and speed of positioning responses. Subjects tend to undershoot the mark in near to far movements. (AUTHOR)

378

Kama, W.N. 1961 EFFECTS OF SIMULATED WEIGHTLESSNESS UPON POSITIONING RESPONSES (Aerospace Medical Labs., Wright-Patterson AFB, Ohio) Proj. no. 7184, Task no. 718406. ASD Techn. Rept. no. 61-555, Dec. 1961. ASTIA AD 277 288.

ABSTRACT: The speed and accuracy of positioning movements as functions of distance, direction, and mass were investigated under simulated weightless conditions. Subjects seated on a frictionless device made blind positioning movements by sliding each of two frictionless masses (1000 to 7000 grams) various distances (10, 20, and 40 cm.) either left to right or near to far. Both speed and accuracy decrease with distance; left to right movements decreases with increased mass. With minor exceptions, the effects are similar to those noted when fixed subjects position weightless objects. The responses of fixed subjects were slower, but more accurate, and were not affected by the variable of mass.

379

Kas'ian, I. I. 1962 SOME PHYSIOLOGICAL REACTIONS IN MAN UNDER CONDITIONS OF THE ALTERNATING EFFECT OF OVERLOADING AND WEIGHTLESSNESS.
Izv. Akad Nauk SSSR (Biol.) 6:896-908, Nov.-Dec. 1962 (Russian).

380

Kasten, D. F. 1962 ANALYSES OF HUMAN MOTIONS IN ORBITAL SPACE.
(Paper, 33rd Annual Meeting of the Aerospace Medical Assoc., Chalfonte-Haddon Hall, Atlantic City, N. J., April 9-12, 1962)

ABSTRACT: A qualitative review is made of some seldom considered human factors problems which may confront a weightless worker in a space environment. Discussion is based on inflight zero gravity research, mathematical analyses of human motion in earth orbits, and computer simulation studies of orbital rendezvous. Topics covered include: human locomotion and rotation in a weightless, frictionless environment; human factors and engineering considerations for the design of rotating space stations; problems involved in tethering a space worker to his vehicle; and some misconceptions about the weightless state. Some implications are suggested for future space efforts.

381

Katzberg, A.A. & L.H. Mori 1962 ORGAN AND TISSUE CULTURES. I. EMBRYONIC CHICK HEART AND HUMAN CELL CULTURES.
In Prince, J.E., ed., Biologic Systems of Discoverer Satellites XXIX and XXX. (School of Aerospace Medicine, Brooks AFB, Texas)

ABSTRACT: Living embryonic chick hearts were placed aboard Discoverer satellite to observe the effect that exposure to stress factors of a flight in space

could have on a whole organ. Human cell cultures were also studied during the flight of the Discoverer satellites. It was concluded that the viability and the physiologic function of these hearts were not impaired by any of the stress factors that were encountered in space flight. Human cell cultures for both Discoverer satellites XXXIX and XXX showed no obvious degeneration. On being subcultered, those from Discoverer XXX showed normal proliferation. (STAR)

382

Kester, S.G. 1959 SR-183 LUNAR OBSERVATORY. HUMAN FACTORS LUNAR STUDIES. II. INITIAL PARAMETRIC ANALYSIS. (Boeing Airplane Co., Seattle, Wash.) Rept. no. D7-2444, Astia AD-232 322L, 30 Sept. 1959

ABSTRACT: Presents working charts for an initial study of human factors engineering problems associated with space exploration. Qualitative relationships are developed for parameters considered necessary for study in support of a manned extraterrestrial station. The moon serves as an example. Although the parameters emphasize human factors, the charts are intended for general utilization and will be useful for equipment and facilities design for manned extraterrestrial systems.

383

King, A. L. 1962 WEIGHT AND WEIGHTLESSNESS
Amer. Jour. Phys. 30:387, May 1962.

384

King, B. G. 1960 PHYSIOLOGICAL EFFECTS OF POSTURAL DISORIENTATION BY TILTING DURING WEIGHTLESSNESS. (Paper, 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960)

ABSTRACT: Decerebrate pigeons are useful experimental preparations for studying both static and dynamic postural reflexes. The principal advantage of the decerebrate is that it is less readily distracted than the normal pigeon and gives clean-cut reflex responses appropriate to the stimulus. When postural orientation in relation to the gravitational field is disturbed by tilting, the pigeon reacts by a compensatory movement and position so that the head is normally oriented in relation to gravity, regardless of the position of the body. If the head is fixed, compensatory eye movements and positions result. The semicircular canals do not participate in eliciting postural compensatory poses. This presentation reports results of experimental observations on the effects of postural disorientation during short periods of weightlessness. Advantage was taken of the suitability of the tonic postural reflexes in decerebrate pigeons for study of the functioning of the utricular otolith during weightless flights. Observations were made on normal pigeons and on four decerebrates approximately three weeks following operation. Responses to tilting were noted and were recorded photographically during the control and weightless phases of the flights. These responses are compared and interpreted, and illustrative sequences of the motion picture records presented.

385

King, B.G., C.T. Patch, & P.G. Shinkman 1961 WEIGHTLESSNESS. TRAINING REQUIREMENTS AND SOLUTIONS. (U.S. Naval Training Devices Center, Port Wash, N.Y.) Contract N61339-560, NAVTRADEVCEN 560-1, March 1961. ASTIA AD 259 512.

ABSTRACT: Physical principles and biological mechanisms relevant to human performance under conditions of weightlessness have been explained in order that the trainee can develop an appreciation of how the unaccustomed environment will affect his behavior. Special emphasis has been given to (a) changes of man's center of mass as various parts of the body are moved with respect to each other, and the significance of CM of body movement, (b) the mechanisms of postural reflexes, including experimental observations of response of pigeons to postural disorientation by tilting during weightlessness, and (c) anticipated changes in the sensory input spectrum and implications of such changes. Models have been proposed as visual aids in providing for cognitive learning aspects of training. The different effects of weightlessness on motor-perceptual and perceptual factors have been identified and solutions proposed for separately training each of these effects. (Author).

386

King, B. G. 1961 PHYSIOLOGICAL EFFECTS OF POSTURAL DISORIENTATION BY TILTING DURING WEIGHTLESSNESS
Aerospace Medicine 32(2):137-140, Feb. 1961.

ABSTRACT: In a study of the labyrinthine function, observations on compensatory poses were made on pigeons (both normal and decerebrate) in a C-131 airplane during normal and weightless flights. Both motion and still picture records were made of responses to tilting, following rotation around the various body axes, and were compared with responses made under normal gravity conditions. The results were discussed in terms of the contribution of the utricular otolith in maintaining static posture of the body during conditions of weightlessness. (Tufts)

387

King, B.G. & M.C. Mans 1962 THE FEASIBILITY OF ESTIMATING THE ENERGY EXPENDITURE OF ASTRONAUTS THROUGH PARTIAL SIMULATION OF WEIGHTLESSNESS (Operations Research, Inc.) NASA contract NASr-170, Tech. Rept. 170, 28 Feb. 1962.

388

Kislik, M.D. 1960 THE MOTION OF AN ARTIFICIAL SATELLITE IN THE NORMAL GRAVITATIONAL FIELD OF THE EARTH.
In Kurnosova, L.V., ed., Artificial Earth Satellites
(New York: Plenum Press) IV, 183-201

ABSTRACT: This paper considers the problem of motion of an artificial satellite

in the earth's normal gravitational field without taking into account the effect of air resistance or anomalies in the force of gravity. The results can be utilized in calculating the orbits of high-altitude satellites and for qualitative analysis of the effect of the earth's oblateness on satellite motion. (CARI)

389

Kitzes, G. 1959 OCCUPATIONAL HEALTH PROBLEMS IN SPACE FLIGHT: IMPORTANT HEALTH PROBLEMS IN THE MAN-IN-SPACE STUDIES AT THE AERO MEDICAL LABORATORY Military Medicine 124(10): 717-719, Oct. 1959

ABSTRACT: Problems related to man's survival in space are briefly reviewed and categorized. The primary objectives of space-medical research are to provide an environment, workspace, and sustenance for the space traveller that will allow him to carry out his mission with maximum efficiency and protect him from irreversible injurious body changes. Basic requirements -- physiologic (metabolic environmental), psychologic (isolation, weightlessness, workspace, reduced sensory environment), and requirements pertaining to protection (from radiation, toxic chemicals and odors, noise and vibration, acceleration, natural infection, disorientation) are outlined.

390

Knight, L. A. 1958 AN APPROACH TO THE PHYSIOLOGIC SIMULATION OF THE NULL-GRAVITY STATE. J. Avia. Med. 29(4):283-286, Apr. 1958

ABSTRACT: While studying the physiolcgical effects of prolonged weightlessness the similarities between the condition of a body floating in space and that of a body floating in water were noted, and the conclusion was drawn that weightlessness is the absence of external forces acting on the body. It was assumed that a physiologic condition approaching that observed in the null-gravity state could be simulated by obscuring vision, immersing the subject in water to eliminate tactile and proprioceptive cues, and positioning him in the supine, head-down orientation. A preliminary experiment (three subjects acquaint ed with ccnditions of null-gravity) was conducted to investigate the matter of spatial orientation during immersion in water, and to establish values for the threshold of sensitivity of the otolith organ to change in position.

391

Koelle, H.H. ed. 1951 HANDBOOK OF ASTRONAUTICAL ENGINEERING (New York: McGraw-Hill Book Company, Inc.)

392

Konecci, E. B. 1958 HUMAN FACTORS IN SPACE FLIGHT.
Aero/Space Engng. 17(6):34-48, June 1958

ABSTRACT: This paper lists possible human factor problem areas in space flight under three headings: physiological, human engineering, and psychological-social. Space cabin requirements for the human operator are also listed with discussion of the following: cabin environment, decompression, cosmic radiation and weightlessness.

393

Konecci, E. B. 1959 MANNED SPACE CABIN SYSTEMS, ADVANCES IN SPACE SCIENCE, VOL. I (New York: Academic Press, 1959)

ABSTRACT: Discusses the fundamental requirements for manned space flight, including the human factors involved. Reviews the possible physiological, psychological and human engineering problems to be encountered in space flight Under psychological factors emphasizes crew selection, confinement, isolation, and performance. Outlines the examinations and psychological tests given to selected Project Mercury astronauts.

394

Koshtoyants, Kh. 1960 TESTING SPACE SHIP CABIN
Pravda, May 19, 1960, p. 4, cols. 1-5

ABSTRACT: The pressurized cabin is the most important feature of the space ship satellite. Successful results have already been obtained in the regeneration of atmosphere. Biologists are solving the metabolic problem by transforming the pressurized cabin into a closed system with constant temperature, moisture, and atmospheric regeneration. Acceleration and weightlessness affect the nervous system, particularly its perceptive or receptory functions, which can cause the coordination of an organism's physiological functions to break down. (CARI)

395

Kositskiy, G. I. 1959 MAN IN COSMIC FLIGHT
Zdorov'ye (Moscow) 10:4-6, Oct. 1959

ABSTRACT: The first section, entitled 'How the Weight of the Body Changes," deals with the physiological effects of weightlessness and high G forces, and means of counteracting them with centrifugal force and special anti-G suits. Sechenov's theory that brain activity is impossible without a continuous flow of nerve impulses from the sensory organs is reviewed; the author states that centrifugal force would provide the necessary vigorous stimulation of the

sensory organs. According to recently obtained data on respiration and heart function in experimental animals, the absence of gravity alone does not seem to affect these functions in any special way; however, it is not yet clear how the activity of the higher branches of the brain would be affected under similar conditions. The second section, entitled "Insidious Dangers", discusses the oxygen-carbon dioxide balance necessary for the smooth functioning of the human organism. The third section, "In the Zone of Cosmic Radiation" discusses the possible effects of cosmic rays on the human organism. (CARI)

396

Kositskii, G.I. 1960 CHELOVEK V KOSMICHESKO POLETE (MAN IN SPACE FLIGHT) Zdorov'e (USSR) 10:4-6, 1959 (Air Technical Intelligence Ctr., Wright-Patterson AFB, Ohio) Rept. No. ATIC-1419621, 17 June 1960.

ABSTRACT: The article deals with accelerative stress and other ecological problems of Space flight.

397

Kositsky, G. 1961 NOTES ON THE PHYSIOLOGY OF FLIGHT Moscow News, May 20, 1961

ABSTRACT: The author discusses severla problems of man during space flight. First among them is excess strain on the organism starting with acceleration. The most effective protection is a special anti-excess-strain suit and an adoption of the correct position. Weightlessness is a problem in space flight. However, Gagarin's flight proved that man adapts quickly to weightlessness and does not experience any particular inconveniences. An important problem is the maintenance of necessary living conditions in the cabin of a spaceship. Short flights have simply used a chemical process but longer flights will use biological methods such as a closed-cycle system. The problem of protection from radiation - hard x-rays and above all cosmic rays - is also difficult. (CARI)

398

Kousnetzov, A. G. 1958 SOME RESULTS OF BIOLOGICAL EXPERIMENTS IN ROCKETS AND SPUTNIK II. J. Aviation Med., 29(11):781-784.

ABSTRACT: This is a review of Russian biological experimentation in space flight as presented by A. G. Kousnetzov, Chief of the Physiology Department of the Soviet Air Force Scientific Research Experimental Institute of Aviation in Moscow, in a paper delivered at the Third European Congress of Aviation Medicine, Louvain, Belgium, in September 1958. Since 1949, Soviets have been investigating the effects of space flight on animals

The first and second phases of the study involved catapult launching and parachute descent. The third phase culminated in animal-rocket launchings to a height of 473 km. No major physiologic changes resulting from the experiments were observed in the animals. The launching of Sputnik II carrying the dog, Laika, was a biological experiment to observe all of the conditions of space flight. Data concerning the condition and behavior of the animal were successfully transmitted and received. No physiologic manifestations of the effects of cosmic radiation on the animal were discovered.

399

Krivetsky, A., W. H. Bauer and others 1962 RESEARCH ON ZERO-GRAVITY EXPULSION TECHNIQUES. (Bell Aerosystems Co.) Rept. no. 7129-933003; ASTIA AD 274 044.

ABSTRACT: Synthesis of Expulsion Devices: Morphological approach and expulsion device methods. Expulsion Device Configuration: Diaphragm-type configuration, Bladder-type configuration, Mechanical systems, Surface forces, Orientation systems, Controlled deformation or folding configuration, Hybrid or miscellaneous systems, Electric and magnetic expulsion devices, and chemical. Space Environment: Temperature, High vacuum, Radiation, Extraterrestrial Environments, Accelerations, and Sonic fatigue. Material Considerations: Material-propellant compatibility, Permeability, Radiation, Elongation and ductility, Temperature, Yield strength, Ultimate Metal-to-metal compatibility, and Vacuum effects. Slosh and Vibration Characteristics: Bladder considerations, Cavitation and fuel spray, Elastic tank breathing mode, and Acoustic modes.

400

Kuehnel, H.A., W.O. Armstrong, J.J. Van Bockel & H.I. Johnson 1962 PILOT PERFORMANCE. In Results of the Second United States Manned Orbital Space Flight, May 24, 1962 (National Aeronautics and Space Administration, Washington, D.C.) pp. 63-68, NASA N 62 14691

ABSTRACT: The results of the MA-7 orbital flight of astronaut M. Scott Carpenter indicate that man can function effectively in a space environment for periods up to 4½ hours. The pilot demonstrated his ability to operate scientific apparatus successfully in a space environment and to obtain useful data for the analysis of scientific problems associated with a terrestrial space environment. The results of the flight provide additional evidence that man is ready for a more extended mission in a weightless environment. Flight difficulties occurring during the mission served to emphasize that the primary attention of the pilot be devoted to management of spacecraft systems and detailed attention to operational functions.

401

Kulwicki, P.V., E.J. Schlei and P.L. Vergamini 1962 WEIGHTLESS MAN: SELF - ROTATION TECHNIQUES. (Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson AFB, Ohio) AMRL TDR 62-129, ASTIA AD-400 354

ABSTRACT: To be an effective weightless work, an individual must be able to achieve and maintain a stable attitude with respect to his vehicle. If the work is to have this capability, he must be able to control both translation and rotation. Translation may not be controlled without hardware, whereas rotation may. The purpose of this study was to investigate the possibility of body rotation by limb manipulation. This self-rotation is analyzed by the application of theoretical mechanics to a rigid mathematical model composed of six cylindrical segments A quantitative of six cylindrical segments. A Quantitative evaluation, based on the mathematical model, is made for one maneuver to determine the expected degree of rotation. As a result of this analysis, a series of selected maneuvers are proposed to give man the capability for rotation about three mutually perpendicular axes. The nine maneuvers are intended to provide an effective rotation, while reducing undesirable coupled rotations. In addition, the stability of rotation of various geometrical shapes is investigated to determine if man can expect a self rotation maneuver to be stable. (Author)

402

Kulwicki, P. V. and Peoples, G. 1962 CONTROL ROTATION AND STABILIZATION FOR THE ORBITAL WORKER (Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson, AFB, Ohio) AMRL Memorandum Report P-21, December 1962.

403

Kuznetzov, A.G. 1958 SOME RESULTS OF BIOLOGICAL EXPERIMENTS IN ROCKET AND SPUTNIK II. J. Aviation Med. 29:781-784

ABSTRACT: Scientific research work investigating the effect of space flight upon living organisms has been carried on in the Soviet Union since 1949. Penetration of the upper air layers by animals is achieved with the help of rockets. The first thing was to place the animals in specially equipped and hermetically-sealed cabins which were supplied with an air-conditioning system allowing to keep up the gas composition of the air, the temperature, and humidity at the required level so as to make the normal vital activity of the organism possible. The next task was to find out the possibility of separation from the rocket, with the help of a catapult, with a subsequent descent of the animals by parachute. The third stage of the experiments was started in 1958. The launching of animals into space with the help of rockets was effected at the height of 473 (294 miles). Changes noticed in the physiological functions of the animal were brought about by the sudden effect upon the latter of external irritants: acceleration, noise and vibration which appeared at the start and continued when the rocket was placed in orbit. The return to normal of the blood circulation and breathing during the zero-gravity state, when the Sputnik is in orbit, seems to prove that this factor caused no considerable changes nor any stable changes in the physiological functions of the animal.

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404

Lamb, L.E. 1960 INFLUENCE OF AEROSPACE FLIGHT ON THE NORMAL CARDIO-VASCULAR SYSTEM: STRESSES AND EFFECTS.
Am. J. Cardiol. 6(1):8-18, July 1960.

ABSTRACT: A discussion of the adjustments and alterations of cardiovascular functions in response to certain flight stresses. Those flight stresses discussed include hypoxia, acute anoxia, acceleration, positive pressure breathing, relative immobility, decreased barometric pressure, and weightlessness.

405

Langenecker, B. 1954 ZUR FRAGE DER ORIENTIERUNG IM SCHWEREFREIEN ZUSTAND (THE PROBLEM OF ORIENTATION IN THE GRAVITY-FREE STATE) In International Astronautical Federation, Space Flight Problems: Being a Complete Collection of All Lectures Held at the 4th Astronautical Congress, Zurich 1953 (Biel, Switzerland: Switzerland, Laubscher & Cie, 1954)

406

Lansberg, M.P. 1958 THE FUNCTION OF THE VESTIBULAR SENSE ORGAN AND THE CONSTRUCTION OF A SATELLITE
(Paper, 9th International Astronautical Congress, August 27-30, 1958, Amsterdam, Holland)

ABSTRACT: The paper discusses the problem of weightlessness during space flight. More specifically, the problem is putting an object with weight into a weightless satellite. By making the satellite rotate around its own axis, an acceleration will result acting in a radial direction.

407

Lansberg, M. P. 1958 SOME CONSEQUENCES OF WEIGHTLESSNESS AND ARTIFICIAL WEIGHT. (Symposium on Space Medicine, British Interplanetary Society, London, 16-17 October 1958)
J. British Interplanetary Society 17(9):285-288, May-June 1960

ABSTRACT: Physiological consequences of weightlessness are discussed. Artificial

ventilation will be necessary, because of the absence of convection. In the absence of gravitational clues to position, some disorientation may occur and motor activities may have to be relearned, but muscular atrophy is not likely to be a real hazard. It would be unwise to extrapolate from what is experienced during parabolic flights to what can be expected during semipermanent weightlessness.

408

Lansberg, M.P. 1959 COCKPIT OF FIRST SPACESHIP MAY BE LIKE A PADDED CELL (Symposium, Brit. Interplanetary Soc., London 1958) Reprint Space Jan-Mar. 1959, p. 25-27

ABSTRACT: Discussion of problems arising from continual weightlessness. These include (1) Air circulation can no longer be induced by convection; (2) body perception will lack gravitational clues and (3) all muscular activity intended to move an object will have to be relearned.

409

Lansberg, M.P. 1960 A PRIMER OF SPACE MEDICINE
(Amsterdam: Elsevier Publishing Co., 1960)

ABSTRACT: Specific physical, physiological, and psychological problems of manned space flight are presented. Also included is a description of the dynamic conditions of life in a space cabin and man's acceleration tolerance during passage to and from the space station.

410

Lansberg, M.P. 1962 THE PHYSIOLOGIC ACCELEROMETERS
In Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography (National Academy of Sciences, National Research Council) Publication No. 977, Pp. 27-34

ABSTRACT; Physiological accelerometers under conditions of weightlessness were investigated. Three inherent contradictions existing are that (a) the head is held in an inclined position relative to the vertical, (b) the head is rotating around a horizontal axis, and (c) the head is moved along a horizontal path. During weightlessness, it will be man's visual framework that will induce his spatial orientation. Against this background, the three contradictions arise. In the situation where the head is held in an inclined position relative to the vertical, the otoliths signal a symmetric status, albeit a symmetry of zero gravity, and for the higher centers a symmetry means perpendicularity, which is denied by the visual reference. Probably the voice of the otoliths will not be very strong in this instance, and the visual clue will dominate. The reason is that the otoliths respond to change in acceleration rather than to acceleration. In the situation where the head is rotating around a horizontal axis, matters become worse.

There is not only a conflict between otolithic information and visual framework but, worse still, the semicircular canals report a change in attitude which should be corroborated by the message from the otoliths which, however, may default. A disagreement now develops between the two parts of the labyrinth. This disagreement would not arise if the head movement had occurred around a vertical axis, vertical in the man's subjective framework of orientation. The situation where the head is moved along a horizontal path will probably be of less importance because such linear movements do not seem likely to occur.

411

Lanton, R. W. 1962 PHYSIOLOGICAL CONSIDERATIONS RELEVANT TO THE PROBLEM OF PROLONGED WEIGHTLESSNESS: A REVIEW. Astronautical Sci. Rev. 4:11-18, January-March 1962.

412

Lawden, D.F. 1957 THE SIMULATION OF GRAVITY
Brit. Interplan. Soc. J. 16:134-140, Jly./Sept. 1957

ABSTRACT: The artificial gravitational field produced by rotating a spaceship or artificial satellite about its axis is compared and contrasted with normal gravity at the Earth's surface.

413

Lawton, R. W., et al 1960 BIO-ENGINEERING PROBLEMS IN EARLY MANNED SPACE FLIGHT. In St. Whitelock, O. V., ed. Annals of the New York Academy of Sciences 84:29-74, Feb. 1960.

ABSTRACT: This article describes problems to be encountered during early manned spaceflight and offers solutions to those problems.

414

Lawton, R. W. 1962 PHYSIOLOGICAL CONSIDERATIONS RELEVANT TO THE PROBLEM OF PROLONGED WEIGHTLESSNESS. (Paper, 13th International Astronautical Congress, Varna, Bulgaria, September 23-29, 1962)
See also Astronaut. Sci. Rev. 4(1):11-18,31-38.

415

Lawton, R.W. 1962 PHYSIOLOGICAL CONSIDERATIONS RELEVANT TO THE PROBLEM OF PROLONGED WEIGHTLESSNESS: A Review. Astronaut. Sci. Rev. 4(1):11-18, 31-38 Jan-Mar 1962

ABSTRACT: The problems of weightlessness and methods of avoiding its ill-effects are the main subjects of this paper. The following subjects are briefly discussed: general metabolic effects, immobilization and bed rest, submersion, cardiovascular effects, bone demineralization, muscle atrophy, otolith functions, semicircular canal phenomena, the slow rotation room, adaptation, selection and training.

416

Lawton, R.W. 1963 THE PATHOPHYSIOLOGY OF DISUSE AND THE PROBLEM OF PROLONGED WEIGHTLESSNESS: A REVIEW
(6570th Aerospace Medical Research Laboratories, Air Force Systems Command, Wright-Patterson AFB, Ohio) Report No. AMRL-TDR 63-3 June 1963

ABSTRACT: The physiological implications of zero-G as encountered in space flight are discussed and the available research concerning the physiological effects of weightlessness is reviewed. The purpose of this review is to proceed from the present state of knowledge of normal human physiological systems, particularly as their structure and function are affected by gravity, to a consideration of the possible physiological consequences of prolonged human exposure to zero-G. Methods used to produce and to simulate zero-G are briefly reviewed. The data suggesting that prolonged weightlessness will be a deconditioning environment is presented. This data is considered for possible untoward effects of prolonged exposure to weightlessness, and for methods of prevention of undesired effects. The problem of artificial gravity by rotation of a space vehicle is briefly considered.

417

Leavitt, W. 1959 THE WEIRD WORLD OF WEIGHTLESSNESS
Air Force 42:109-110, April 1959

418

Leiderman, P. H. & R. Stern 1961 SELECTED BIBLIOGRAPHY OF SENSORY DEPRIVATION AND RELATED SUBJECTS
(USAF Biomedical Lab., Wright-Patterson AFB, Ohio)
Contract AF 33(616), 6110, Proj. 7220, ASD TR 61 259, July 1961.

ABSTRACT: This bibliography compiles and classifies the available articles and books relevant to the field of sensory deprivation. Included are

review articles; theoretical publications; anecdotal reports; experiemental, clinical, developmental, and social accounts; sleep deprivation; vigilance; level of activation and arousal; animal and physiological studies. American and British publications are reasonably well covered. No references specific to sensory deprivation are found in the literature of other countries. (Tufts)

419

Lelievre, J. 1958 LE VOL A PESANTEUR APPARENTE NULLE (A FLIGHT WITH APPARENT ZERO GRAVITY)
Information Air, March 20, 1958, pp. 7-10

420

Lepper, R. 1960 ZERO G FACILITY.
(Norair Div., Northrop Corp.) Rept. ASRL-TM-60-18Z-3

421

Lerine, R.B. 1960 NULL-GRAVITY SIMULATION
(Paper 1960 Meeting of the Aerospace Medical Assoc., March 9-11, 1960, Miami Beach, Fla.)

ABSTRACT: In a true state of free-fall, cancellation of gravitational and inertial fields results in no tendency for a body to accelerate with respect to its surroundings and in no tendency for the components of the body to accelerate with respect to each other. Although it is not possible to attain such a state in a laboratory at rest with respect to the earth, it is possible to duplicate the effects of weightlessness to varying degrees, and for extended time spans, on a large number of the body functions and sense orgnas. Success of such simulation depends especially on nullification of visual, mechanoreceptor, and vestibular cues to the gravitational vertical, and also on substantial reduction of any work required of the organism by virtue of its being in an uncompensated gravitational field. An artificial environment for simulation of the null-gravity state, based on the concept of Muller (Science 128: 772, 1958), will be discussed; and a comparison of the physiological and psychological effects of such a simulator with corresponding effects to be expected in true null-gravity will be made for several of the important body senses and functions.

422

Levering, B. 1956 THE CASE OF THE CURIOUS CAT: "LUCKY" FLOATS IN WEIGHTLESS REPOSE AT RANDOLPH'S SCHOOL OF AVIATION MEDICINE.
Skyline 14(4):10-13. Dec. 1956.

Experiments on weightlessness are becoming increasingly important to aviation as man approaches space flight. Detailed discussions are made of S. J.

Gerathewohl's investigations with the cat (Lucky) which are a part of a three-fold research project on weightlessness which he is conducting at the USAF School of Aviation Medicine. Other portions of the program include studies of human tolerance to weightlessness (wherein volunteer subjects experience weightlessness during parabola flights) and visual illusions during zero gravity (wherein subjects are requested to place a pencil dot on targets.) Mention is made of several other investigations monitored by Dr. Gerathewohl particularly the "sealed cabin simulator" studies (under the immediate direction of H. Strughold) wherein living conditions during space flights are reproduced as closely as possible

423

Levine, R.B. 1960 NULL-GRAVITY SIMULATION.
(Paper, 1960 Meeting of Aerospace Medical Association, Miami Beach, May 9-11)

ABSTRACT: In a true state of free-fall, cancellation of gravitational and inertial fields results in no tendency for a body to accelerate with respect to its surroundings and in no tendency for the components of the body to accelerate with respect to each other. Although it is not possible to attain such a state in a laboratory at rest with respect to the earth, it is possible to duplicate the effects of weightlessness to varying degrees, and for extended time spans, on a large number of the body functions and sense organs. Success of such simulation depends especially on nullification of visual, mechanoreceptor, and vestibular cues to the gravitational vertical, and also on substantial reduction of any work required of the organism by virtue of its being in an uncompensated gravitational field. An artificial environment for the simulation of the null-gravity state, based on the concept of Muller (Science 128:772, 1958), will be discussed; and a comparison of the physiological and psychological effects of such a simulator with corresponding effects to be expected in true null gravity will be made for several of the important body senses and functions. (Aerospace Med. 31(4):312, April 1960)

424

Levine, R.B. 1961 NEW APPROACH TO ZERO GRAVITY TESTS.
Aircraft & Missiles 4:26-29, June 1961.

ABSTRACT: In order to simulate the environment, Lockheed's Null-Gravity Simulator utilizes the process of immersing a man in water. Water immersion gives the following desired effects: (1) the subject loses the ability to detect gravitational support, (2) muscular effort for maintaining posture is reduced, (3) previously stretched, soft tissues no longer perceive the direction and magnitude of the gravitational field, (4) the force of friction between the vessel walls and the subject decreases to zero, and (5) hydrostatic pressures in the circulatory system are nearly equaled by the water pressure. Also included is a physical description of the simulator.

425

Lewis, C. 1958 U. S. AIR FORCE SCHOOL SIMULATES LIVING IN SPACE Aviation Week 68(4):49, 51, 53, 55, 57, 59, 61, Ja. 27, 1958

ABSTRACT: Space research projects conducted by SAM in the following areas: space cabin simulation, psychological testing, weightlessness, and photosynthesis

426

Ley, Willy 1928 DIE MÖGLICHKEIT DER WELTRAUMFAHRT: ALGEMINVERSTANDLICHE BEITRAGE ZUM RAUMSCHIFFAHRTS-PROBLEM (The Possibility of Space Flight: General Agreement of Contributions to the Space Tiavel Problem) (Leipzig: Hachmeister und Tahl, 1928)

427

Lindberg, R. G. & D. F. Mitchell 1962 BIOLOGICAL AND PHYSIOLOGICAL STUDIES OF PEROGNATHUS (POCKET MICE) (Northrop Space Labs., Hawthorne, Calif.) NASA Contract NASr-91; NSL-62-125, NASA N62-15597.

ABSTRACT: The pocket mice (genus Perognathus), native to arid regions in Western U. S. and Mexico, are adaptable to experimentation in space capsules because they have no requirement for intake of drinking water, weigh only 6 to 10 grams as adults, and can readily be induced to hibernate. These hibernating mice can be used in inexpensive, lightweight space experiments to determine the biologic effects of cosmic radiation and prolonged weightless ness. Since cytogenetic effects are one of the principla indices of radiation damage, the Karyotypes of all available species of pocket mice are described. This information will also be useful in the difficult taxonomy of the genus and in potential studies of persistent chromosomal damage in natural populations in the Nevada test stie. The total chromosome sets of Perognathus formosus mohavensis Huey and P. Longimembris panamintinus Merrian are described. Comparisons of the 16 pairs of chromosomes of P. formosus with the 24 pairs of chromosomes of P. Longimembris show striking differences; all of the metacentrics of P. formosus are longer than those of P. longimembris, and the latter species has a large series of small median to submedian metacentrics which are completely absent in P. formosus. For radiation damage analysis purposes, the karyotype of P. formosus may prove quite useful; however, this species is one of the largest of the genus, weighing about 25 grams. One other small species (P. flavus), which may also prove useful and which weighs less than P. formosus, remains to be investigated.

428

Lippisch, A.M. 1963 VEHICLE DESIGNS FOR EXPLORATION OF MARS
Paper: American Astronautical Society Sympoisum on the Exploration of Mars, Denver, Colorado, June 6-7, 1963 Preprint (24)

ABSTRACT: As a result of experiments and studying, the author has drawn the

following conclusions: (a) The atmospheric conditions on Mars will make it possible to use a flying vehicle for exploration of the planet. (b) Flight near the surface of the planet is similar to flight in the Earth atmosphere at altitudes of 18 km or 60000 ft. (c) Power requirement in flight is reduced to 70 percent of the power required to fly the same vehicle on Earth at ground level (d) For flight of longer duration a power plant with a mass ratio of 50 lb/kw would be required under optimum conditions. (e) The development of ultra light weight structures for a high performance aircraft layout should be considered.

429

Lister, W., Jr. 1962 SOVIET PLAN: ARTIFICIAL GRAVITY FOR SPACE SHIPS Herald Tribune (New York), Thursday, April 5, 1962.

ABSTRACT: Soviet scientists will create artificial gravity in future spaceships if a new training program ordered for cosmonauts does not eliminate nausea during prolonged weightlessness. The program, consisting of increased concentration on spinning and springing, is intended to increase the stability of a cosmonaut's inner ear so as to withstand the nausea experienced by Maj. Gherman Titov during his 17-orbit flight last August. If future orbital flights show that space nausea occurs regularly and ground whirling cannot condition a man to withstand it, some artificial gravity--about one-fourth to one-tenth of the force of gravity on earth--will be provided in Soviet spaceships. (CARI)

430

Livshits, G. SH. 1956 O VOZMOSHNOSTI MEZHPLANETNYKH POLETOV. (On the Feasibility of Interplanetary Flight) (Alma-Ata: Kazakhskoe gosudarstvennoe izdatel'stvo, 1956)

ABSTRACT: Space travel and problems connected with its realization are depicted in popular language to acquaint the layman with the tremendous difficulties of achieving space flight. A chapter entitled "Preparation for the Realization of Interplanetary Flight" reviews historical progress of astronautics from the first rocket flights to modern animal rocket experiments and sputniks. It also summarized the findings related to overcoming effects of acceleration and deceleration forces, weightlessness, creation of cabin atmosphere, solar and cosmic radiation, etc.

431

Loftus, J.P. 1960 MOTION SICKNESS DURING A WEIGHTLESS STATE (Paper, Symposium on Motion Sickness in Weightlessness Research, March 1960 Wright-Patterson AFB, Ohio)

432

Loftus, J. P., & L. R. Hammer 1961 WEIGHTLESSNESS AND PERFORMANCE. A REVIEW OF THE LITERATURE. (Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson AFB, Ohio) Proj. 7184; ASD TR 61-166; ASTIA AD-267 041; June 1961

ABSTRACT: The implications of weightlessness as encountered in space flight are discussed, and the known research dealing with the psychological and physiological effects of zero gravity is critically reviewed. Topics are grouped under the headings of orientation, psychomotor performance, and physiological functions, with a special section on methods of research. The major problem area indicated is the effect of weightlessness on gravity oriented sensory mechanisms, particularly the vestibular apparatus, and consequently on both physiological functions and psychomotor performance. An extensive bibliography is included. (AUTHOR)

433

LoMonaco, T. 1948 L'ORGANISMO UMANO RESISTERA ALLE VARIAZIONI AMBIENTALI DI UN VIAGGIO INTERPLANETARIO? (Will the Human Organism Be Able to Withstand the Environmental Changes of an Interplanetary Journey?) Riv. med. aeronaut. 11:84-87

434

LoMonaco, T. 1952 ALCUNI PROBABILI FENOMENI FISIO-PATOLOGICI DELL 'UOMO DURANTE I FUTURI VOLI SIDERALI (Some Probable Physiopathological Phenomena In Man During Future Interplanetary Flights) Riv. med. aeronaut. (Roma), 15(1):3-12

ABSTRACT: Physiopathological aspects of interplanetary flight are discussed, falling in three main categories: (1) changes in speed or direction of a moving body exert forces on the organism which are tolerated best if they are of short duration; (2) reduction of the apparent weight beyond the zone of gravitation would affect the labyrinthic rather than the cardiovascular system and would interfere with muscular coordination; and (3) problems of the environment include maintenance of air supply, temperature, and food, and avoidance of cosmic radiation. Space medicine cannot, at present, give any assurance as to the survival of humans in a space ship.

435

Lo Monaco (Croce), T. 1952 PRIMI STUDI SUGLI EFFECTTI FISIOPATOLOGICI CAUSATI DALLA SUB-GRAVITA IN ANIMALI LANCIATI, DENTRO MISSILI, NELL'ALTO ATMOSFERA (First Studies on the Physiopathological Effects Caused by the "Sub-Gravitation" in Animals Propelled in Rockets into the Upper Atmosphere) Rivista di Medicina Aeronautica (Rome) 16(2): 192-199

436

LoMonaco, T., M. Strollo, & L. Fabris 1956 COMPORTAMENTO DELLA COORDINAZIONE MOTORIA IN SOGGETTI SOTTOPOSTI A VALORI DI ACCELERAZIONE VARIANTI DA 3 A O G. (Behavior of Motor Coordination in Subjects Exposed to Acceleration Values Varying From 3 to 0 G) Proc. International Astronautical Congress, VIIth, (Rome), Pp. 825-839, Sept. 12-22, 1956.

ABSTRACT: Thirty subjects with normal labyrinthine function were exposed, by means of a subgravity tower, to accelerations varying from 3 to 0 G for a total of 8 seconds, of which 4 were spent in subgravity. Under these conditions, studies were made of eye-hand coordination and body equilibrium. During the experiment the subjects showed motor incoordination. Under subgravity conditions there was evidenced an increase of muscle tonus, a sense of levitation, bewilderment and distraction, and various unpleasant sansations. Twenty of the thirty subjects exposed to various consecutive tests demonstrated improvement in the coordination test and a decrease in unpleasant sensations, indicating possible adaptation to experimental conditions.

437

Lomonaco, T., M. Strollo, & L. Fabris, 1957 SULLA FISIOPATOLOGIA DURANTE IL VOLO NELLO SPAZIO: COMPARTOMENTO DELLA COORDINAZIONE MOTORIA IN SOGGETTI SATIOPOSTI A VALORI DI ACCELERAZIANA VARIANTE DA 3 A ZERO G (Physiopathology During Space Flight: Behavior of Motor Coordination in Subjects Exposed to Acceleration Values Varying From 3 G to 0 G) (Presented at Seventh International Astronautical Congress, Rome, 1956) Rivista di Medicina Aeronautica 20(1):76-96 (Suppl. to No. 1, Jan.-Mar.)

438

LoMonaco, T., A Scano, M. Strollo, and F. Rossanigo 1957 ALCUNI DATI SPERIMENTALI FISIOPSICHICI SUGLI EFFETTI DELLE ACCELERAZIONI E DELLA SUB-GRAVITA PREVISTI NELL 'UOMO LANCIATO NELLO SPACIO. (Some Physio-psychic Experimental Data On the Effects of Accelerations and Gravity Predicted for Man Launched Into Space) Riv. med. aeronaut. (Roma), 20(3):363-390. July-Sept 1957.

ABSTRACT: Thirty subjects with normal labyrinthine functions were exposed to accelerations ranging from +3 g (for fractions of a second) to zero g (4 seconds) in a 14-meter-high subgravity tower. The eye-hand coordination was studied by means of an aiming test. Slight but well defined motor incoordination was observed. During weightlessness the majority of subjects experienced a lifting sensation or a feeling of levitation, an increase in muscle tonus, and various unpleasant sensations. Five subjects exposed to several consecutive runs showed an improvement in coordination performance and less severe subjective sensations, indicating an adaptation to the experimental conditions. In 10 subjects, most of whom had already been exposed to the latter experiment, the CF and CF5 leads of the electro-cardiogram during controlled apnea before, during, and after gravity variations showed a marked increase in heart rate which rapidly returned to normal. The coordination test was repeated on five deaf mute subjects whose labyrinthine function was completely failing, and demonstrated good eye-hand coordination during the tower experiments

439

Lomonaco, T., A. Scano, M. Strollo & F. Rossanigo 1958 ALCUNI DATI SPERIMENTALI FISIC-PSICHICI SUGLI EFFETTI DELLE ACCELERAZIONI E DELLA SUBGRAVITA PREVISTI NELL'UOMO LANCIATO NELLO SPAZIO (Some Physio-psychic Experimental Data on the Effects of Accelerations and Sub-gravity Predictable for Man in Space)
Minerva medica (Torino) 49: 61-62, 4 Aug. 1958
See also: Riv. Med. aero. (Rome) 20(3): 363-390, July-Sept. 1957.

440

LoMonaco, T.C., A. Scano, & F. Rossanigo 1958 VARIATIONS OF PSYCHO-PHYSIOLOGICAL DATA IN MAN SUBJECTED TO CHANGES IN ACCELERATIONS BETWEEN 3 AND ZERO G. Riv. di Med. Aero. 21(4):691-704
(In Italian with English summary)

ABSTRACT: Studies were carried out concerning psychophysiologic effects of weightlessness on human subjects (zero G, after an initial acceleration of 3 G) States of subgravity were achieved by drops from a tower 14-m high, which is described in detail. The authors made radiograms of the thorax and electro-nystagmographic recordings during the zero G state. Sensations experienced during the experiment were described by the test subjects upon termination of the experiments. The results show that weightlessness is accompanied by displacement of the heart and the diaphragm. Zero gravity, however, does not induce nystagmus or modify previously induced nystagmus. Among the sensations reported, the feeling of being lifted and of falling into the void was considered unpleasant; some subjects reported loss of the sensation of being tied to the seat. Two subjects who had kept their eyes shut reported that they felt like taking successive upward jumps after the actual fall, which was not perceived as such.

441

LoMonaco, T., A. Scano & F. Rossanigo 1960 COMPORTAMENTO DI ALCUNE FUNZIONI PERCETTIVO-MOTORIE DURANTE IL PASSAGGIO DA CIRCA 2 A 0 G ED INFLUENZA DELL ALLENAMENTO: ESPERIMENTI ESEGUITI CON LA TORRE DI SUBGRAVITA. (Behavior of Some Perceptual-Motor Functions During the Transition from About Two to Zero G and the Effect of Training: Experiments Executed with the Subgravity Tower) Riv. med. aeronaut. (Rome), 23(4):439-456 Oct-Dec. 1960. (In Italian).

ABSTRACT: Tests were conducted on a group of six subjects in order to establish the degree of performance during hyper-and zero gravity. The subjects were required to execute a repetitive task with electrical switches following a pre-established pattern while at rest and when launched on a subgravity tower to various states of gravity. Film was taken during the test for observation at a later time. After mild rectilinear acceleration, the normal subjects could tolerate several short and frequent exposures during weightlessness. Moreover, the subjects could perform simple perceptual-motor tasks. The subjects with restraint devices performed with greater ease and were more accurate than those without restraint devices. Repetition of the task during launches also led to greater accuracy in performance. Although the greater part of the test was only slightly affected provided that the relation between his body and the surrounding objects remained fixed.

442

Lomonaco, T. 1962 CONSIDERAZIONI BIOLOGICHE SUI VOLI SPAZIALI ESEGUITI FINO AD OGGI (BIOLOGICAL CONSIDERATIONS ON THE PRESENT STATE OF SPACE FLIGHT) Rivista di medicina aeronautica e spaziale (Roma) 25(3):431-449, July-Sept. 1962

ABSTRACT: A review is presented of the physiobiological data derived from Russian, American, and French suborbital and orbital flights utilizing animals and humans from 1949 to 1961. The experiments culminated in the orbital flights of the Soviet astronauts Gagarin and Titov in 1961. Neither showed any significant change in cardiovascular or respiratory function during the active phase of the flight. No changes were observed during the period of weightlessness, and no disorders of motion or muscle coordination were recorded. Only Titov suffered from nausea and vertigo for several moments. The first American suborbital flights (1961) were accomplished by Shepard and Grissom, and on February 20, 1962, Colonel John Glenn manned the first orbital flight. Telemetered biological parameters showed Glenn's cardiovascular functions in hyper- and zero-gravity to correspond to previously observed data. Sensory function underwent no change except for a reduction of twilight vision. No labyrinthine disorders were observed during zero-gravity although the astronaut attempted to elicit them by voluntary head movements. On May 24, 1962, the American pilot Carpenter was launched into orbit. During the weightlessness he exhibited tachycardia and great changes in blood pressure (Aerospace Medicine 34(3):271, March 1963)

443

Lomonaco, T., A. Scano & G. Meineri 1962 PHYSIOLOGICAL OBSERVATIONS ON THE MOVEMENT OF HUMANS WITH PARTIAL OR TOTAL ELIMINATION OF BODY WEIGHT. I. MECHANICS OF WALKING AND ITS ENERGY EXPENDITURE. Riv. Med. Aero. 25:623-635, Oct.-Dec. 1962 (It)

444

Loret, B. J. 1961 OPTIMIZATION OF MANNED ORBITAL SATELLITE VEHICLE DESIGN WITH RESPECT TO ARTIFICIAL GRAVITY. (Aeronautical Systems Division, Wright-Patterson AFB, Ohio) ASD TR 61-688; Dec. 1961

ABSTRACT: A design envelope is established as the result of a human factors analysis of the artificial gravity environment peculiar to rotating space vehicles. The envelope is prescribed by: an upper limit on vehicle angular velocity of 0.4 radian/second to minimize the occurrence of "canal sickness"; a basic upper limit on artificial gravity of 1 g; and a basic lower limit on artificial gravity of 0.2 g as the lowest value of g at which man can walk unaided. Both g-limits are modified to compensate for Coriolis forces which cause variation in g-level for tangential walking inside the rotating vehicle. An upper limit on vehicle radius of 180 feet is established on the basis of engineering practicality. The optimum vehicle configuration is established as a Modified Axially Expanded Dumbbell, characterized by a single, cylindrical, living-working compartment oriented parallel to the spin axis, counterbalanced by other vehicle components. The configuration is illustrated in the conceptual Pseudo-Geogravitational Vehicle, which has a radius of 180 feet and an operational angular velocity of 0.4 radian/second to produce 0.9 g in the living-working compartment. (AUTHOR)

445

Loret, B. J. 1962 OPTIMIZATION OF SPACE-VEHICLE DESIGN WITH RESPECT TO ARTIFICAL GRAVITY. (Paper, 33rd Annual Meeting of the Aerospace Medical Assoc., Chalfonte-Haddon Hall, Atlantic City, New Jersey, April 9-12, 1962)

ABSTRACT: A design envelope and the optimum vehicle configuration are established through a human-factors analysis of the artificial gravity environment peculiar to rotating space vehicles. The envelope is prescribed by: an upper limit on vehicle angular velocity of 0.4 radians/sec to minimize occurrence of "canal sickness"; an upper limit of one "g", and a lower limit of 0.2 g to permit unaided walking, both limits modified to compensate for Coriolis effects; and a practical upper limit on vehicle radius of 180 feet. The optimum configuration is characterized by a single cylindrical crew compartment oriented parallel to the spin axis, counterbalanced by other vehicle components. The configuration is illustrated in the conceptual Pseudo-Geogravitational Vehicle of 180-foot radius, rotated at 0.4 radians/sec to produce 0.9 g in the crew compartment.

446

Lovelace, II, W.R. & A.S. Crossfield 1959 BIOMEDICAL ASPECTS OF ORBITAL FLIGHT. Soc. exp. test Pilots, 3(3):41-56, Spring 1959.

ABSTRACT: The biomedical aspects of a manned space flight is the topic of this article. Four stages of performance are required as guides to tolerance needed to obtain an adequate level of functioning of man in the respective phases. The seven phases of an orbit mission and the medical problems of each phase are examined. Also included is a description of the three types of manned orbital vehicles available for use in biomedical research.

447

Lowi, B.H. & T.J. Gallagher 1961 BIO-ASTRONAUTICS RESEARCH: WHAT SHALL WE SIMULATE? In Bergeret, P., ed., Escape and Survival: Clinical & Biological Problems in Aero Space Medicine. (London; New York; Paris: Pergamon Press, 1961) AGARDograph 52. Pp. 108-114. ASTIA AD 261 881

448

Lowrey, R.O. 1960 SPACE FLIGHT SIMULATORS--DESIGN REQUIREMENTS AND CONCEPTS. Aerospace Engineering 19(10):50-56, Oct. 1960.

ABSTRACT: Man's experience in spaceflight will be represented by the sum of the environmental factors which he perceives. The objective of spaceflight simulation is the representation of the total anticipated environment. Existing facilities are insufficient to provide the simulation capability for full exploitation of man's capabilities.

449

Lowry, R.H. 1960 CREW REQUIREMENTS FOR AN ORBITING SPACE STATION. In Proceedings of the Manned Space Station Symposium, (Sponsered by the Institute of Aeronautical Sciences with the cooperation of the NASA and Rand Corporation, Los Angeles, Calif, April 20-22)

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450

Mackworth, N.H. 1950 RESEARCHES ON THE MEASUREMENT OF HUMAN PERFORMANCE (His Majesty's Stationery Office, London) Med. Res. Council, Special Report Serial No. 268

451

Magnolia, L.R. & J.R. Trew 1961 THE LUNAR PROBLEM VOLUME I - BIBLIOGRAPHY (Space Technology Laboratories, Inc., P.O. Box 95001, Los Angeles 45, California STL AB 61-5110-40 ASTIA AD 268 706

ABSTRACT: This bibliography is issued in two volumes. Volume 1 is composed of annotated and abstracted references and is arranged alphabetically by main entry.

Volume 2, the index, provides additional coverage by author, source and fields of interest.

452

Magnolia, L.R. & J.R. Trew 1961 THE LUNAR PROBLEM VOLUME II -- INDEX (Space Technology Laboratories, Inc., P.O. Box 95001, Los Angeles, California) STL AB 61-5110-40 ASTIA AD 268 705

ABSTRACT: This index volume is designed to be used with The Lunar Problem, volume 1, Bibliography. Three areas are covered: author, source and fields of interest.

453

Makowski, J. 1958 APPARENT WEIGHTLESSNESS CALLS FOR NEW DESIGN APPROACH Aviation Age 30:196-203, Sept. 1958

454

Malcik, V. 1961 OTAZKY KOSMICKEHO LEKARSTVI (Problems of Space Medicine) Tvorba (Prague) 26(17): 387-388, April 27, 1961 (In Czech.)
See also: U.S. Joint Publ. Research Service, Washington, D.C., Trans. No. 4717 (1842-S), June 22, 1961

ABSTRACT: This is a review of the physiological problems encountered in space flight. A rotating anti-g capsule may be installed in the space ship in order to keep the astronaut transverse to the direction of acceleration. Although weightlessness does not affect vital functions, it does affect coordination and orientation in space. Vibration is another problem encountered in space flights. Vibrations of high amplitude cause general fatigue and disturb the nervous system, vision, and hearing. The cabin atmosphere may be composed of 60% oxygen, 20% helium, and 20% nitrogen. If so, the high oxygen content and helium will avert some of the consequences of explosive decompression by reduction of cabin pressure. Also included is a discussion of sanitation problems to be solved.

455

Malcik, V. 1961 THE STATE OF WEIGHTLESSNESS AND FLIGHT ILLUSIONS
Rude Pravo (Prague), 13 Aug. 1961, p. 3

ABSTRACT: The author points out that it is virtually impossible to simulate weightlessness and that thus, the actual experiences under this condition on the part of the Soviet astronauts yielded much valuable data. The article reviews some of the findings in experiments with animals during rocket flights and mentions some of the illusions experienced by space travelers, stating that some of these would be of great significance in cases in which the traveler made a forced landing with the space craft. The author stresses the importance of making astronauts aware of the illusions which they may encounter. Physicians and psychologists must cooperate in analyzing and explaining these phenomena to the astronaut. Above all, the astronaut must be taught to rely on the instruments in the space craft and to accept their indications even when his senses indicate that conditions are contrary to what the instruments show. Only thus can the astronaut protect himself and his craft, the author asserts.
An accurate study of the effects of weightlessness can be made only by human space travelers; no instruments or experimental animals can substitute in these experiments, the article states. The article briefly mentions statements made by Gagarin and Titov regarding their reaction to weightlessness.

456

Mallan, L. 1955 MEN, ROCKETS AND SPACE RATS
(New York: Julian Messner, 1955)

ABSTRACT: The accomplishments in rocket technology, which made possible the announcement of a planned earth satellite, are brought together in terms of the men who are pioneering in the design and testing of rocket ships and are risking their lives as the guinea pigs of space medicine to determine the effects of space flight upon human beings.

457

Mallan, L. 1956 SECRETS OF SPACE FLIGHT
(Greenwich, Conn.: Fawcett Publications, Inc., 1956) (Fawcett Book No. 298)

ABSTRACT: A photographic account is presented of rocketry and space flight. Subjects covered include studies in space medicine; escape capsules and rocket sleds; development of the space suit; launch into the stratosphere; training of space pilots, and research rocket takeoff.

458

Maloney, J.A., & F.G. Richardson 1961 TESTS OF A LIFE SUPPORT SYSTEM UNDER SIMULATED OPERATING CONDITIONS. In 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington D.C. (Mt. Prospect, Ill.: Institute of Environmental Sciences) Pp. 379-394

ABSTRACT: As an initial step in man's exploration of space the McDonnell Aircraft Corporation under the sponsorship of NASA has developed a "space capsule" complete with all necessary controlling systems for orbital flights about the Earth. This project, known as Project Mercury, is to place a man in orbit approximately 100 miles above the earth and return him safely. Time required for one orbital revolution will be approximately 90 minutes and the first orbital flight will consist of three orbits making a total flight time of four and one half hours. A primary requirement for a successful orbiting mission is the satisfactory operation of a Life Support System. In addition to the basic requirement to sustain the Astronaut in this flight, there will be periods of "on-the-pad" time prior to launching and "in the ocean" time after re-entry during which the system must provide for the Astronaut's safety and comfort. The satisfactory operation of the life support system of spacecraft must be assured before man can safely venture beyond his normal environment. Complete system operation under conditions as nearly like those expected to be encountered is one means of evaluating design adequacy A program for evaluating and demonstrating operation of the Environmental Control System of the Mercury Capsule was conducted in McDonnell's Systems

The system test installation, instrumentation, methods of simulating essential sapsule environments, test procedures, safety precautions, and medical monitoring instrumentation and methods are described. The basic program for system demonstration is outlined and a brief evaluation of the test installlation is presented. (Author)

459

Marfone, P. & D. Grady 1961 OUTER SPACE ENVIRONMENT SIMULATION. 1961 Proceedings of the Institute of Environmental Sciences, (Institute of Environmental Sciences, Mt Prospect, Ill.)

460

Margaria, R. 1950 ALCUNI IMPORTANTI DE URGENTI PROBLEMI DI MEDICINA AERONAUTICA (Important and Urgent Problems of Aeronautic Medicine) Minerva Medica. (Torino), 41:229-232, July 28, 1950

461

Margaria, R. 1953 THE CONDITION OF SUBGRAVITY AND THE ELIMINATION OF THE EFFECTS DERIVING FROM ACCELERATION (La condizione di subgravità e la sottrazione dall' effectto delle accelerazioni.) Rivista di medicina aeronautica (Roma), 16 (4): 469-474. 1953

ABSTRACT: A method of creating conditions of subgravity by immersion of the test subject in a fluid of equal specific gravity is discussed. Such an experimental procedure would make superfluous the considerably more complicated and costlier methods in which weightlessness is created by means of free falling bodies. Furthermore, a body immersed in a fluid of equal density does not under-go either gravitational or other types of acceleration. This phenomenon could be applied towards prevention of injuries in airplane crashes, by placing the pilot into a reinforced cockpit immersed in a fluid of a density equal to pilot's body.

462

Margaria, R. 1957 LE FORZE DI ACCELERAZIONE E LA CONDIZIONE DI SUBGRAVITA IN VOLO. (ACCELERATION FORCES AND THE SUBGRAVITY STATE DURING FLIGHT) Riv. Med. Aeronaut. (Rome) 20:(2):175-186

463

Margaria, R., T. Gualtierotti, and D. Spinelli 1958 PROTECTION AGAINST ACCELERATION FORCES IN ANIMALS BY IMMERSION IN WATER J. of Aviation Medicine 29(6):433-437, June 1958

ABSTRACT: Experimentally an animal immersed in water can stand acceleration forces more than ten times greater than in air, the probability of survival being very high even at 1,00 G. A limit to the resistance to acceleration forces is given by parts of the body having a specific weight different from that of the rest of the body, particularly the lungs for their air content, and the otoliths, Rat foetuses, having no air in their lungs, can survive impacts corresponding to accelerations higher than 10,000 G when the mother is floating in water.

464

Margaria, R. 1958 WIDE RANGE INVESTIGATIONS OF ACCELERATIONS IN MAN AND ANIMALS: FOURTH ANNUAL LOUIS H. BAUER LECTURE.
Riv. med. aeronaut. 21:655-690
See also J. Aviation Med. 29(12):855-871, Dec. 1958.
See also (Milan University, Italy) AFOSR TN-58-516, ASTIA AD 158 327

ABSTRACT: This article discusses many aspects of the problem of accelerative forces on man and animals. The viewpoint presented is that much more information can be gathered with less troublesome experimental situations that the gravity-free or free-fall situation. Several examples of simpler data-gathering circumstances are included. Discussion also considers protection from acceleration forces, disadvantages of a gravity-free condition, sensitivity of the labyrinth to gravitation, and effects of gravitation upon various animals. The author includes several experiments conducted under non-free-fall conditions, especially underwater studies.

465

Margaria, R. & T. Gualtierotti 1960 BODY SUSCEPTIBILITY TO HIGH ACCELERATIONS AND TO ZERO GRAVITY CONDITION. (Paper, Intern. Council. Aero. Sci. 2nd Intern. Congress, Sept. 12-16, 1960, Zurich)

ABSTRACT: Experiments were conducted on pigeons, birds and frogs in order to investigate possible effects of satellite flight on humans. This report gives the results of those experiments and observations.

466

Margaria, R., & T. Gualtierotti 1962 LA PERCEZIONE DEL MOTO, L'EQUILIBRIO E L'ORIENTAMENTO IN CONDIZIONI DI GRAVITAZIONE NULLA (PERCEPTION OF MOTION, EQUILIBRIUM, AND ORIENTATION IN CONDITIONS OF ZERO GRAVITY) Rivista di medicina aeronautica e spaziale (Roma) 25(3):450-465, July-Sept. 1962

ABSTRACT: The main systems (vestibular and visual systems and cutaneous exteroceptors) controlling body sensations in space are reviewed. All converge at the level of the cerebellar cortex which analyzes accelerations via labyrinthine connections and integrates visual, acoustic, and other data. The mechanism of action of vestibular receptors is discussed in relation to their anatomical position and to the constant stimulus of 1 g. Gravity receptors appear to follow the Weber-Fechner law, that for a sensation to increase by equal amounts (arithmetical progression), the stimulus must increase by geometrical progression. A hypothesis is presented that under zero gravity conditions responses to a given acceleration will be greater than when sense organs are already subjected to a constant stimulus of 1 g. It is also postulated that the otoliths work as a differential inertia meter. Experimental verification of these hypotheses is suggested by means of comparing the response to acceleration on Earth and during orbital flight in the same animal. (Aerospace Medicine 34(3):277, March 1963)

467

Martin Co., Denver, Colo 1961 MTSS. GENERAL HUMAN FACTORS CONSIDERATIONS VOLUME III.
Aeronautical Systems Division, Wright-Patterson AFB, Ohio) ASD-CR-61-14 ASD-TR-61-211, July 1961 ASTIA AD 273 005L

ABSTRACT: Contents include material on the following subjects:
Acceleration
Weightlessness
Artificial Gravity
Labyrinthine Sensitivity in Space Flight
Vibration
Summary of Vibration Test Results
Summary of Literature Surveyed

468

Mathews, C.W. 1960 REVIEW OF THE OPERATIONAL PLANS FOR MERCURY ORBITAL MISSION. (Paper, 28th Annual Meeting of the Inst. Aero. Sci., New York, N.Y., 25 Jan. 1960)

469

Mayo, A.M. 1957 SOME SURVIVAL ASPECTS OF SPACE TRAVEL
Journal of Aviation Medicine 28(5): 498-503

ABSTRACT: In a space craft as in aircraft the over-all objectives must command firs attention. Survival problems resulting from space environment will be so severe however, that a larger percentage of total space craft design time is likely to be spent in their solution than in airborne craft. The design of crew compartments will be dictated by the requirements of human operators not significantly different in basic physical and mental capabilities from those of the pilots of present aircraft. Automatic controls will be needed as greatly for actuation of safety equipment and environmental control of the crew quarters as in control of the craft and its propulsion and power systems. A major problem will be that of suitably linking the human operator to his "automatic" systems. Hermetically sealed crew quarters to provide a livable earth environment in space will be a prime survival requirement. The reconversion of liquid and food waste products to useful nutrients that are psychologically satisfactory might be approached by the use of secondary living organisms in the same manner as in nature. Temperature control will undoubtedly require specialized attention. The possibly dangerous stresses to be encountered during space flight include weightlessness and acceleration. The problems of surviving the effects of a wide variety of solar and cosmic radiation are other dangers. Careful consideration must be given to a proper balance of the fundamental moral, morale and economic factors to provide escape equipment justifiably on the basis of the total purpose of the craft involved.

470

Mayo, A. M. 1960 LIFE SCIENCES AND HYPER-ENVIRONMENTS 1960
Proceedings of the Institute of Environmental Sciences, 43-62.

ABSTRACT: If it is to meet the objectives for which it is created, the space cabin must be configured to function within the capabilities of its operators. In order to insure man-machine compatibility, a set of realistic requirements for the over-all operation should be reduced to the most fundamental terms practical by questioning each requirement until the objective is clearly outlined.

The fundamentals must be adequately considered in relation to the whole system before allowing compromise by utilizing existing devices. A feasibility study should then point to meeting each of the requirements.

471

Mayo, A.M. 1961 REQUIREMENTS FOR ARTIFICIAL GRAVITY DURING PROLONGED SPACE FLIGHT-IMPACT ON VEHICULAR DESIGN AND OPERATION
(Paper, AAS 7th Annual Meeting Jan. 16-18, 1961, Dallas, Texas) AAS preprint no. 61-13, 6 pp.

472

Meineri, G. 1962 GLI EFFETTI DELLA SUBGRAVITA E I METODI PER RIPRODURLA A TERRA E IN VOLO (Subgravity Effects and Simulation Methods in Laboratory Situations and In Flight)
In Antonio Ambrosini, Ed. RENDICONTI DEL CONGRESSO INTERNAZIONALE--L'UOMO E LA TECNICA NELL'ERA NUCLEARE E SPAZIALE, 18-21 APRILE 1962,
(Proceedings of the International Congress--Man and Technology in the Nuclear and Space Age, 40th Trade Fair, Milan, April, 18-21, 1962)
(Rome, Italy: Associazione Internazionale Uomo nello Spazio)
Pp. 593-609

ABSTRACT: A description is given of the chief methods and physical means used to simulate subgravity conditions; a distinction is made, in the first place, between ground methods (the use of which is recommended for readons of easy performance and greater security, while noting, howe er, that they usually permit investigation of only a few of the psychophysiological aspects occurring in spaceflight) and the much more cumbersome methods through which real and complete subgravity conditions can be attained (parabolic flight, suborbital, and orbital launching of missiles). The accomplishments and activities of the Center of Studies and Researches of Aerospace Medicine in Rome, by means of the Subgravity Tower designed and installed at the Center's own initiative, are reported. This tower permits the attainment of real, though short-lasting subgravity conditions, preceded and followed by periods of acceleration. Using the Subgravity Tower, it has been possible to tackle a few problems of spaceflight, particularly with respect to the transition between the active and passive stages of spaceflight. (Author)

473

Meineri, G. 1963 THE EFFECTS OF SUBGRAVITY AND METHODS FOR REPRODUCING IT ON EARTH AND DURING FLIGHT.
Riv. Med. Aero. 26:80-98, Jan.-Mar. 1963

474

Metlitskii, L. V. and I. I. Kas'yan 1962 BIOCHEMICAL ASPECTS OF THE RADIATION METHOD OF PRESERVING FOOD PRODUCTS (AND) SOME HUMAN PHYSIOLOGICAL REACTIONS UNDER CONDITIONS OF ALTERNATING OVERLOADS AND WEIGHTLESSNESS.
Trans. of Akademiya Nauk SSSR. Izvestiya (Seriya Biologicheskaya), 27(6):869-884 and 896-908, 1962.
(Joint Publications Research Service, San Francisco, Calif.)
Feb. 12, 1963 JPRS: 17591

475

Metzger, C.A. & A.B. Hearld 1962 CREW ACCOMMODATIONS FOR AEROSPACE MISSIONS (Paper, 1962 Meeting of the Aerospace Medical Assoc., April 9-12, 1962, Atlantic City, N.J.)

ABSTRACT: The results of research by the Aerospace Medical Laboratory on techniques and devices for crew accommodation for use in a weightless environment, which would exist in an earth-orbiting vehicle, are presented. New and unique methods for storing human wastes, with and without chemical treatment, in sealed containers are described. Specialized techniques for bathing, shaving, oral cleansing, laundering and nail and hair care are reviewed. Gravity-independent procedures for storing, preparing, preserving, and dispensing of foods are presented. The problems of weightlessness and the integration of the accommodations are discussed. Laboratory models of components required for food storage and serving, refrigeration, waste collection and disposal, and personal hygiene and sanitation are described. Feasibility of the techniques and experimental devices will be studied in a 3-man 14-day test in a laboratory life support system evaluator.

476

Metzger, C. A. and A. B. Hearld 1962 CREW ACCOMMODATIONS FOR AEROSPACE MISSIONS (6570th Aerospace Medical Research Labs., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio) MRL memo. no. V-6; May 1962, ASTIA AD-276 203

ABSTRACT: Techniques and laboratory models of equipment to demonstrate the required capabilities of crew accomodations were developed. These models are not engineered for installation in a planned vehicle. They are intended to demonstrate the feasibility of principles and designs that can be adapted for use during an aerospace mission. Reductions in basic requirements, increases in available power, and advances in methods and materials will permit the design of more sophisticated equipment. (AUTHOR)

477

Mickelwait, A.B. 1962 LUNAR MISSIONS - LAUNCH TO RENDEZVOUS
(Space Technology Labs., Inc., Redondo Beach, Calif.)
ARS 2456-62, 17-19 July 1962.

478

Miller, J.W., ed. 1962 VISUAL PROBLEMS OF SPACE TRAVEL
(National Academy of Sciences, National Research Council, Washington, D.C.)
June 18, 1962 ASTIA AD 276 513

ABSTRACT: The problems of space flight as they relate to the visual mechanism are discussed. Substantial portions of the Brown report are quoted in the present report. This report, in addition to updating the Brown report presents a considerable amount of additional information regarding specific critical visual problems, as well as a recently compiled, extensive bibliography of research in this field. (Author)

479

Miller, S.U. and A. Stephenson April 1960 CREW STATIONS OF THE FUTURE
(1960 Proceedings of the Institute of Environmental Sciences, C-24--C-25)

ABSTRACT: This is a commentary on a paper presented by John Bowring to the Institute of Environmental Sciences in April of 1960. The title of the paper was "Crew Stations of the Future."

480

Milliron, J. R. 1960 SPACE ENVIRONMENTAL EFFECTS.
In (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) PROCEEDINGS OF WADC SPACE TECHNOLOGY LECTURE SERIES, VOLUME 1 TECHNICAL AREAS. WADC TR 59-732; ASTIA AD-235 424; pp. 61-74

ABSTRACT: The environments described may occur individually or in combination, and certain combinations cause more significant effects than others. The effects are a function of many variables including the components, the characteristics of the component materials, and the environmental conditions. To achieve reliable performance the designers of systems will need to acquire an understanding of the associated environments and their combined effects. Test conditions should relate directly to the actual conditions encountered in space. (AUTHOR)

481

Minkewitzova, D. 1959 FIVE SECONDS IN A WEIGHTLESS STATE
Central Intelligence Agency Scient. Inform. Rep., Sept. 18, 1959, pp. 50-51
from: Zapisnik (Prague) 3 (14): 16-17, July 1959. (In Czech)

ABSTRACT: In a zero-gravity experiment conducted by the Czechoslovak Institute of Aviation Medicine (Ustav leteckeho zdravi), two physicians of the Institute were used as subjects. Electrocardiograms were taken on one of the subjects. Several consecutive zero-gravity experiments, each lasting 5 seconds, were performed from 2,000-meter altitude, using IL-14 aircraft of Czechoslovak make. Normal drinking from a cup or a bottle was impossible in a weightless state. After approximately 30 minutes the aircraft landed and the experiment was completed. Almost all of the members of the test crew were ill and nauseated, including the reporter, who also suffered an extremely severe headache subsequently. The headache was so severe, the reporter asserts, that three different types of headache powders and pills were completely ineffective; in fact she felt as though "someone hand scrambled my brains."

482

Minners, H.A., S.C. White, W.K. Douglas, E.C. Knoblock & A. Graybiel 1962
AEROMEDICAL STUDIES: CLINICAL MEDICAL OBSERVATIONS
(In: Results of the Second United States Manned Orbital Space Flight, May 24, 1962, Rept. No. NASA SP-6, Govt. Printing Office, Washington, D.C., 1962)

ABSTRACT: This is a report of medical examinations of two astronauts after each had spend 4½ hours in weightless space flight. Generally, there was no evidence of detrimental physical or biochemical effects. Specifically, no abnormal vestibular nor related gastrointestinal symptoms have occurred. Moreover, no pulmonary atelectasis has been found, no cosmic-ray damage has occurred, and no psychiatric abnormalities have been produced. Water survival and heat stress are two problems not yet solved in manned space flights.

483

Montgomery, Jr., A.V. 1962 EFFECT OF SPACE ON MAN
In: National Symposium on Effects of Space Environment on Materials, St. Louis, May 7, 8, and 9, 1962 (St. Louis Aircraft Corporation)

ABSTRACT: A few principles involved in the definition of a spacecraft environment are outlined and exemplified. These principles involve individual variations, duration of stimulus, discrete range of acceptability, and interactive effects between simultaneously applied environmental factors. (Author)

484

Moore, W.L., Jr. & B. Rowen 1963 DYNA-SOAR (X-20) AND AEROSPACE PLANE
Paper: Lectures in Aerospace Medicine, School of Aviation Medicine, Brooks AFB, Texas, 4-8 February 1963

485

Mueller, D. D. 1962 THE CORIOLIS EFFECT IN ZERO-GRAVITY RESEARCH AIRCRAFT
(Aerospace Medical Div. Aerospace Medical Research Labs. Wright-Patterson AFB, Ohio)
MRL-MEMO-P-9 June 1962 ASTIA AD 248 049

ABSTRACT: The purpose of this paper is to define and discuss the nature and extent of the Coriolis effect as it exists on board the ASD zero gravity research airplanes during a weightless parabola and to suggest improvements in the pilot's instruments which are used to fly the maneuver. Considered are: Coriolis forces, aircraft rotation during weightless maneuver, and pilot techniques. (N63-19010)

486

Mueller, D.D. & J.C. Simons 1962 WEIGHTLESS MAN: SINGLE-IMPULSE TRAJECTORIES FOR ORBITAL WORKERS
(Aerospace Medical Division. Behavioral Sciences Lab., Aerospace Medical Research Labs. (6570th), Wright-Patterson Air Force Base, Ohio)
Project no. 7184, Task no. 718405. Technical Documentary Report No. AMRL-TDR-62-103, Sept. 1962. ASTIA AD 289 257

ABSTRACT: While performing maintenance and assembly tasks outside of space vehicles under weightless conditions, a worker may accidentally propel himself away from his vehicle. To determine the speed of such a single-impulse launch, subjects under weightless conditions in a zero-g KC-135 aircraft propelled themselves away from a surface with their legs. They attained maximum velocities of approximately 10 m.p.h. Using various launch speeds and directions, theoretical trajectories were projected for both coplanar and noncoplanar launches. These trajectories indicate that any launch having a velocity component parallel to the direction of orbital motion will result in a trajectory such that the worker will never return to his vehicle. (Author)

487

Mueller, Donald D. 1963 ZERO GRAVITY INDOCTRINATION FOR THE GE MINI/APOLLO ASTRONAUTS
(6570th Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio)
AMRL Memo P-31, March 1963. ASTIA AD 402 786

ABSTRACT: This brochure describes the activities to be performed during weightless flight aboard the ASD zero-G aircraft for indoctrinating and training the Gemini/Apollo astronauts. The activities were chosen because they illustrate motions or behavior patterns that are significantly different during weightlessness from those under normal gravity conditions. The particular significance of each activity as it pertains to orbital flight is discussed. The number preceding the title of each acitivity refers to the corresponding activity on the schedule sheet included as the last page of this brochure. The schedule sheet is used to indicate the activity to be performed by each trainee on each weightless parabola.

488

Muller, B. 1956 FLUGMEDIZINE: KOMPENDIUM DER LUFTFAHRTMEDIZIN (Aviation Medicine: Compendium of Aviation Medicine)
(Dusseldorf: Droste, 1956) Nordrhein-Westfalen. Ministerium fur Wirtschaft und Verkehr. Verkehrswissenschaftliche Veroffentlichungen. Heft 34.

ABSTRACT: This monograph surveys the field of aviation medicine and is intended for use by medical students, students of aerotechnology, physicians, engineers, and fliers interested in aeromedical problems. The chapters deal with the historical development of aviation and aviation medicine, high-altitude flight and the effects of altitude, acceleration and centrifugal forces, motion sickness sensory organs and sensory illusions in flight, orientation as to the position in space and movement, psychophysiology of fliers, flight hygiene, flight accidents, physical and psychological examination of fliers, flying fatigue -- symptoms and therapy, and some problems of space medicine

489

Muller, H. J. 1958 APPROXIMATION TO A GRAVITY-FREE SITUATION FOR THE HUMAN ORGANISM ACHIEVABLE AT MODERATE EXPENSE.
Science 128(327):772. Oct. 1958.

ABSTRACT: This brief report describes in some detail relatively simple equipment which can be constructed to permit studies of the effects of weightlessness on the human organism. The relatively small cost of the apparatus recommends it for pilot studies in this area. The author suggests other questions which would be opened for investigations such as effects on free-fall tolerance.

490

Mur Vilaseca, Tomas 1953 LA ASTRONAUTICA. QUE DEBEMOS PENSAT ACERCA DE LA POSIBILIDAD DE LOS VIAJES POR EL ESPACIO? (Astronautics. What Ought We to Know About the Possibilit, of Voyages Through Space?)
Rev. Obras Publicas 101: 269-279, June 1953

ABSTRACT: Survey of astronautics, including propulsion of a space vehicle, historical outline, fundamental equations of the rocket, the space station, and the trip to the moon.

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Nadel, A.B. 1958 HUMAN FACTORS REQUIREMENTS OF A MANNED SPACE VEHICLE (General Electric Co., Santa Barbara, Calif.) Rept. RM 58TMP 10 April 1958

ABSTRACT: This report presents an analysis of human factors requirements of a manned space vehicle in light of present knowledge. One section deals with the physical environment of the operator, covering the effects of physical stimuli from space external to the craft, their possible effects on the operator and protective measures needed. Another section is concerned primarily witn inputs from space received via the sensory system of the operator. Phenomena apprehended through the perceptual system are described together with their possible effects and practices recommended to avoid undesirable effects. The information processing function (information items needed, displays, and display-control relations) is discussed at length

492

Nadel, A.B. 1959 SUPPORTING MAN IN SPACE: 1970-1975 (General Electric Co., Santa Barbara, Calif.) RM 59 TMP-85. 30 Nov. 1959

ABSTRACT: This report discusses progress in space technology that is expected to take place by 1970 and anticipates several bold adventures into space during the period 1970-1975, such as successful trips to the moon and the beginning of interplanetary travel (Mars, Venus, etc.). Needed requirements and capabilities for such accomplishments are discussed in the following areas: (1) the physical environment - atmosphere, gravitational forces (acceleration and zero g), temperature, and radiation; and (2) acoustic noise and vibration.

493

Nagoya U. Research Inst. of Environmental Medicine 1962 ANNUAL REPORT, 1961 (Nagoya U. Research Institute of Environmental Medicine, Japan) In Japanese.

ABSTRACT: Contents include:

1. "Annual Review of Progress in the Aeromedical Department" Fushiro Motobayashi, p. 1-2.
2. "Preliminary Study on the Biological Phenomena In Rocket Flight" Shigeru Ando and Sadaharu Takagi, p. 2-4.
3. "How is the Mento-Physical Condition Measured? (1. Preliminary Study)" Fushiro Motobayashi, Sukeo Sugimoto, Tamotsu Somiya, and Sadaharu Takagi, p. 5-12.

4. "Neuroglial Response and a Theory of Neuroglialneuronal Interaction" Genyo Mitarai, p. 12-17.
5. "Adient Reaction Potential and Abient Reaction Potential as a Function of the Fistance (From the Object (3) Tamotsu Somiya, p. 17-21.
6. "Experimental and Theoretical Studies on Behavior in Space" Tamotsu Somiya, p. 21-31.

494

Neiner, J. J. 1959 THE EFFECT OF ZERO GRAVITY ON FLUID BEHAVIOR AND SYSTEM DESIGN. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TN-59-149; ASTIA AD-228 810; April 1959

ABSTRACT: The results are given of a test program which shows the behavior of fluids under the method of obtaining this environment is described. The effect of this environment on fluids of different densities and viscosities is presented as well as a discussion of the behavior of air bubbles released in the fluid and methods of fluid transfer under this condition.

495

Neuman, W. F. 1963 POSSIBLE EFFECTS OF WEIGHTLESSNESS ON CALCIUM METABOLISM IN MAN.
(U.S. Atom Energy Comm., Univ. Rochester, Rochester, N. Y.) 622: 1-13, 18 Jan. 1963.

496

New, G. W. 1955 YOU'RE IN SPACE
Air Training, 4(6):24-25, Jan. 1955.

ABSTRACT: A test pilot's subjective experiences in ascending to higher than 85,000 ft. altitude are described. The sensations during a brief period of weightlessness included falling, difficulty in orienting and spinning.

497

Newbauer, J.A. 1959 KEEPING YOUR FEET ON THE GROUND IN SPACE.
Astronautics. 4: 28, June 1959

ABSTRACT: A brief note given on current and projected experiments with magnetic shoes which will allow man to walk in normal fashion in spacecraft during periods of weightlessness.

498

Nicholson, J. F., & D. W. Naas 1960 MAGNETIC SHOES FOR HUMAN ORIENTATION IN SPACE. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TN 59-352; ASTIA AD-236 362, Feb. 1960

ABSTRACT: Both permanent and electromagnetic shoes for human orientation in a weightless environment are described. The electromagnetic shoes operate on a low voltage power source which may be adjusted to the individual requirements of the wearer. A microswitch which interrupts the magnetic circuit each time the heel is raised reduces walking fatigue and increases the operational life of the batteries. An inertia switch is included in the magnetic circuit as a safety device. When the switch senses any sudden acceleration or deceleration, it shunts the potentiometer and allows additional current to flow to the electromagnet thereby increasing the holding force. (AUTHOR)

499

Nicoll, N.R. 1954 DESIGN OF THE LIFE COMPARTMENT NECESSARY FOR SPACE TRAVEL Brit. Interplan. Soc. J. 13:277-282, Sept. 1954

ABSTRACT: The composition of the life compartment of a spaceship is dealt with and an overall weight of under one ton is developed as being realistic. The compartment is of double-wall construction, containing equipment for atmosphere control, variations in g and other necessities for the survival of a crew of thirteen for 15 days.

500

Niehuss, O. 1959 A PRELIMINARY INVESTIGATION OF THE SPECIFIC PERFORMANCE CAPABILITIES OF THE KC-135 AIRPLANE FOR PROVIDING EXPERIMENTAL ZERO-GRAVITY ENVIRONMENT (Boeing Airplane Company, Renton, Washington) Document D6-3885, September 1959

501

Nieto Boque M. 1961 GRAVITY AND ITS REPERCUSSIONS ON MAN. STUDY OF ITS PHYSIOLOGICAL ACTION IN "TERRESTRIAL MAN" FOR THE PURPOSE OF UNDERSTANDING ITS ACTION ON "PLANETARY MAN".
Bol. Cons. Gen. Colegs. Med. Esp. 24:11-32, April 1961 (Spain)

502

Nikolaev, A.G. & P.R. Popovich 1962 MY ZHILI I RABOTALI V KOSMOSE (We Lived and Worked in Space) Priroda (Moskva), (9): 10-16, Sept. 1962.

ABSTRACT: The authors relate their experiences on the orbital flights of

Vostok-3 and Vostok-4. While in flight they did not experience vestibular disturbances, lack of appetite, or insomnia. No unpleasant sensations resulted when moving in the cabin. They regard a six-hour sleep as adequate. Psychologically the most unpleasant moment during the flight was the re-entry. In the opinion of both cosmonauts, a prolonged space flight does not impair the physical capacity of the human organism. (Aerospace Med. 34 (8): 769, Aug. 1963

503

Nixon, C.W. and C.E. Waggoner 1962 SPEECH DURING WEIGHTLESSNESS (Aerospace Medical Div., Air Force Systems Command, Wright-Patterson AFB, Ohio) Proj. 7231; MRL TDR 62-45, May 1962. ASTIA AD 284 688.

ABSTRACT: Certain characteristics of human speech exhibited under 1-g conditions may be different under weightless conditions. If such differences exist, they might interfere with satisfactory speech communication under conditions of zero gravity. Standard speech materials recorded under conditions of 0 g, 1 g, and 2-1/2 g's were evaluated by both objective and subjective methods. Results indicate that speech production is not significantly altered by brief periods of zero gravity. Reception of speech also seems to be unaffected. Both speakers and listeners indicate good speech intelligibility under conditions of weightlessness. (Author)

504

North American Aviation, Inc. 1961 WEIGHTLESSNESS: MAN IN SPACE, A LITERATURE SURVEY. (Space and Information Systems Division, North American Aviation, Inc., Los Angeles, Calif.) Rept. No. SID 61-447; ASTIA AD-282 469; 12 Dec. 1961

ABSTRACT: Covered in this partially annotated bibliography is a review of literature from 1957 to August 1961 on the state of weightlessness with primary emphasis on the physiological aspect with some engineering documentation included. The 131 references are listed alphabetically by periodical title and corporate author in one alphabet. Both an author and subject index follows the bibliography (AUTHOR)

505

North American Aviation, Inc 1961 PROJECT APOLLO; PRE-CONTRACTURAL DOCUMENTATION AND ORBITAL RENDEZVOUS: A LITERATURE SURVEY (North American Aviation, Inc., Downey, Calif.) Rept. No. SID 61-470 Dec. 29, 1961

ABSTRACT: A review of literature on Project Apollo and Orbital Rendezvous, in two parts, from August 1959 to December 4, 1961 is given. The references are listed alphabetically by corporate author and periodical title in one alphabet. Following the bibliography are both author and subject index. (Author)

506

Novotny, Z. 1960 THE EFFECT OF FULL OR PARTIAL WEIGHTLESSNESS ON LIVING ORGANISMS. (Paper, First Czechoslovak Conference on Rockets and Astronautics, Liblice, April 22-23, 1960)

ABSTRACT: The influence is considered of a reduced number of excitations due to the effect of partial or complete cessation of the sensation of weight from the periphery to the central nervous system. In the surface skin and in the internal receptors and the receptors of the inner ear less impulses are generated than under the effect of normal gravity so that the brain crust does not have sufficient information to gain an impression of the location and movement in space; vision cannot always substitute fully these sensations and, as a result of this, illusory impressions are gained on the location in space. Exclusion of the factor of weight of the extremities leads to a relative over-dosage of nerve impulses to the appropriate muscles leading to excessive movement. The state of weightlessness preceding the state of excessive gravitational effects leads to a reduced resistance of the body to high g-loads. The author also dealt with the further possible effects of the state of partial and complete weightlessness over long periods, on the reduction of the quantity of muscle substance (muscle atrophy), on the vegetative reaction in the blood circulation and breathing, on the basic food consumption, on the level of nervous activity, etc. A short 16 mm film on the state of weightlessness for short durations was projected

507

Oberth, H. 1929 FRACTIONAL G AND WEIGHTLESSNESS
In Wege zur Raumschiffahrt (Munich Oldenburg 1929) pp. 100-106

508

Ogle, D.C. 1957 MAN IN SPACE VEHICLE
U.S. Armed Forces Med. J. 8(11): 1561-1570, Nov. 1957

509

Osakov, P.K. 1958 LIFE IN SPUTNIK
Astronautics, Vol. E, No. 2, Feb. 1958. Pp. 38-39, 49-50

ABSTRACT: A Russian biologist examines problems involved in keeping a living organism alive in Space and reveals Soviet approaches.

510

Otto, E. & T. R. ThorKelson 1960 SIMULATION OF ZERO-G AIRCRAFT CONTROL
Instrum. Control Syst. 33(9):1564-1567, Sept. 1960.

WEIGHTLESSNESS

P

511

Pace, N. 1958 PROBLEMS IN SPACE PHYSIOLOGY
Publ. Astronaut. Soc. Pacific, 70(415):349-359. August 1958.

ABSTRACT: A review of problems encountered in space flight including air content and pressure, waste disposal, food and water, radiation, g tolerance and weightlessness.

512

Page, W. 1962 CAN SPACE PROLONG YOUR LIFE?
Space World, 2(4):56-58, March 1962.

ABSTRACT: This article deals with conditions in outer space which may prove beneficial in the treatment of disease and provide new cures. The author suggests the use of weightlessness and certain radiations in the treatment of specific diseases and comments on the possibility of a 100 per cent germ free hospital in outer space.

513

Pando, M. Velasco 1958 ARTIFICIAL SATELLITES AND INTERPLANETARY TRAVEL PHYSIOLOGICAL EFFECTS OF CHANGE IN GRAVITY.
Revista De La Real Academia De Ciencias De Medris. 52(2):141-145

ABSTRACT: A corrected and extended version of an analytical study on the launching of space rockets. Attempts to correlate a mathematically basic physiological and physical parameter.

Parin, V. V. 1960 MAN IN SPACE
Tekhnika molodezhi 1960(11):19

[illegible] describes the problems still to be solved before man can [illegible] out on space travels. These problems include environmental [illegible] upon the organism and the elaboration of methods and means to ensure its [illegible]mal functioning. In the first place it is necessary to study, in all details, the factors of the means intended to safeguard the vital action of the organism and general flying safety. The knowledge of acceleration effects if also of importance. Seclusion over a long time in an isolated and narrow room, as is the flyers' cabin, is apt to cause severe psychological complications. The absence of habitual stimuli, the complete silence, darkness, weightlessness, perturbation in the normal alternation of day and night, work and rest, may cause disturbances in the psychic sphere and in blood circulation as well. Food and water supplies are one of the main problems, and so is the study of nutritive conditions. The conquest of space has to go through three stages: instruments, animals, man. The first two stages are being pushed on by powerful efforts, and have already yielded abundant and valuable material While man has not yet launched on space travels himself he has nevertheless succeeded in gaining insight into the mystery of space thanks to the latest complicated trials.

515

Parin, V. 1961 BIOLOGY, TECHNIQUES AND SPACE
Przeglad techniczny 1961(31):6-7

ABSTRACT: The article describes and praises Soviet space achievements, broadly outlines the need for close cooperation between the various scientific fields participating in the space program and the training of cosmonauts. After mentioning the April 12, 1961 flight of Gagarin, the author points out that a new science has been created as a result of the exacting demands of cosmic flight-space biology and medicine. In contradistinction to the former concepts of biology, space biology and medicine are closely related and combine a number of other fields. A number of factors may influence the living organism in space. These were first determined in animals by the radiotelemetering method. The results of these first investigations in space physiology showed that during flight, right up to peak velocity and again during the space vehicle's deceleration period, the living organism is subjected to great strains on the heart and blood vessels. During training, the cosmonaut was sjbjected to a gradual and careful increase in acceleration; careful medical control was carried out during all training stages, assuring the perfect health of the cosmonaut. (CARI)

516

Parin, V.V. & V.I. Iazdovskii 1961 PUT' SOVETSKOI KOSMICHESKOI FIZIOLOGII (ADVANCES IN SPACE PHYSIOLOGY IN THE SOVIET UNION)
Fiziologicheskii zhurnal SSSR (Moskva) 47(10): 1217-1226, Oct. 1961

ABSTRACT: The first and second stages of animal experiments in Soviet space medicine and biology were carried out with rocket flights. Satisfactory data were obtained on physiology and behavior under space-equivalent stresses and on the adequacy of hermetic cabins, cabin equipment, space suits, and recovery equipment. The orbital flight of the dog, Laika, confirmed that a highly organized organism can survive space flight in a satisfactory condition. Other satellite flights with different types of animals allowed continuous observations of their condition throughout the flight and during landing. The final stage was preceded by the selection and training of cosmonauts. The training program subjected the cosmonauts to simulated stresses gradually increasing in intensity until the levels expected in space were exceeded. Careful medical observations were made throughout the training. The results of this preparation were seen in the successful flight of Gagarin. In Titov's flight prolonged weightlessness affected his vestibular sense organs but not his efficiency. Recovery after the flight was rapid.

517

Parin, V.V., O.G. Gazenko, & V.I. Yazdavkiy 1962 THE POSSIBILITY OF PROTECTIVE ADAPTATIONS OF THE ORGANISM AND LIMITS OF ADAPTATION UNDER CONDITIONS OF MAXIMUM OVERSTRAIN AND WEIGHTLESSNESS.
Vestnik Adad. Med. Nauk SSR (Moscow), JPRS-15187, NASA N 62-17962, 10 Sept. 1962.

ABSTRACT: A study is made of the possibility of protective adaptations and limits of adaptation of an organism under conditions of maximum overstrain and weightlessness. A study of the rate of blood circulation and oxygen content in arterial blood shows a direct dependence of the degree of blood oxygenation on the rate of circulation. This can serve as evidence of the active participation of the hemodynamics of the lesser pulmonary circulation in blood oxygenation during transverse overloads. As a result of ground experiments and human space flights, the limits of admissible values of prolonged accelerations have been established; and preliminary results on the possibility of raising the physiological tolerance of man to the action of accelerations by the training exercise method have been obtained. An alteration of afferentation was observed under conditions of weightlessness after prolonged space flight. (STAR)

518

Parin, V.V. & O.G. Gazenko 1962 SOVIET EXPERIMENTS AIMED AT INVESTIGATING THE INFLUENCE OF THE SPACE FLIGHT FACTORS ON THE ORGANISM OF ANIMALS AND MAN. (Paper, 3rd International Space Science Symposium and Fifth COSPAR Plenary Meeting, April 30 - May 9, 1962, Washington, D.C.) NASA N 62-15217.

ABSTRACT: This is a presentation of the results of the biological experiments conducted on Space ship-satellites II, III, IV, and V and of scientific observations made during Gargarin and Titov's flights aboard space ships Vostok I and II. The physiological reactions to various flight stresses were not fatal. Neither the cosmonauts nor the animals had any observable change in health. The most important task is the study of the influence on the human organism of the various flight stress factors, including emotion strain.

519

Parin, V.V., & O.C. Gazenko 1962 SOVIETS GIVE VOSTOK PHYSIOLOGICAL DETAILS Aviation Week and Space Technology, May 28, pp. 67, 71.

ABSTRACT: The first flights of the astronauts were made in paths already tested in launchings of space ships with animals aboard. Animals in this case were specific indicators of danger. Close investigation of animals during flight and after recovery to Earth enabled us to conclude that there are no considerable changes dangerous for life and health of cosmonauts. A combination of physiological methods and the corresponding medical research apparatus was used in order to make studies of the influence of space flight factors on the cosmonaut's organism. During Gagarin's and Titov's flights physiological methods were used chiefly for the purposes of physician's control. Before the launch, at all the portions of the flight trajectory and after, Gagarin's health was satisfactory. After lift-off during the gradual increase of velocity of the ship the heart rate increased to 140-158 beats per minute, the respiration rate was 20-26. At the end of the powered period the heart rate decreased to 109 beats and the respiration rate reduced to 18 per minute. Gagarin pointed out some unusual sensations under conditions of zero-gravity, though no disorders of functions were observed, he felt and performed his program well. When he approached the Earth his respiration became not frequent, smooth and calm. In three hours after landing indices were fixed characteristic of the normal, calm condition of the space pilot. (CARI)

520

Parin, V., V. Yazdovskiy, & O. Gazengko 1962 SPACE MEDICINE REPORT
FBIS USSR & East Europe, No. 23, Feb. 1, 1962.

ABSTRACT: The effects of space flight factors and man's potential defensive adaptation mechanisms under the conditions of maximum acceleration and weightlessness were the subject of a paper presented to a current session of the USSR Academy of Medical Sciences in Moscow.

Three groups of factors encountered in outer space are discussed in this paper. The first group of physical factors includes extremely low barometric pressures, ionizing radiations, meteorites, and so on. The second group of factors, depending on the rocket flight itself, include noise, vibration, acceleration, and weightlessness. The third group of factors affecting the cosmonaut depend on conditions inside the spaceship and safety facilities for the crew in flight. Scientists believe that the strongest operating factors of space flight are acceleration, weightlessness, cosmic radiation, and emotional tension. (CARI)

521

Parin, V. 1962 CAPACITIES OF THE HUMAN ORGANISM: DEFENSE MECHANISMS AND ADAPTATIONS IN CONDITIONS OF MAXIMUM OVERLOAD AND THE STATE OF WEIGHTLESSNESS.
Perspect Biol. Med. 5:527-533, Summer 1962

522

Parin, V.V. et al 1962 DEVICES TO PROTECT THE ORGANISM FROM G-FORCES AND IN THE WEIGHTLESS STATE
(Office of Technical Services, Washington, D.C.) 62-24377 March 21, 1962
Trans. from Meditsinskli Rabotnik (USSR) 25:3. 6 Feb. 1962

523

Parin, V.V. 1963 COSMOS, MEDICINE, MAN
Komosomol'skaya Pravda, 10 March 1961, 1 p.
(Translation Services Branch, Foreign Technology Division, Wright-Patterson AFB, Ohio) FID-TT-52-1603/1, Jan. 17, 1963. ASTIA AD 295801

ABSTRACT: Four questions were directed to Prof. active member of the Academy of Medical Sciences USSR, V.V. Parin. His answers to the following four

questions are contained in this report: (1) What is the characteristic trait of cosmic investigations, carried out in our country? (2) Has the analysis of data obtained during the flight of the second ship-satellite been completed? What new facts have these investigations given to medicine? (3) What is the effect of cosmic flight conditions on the higher nervous activity? (4) Why are dogs employed in the role of experimental animals in cosmic investigations?

524

Parin, V.V. 1963 IT HAS BEEN ACCOMPLISHED
Smena, No. 7, 1961. pp. 3-4
(Translation Services Branch, Foreign Technology Division, Wright-Patterson AFB, Ohio) FTD-TT-62-1607/1, 18 Jan. 1963. ASTIA AD 295 805.

ABSTRACT: Behind the flight of Communist Yuriy Alekseyevich Gagarin are years of scientific achievements in the field of space flight. An unforgettable day was when the first soviet satellite weighing 83.6 kg made a round trip around our planet. From that memorable day, more than three years have passed. The flight of the Dog Layka and later, the first trip of the Zoo-Botanical Garden headed by dogs Byelka and Strelka. Dogs were used instead of monkeys because it is difficult to train a monkey to calm behavior under flight conditions. The blast off of dogs can be carried out without chemically doping their nervous system. After the flights of various dogs, [illegible]raphy of the reverse side of the moon. Finally, flights of the [illegible] fifth cosmic ships. All of these flights brought about the [illegible] by scientists that mans flight into the cosmos on board a [illegible]ship is connected with no danger to his health or life.

525

Parin, V.V. 1963 THE COSMONAUT [illegible] FINE, SAID A SOVIET SCIENTIST
Literaturnaya Gazeta, Aug. 15, 1961, p. 4
(Translation Services Branch, Foreign Technology Division, Wright-Patterson AFB, Ohio) FTD-TT-62-1602/1, Jan. 17, 1963. ASTIA AD 295 798

ABSTRACT: A discussion of the good physical condition of both Yuriy Gagarin and German Titov during and following their space flights provides scientists with a good outlook for future space flights. After the flights, scientists concluded that weightlessness does not interfere with normal activities. Moreover, it does not appear to be a hindrance in manual control of the ship. Furthermore, Titov spent 24 hours in the cabin of the Vostok-2 in which time, day and night changed 17 times. This change in the customary time period had no effect on the health of the cosmonaut. Titov's flight also proved that weightlessness has no adverse effect on the functions of man's organism. Finally, the flight proved that man can without greater strain and without harm live under conditions of cosmos--for a time necessary to carry out such flight.

526

Parin, V.V. 1963 MAN IN COSMOS
Smena, No. 13, 1961, pp. 22-23
(Translation Services Branch, Foreign Technology Division, Wright-Patterson AFB, Ohio) FTD-TT-62-1606/1, 17 Jan. 1963. ASTIA AD 295 806

ABSTRACT: Overload is one of the serious problems faced by a cosmonaut during space flight. Scientists are now trying to solve the problem by placing the cosmonaut dressed in an airtight suit into a special chamber filled with liquid In it, he will be situated in a suspended state. It is hoped that the specific weight of the liquid will become equalized with the specific weight of the cosmonaut and thus, make it possible for him to endure overloads. Observations of animals on board cosmic ships explained that the vital activity of the organism under conditions of weightlessness is normal. One of the yet unsolved problems of space flight is that of radiation. One method under investigation to increase the stability of the organism to radiation is by artificially slowing down the vital processes in the organism. This would be done by cooling the living organism.

527

Pavlok, Jan 1958 BIOLOGICKE ZABEZPENCENI MEZIPLANETARNICH LETU (Biological Safety in Interplanetary Flights)
Vojenske zdravotnicke listy (Prague) 27(6): 257-262, 1958

528

Peterson, N. V., & H. Jacobs, eds. 1958 PROCEEDINGS WESTERN REGIONAL MEETING AMERICAN ASTRONAUTICAL SOCIETY, 18-19 AUGUST 1958, PALO ALTO, CALIF.

CONTENTS:

Ward, J. E., Considerations of Weightlessness,
Hoover, G. W., Man's Operational Environment in Space,
Kornhauser, M., Impact Protection for the Human Structure

529

Peterson, N.V., ed. 1958 PROCEEDINGS, FOURTH ANNUAL MEETING, AMERICAN ASTRONAUTICAL SOCIETY, 29-31 JAN. 1958, NEW YORK

CONTENTS:

Riddell, F.R., & R.W. Detra, Returning Alive from Space
Strughold, H.O., Advances in Astrobiology
Conover, D.W., E.G. Aiken, & C.M. Whitlock, The Selection and Training of a Bio-Satellite Crew.

530

Petrovich, G.V. 1961 SOVETSKIE KISMONAVTY V BLIZHNEM KOSMOSE (SOVIET COSMONAUTS IN NEAR-SPACE)
(Vestnik Akad. Nauk S.S.S.R. (Moscow), v. 31, no. 5 May 1961, pp. 13-22, in Russian)
Also in: U.S. Joint Publ. Research Serv., Washington, D.C., Trans. no. 8897 (CSO:66-D), Sept 19, 1961

ABSTRACT: The Soviet space program culminated with the orbiting flight and return of Yu. A. Gargarin. His physiological reactions to weightlessness showed that the human body could tolerate the weightless state for a much longer duration. However, cosmic radiation is a source of danger and presented a major problem to space travelers.

531

Phoebus, C.P. 1958 ACCOMMODATING THE SPACE MAN.
Research Reviews, Pp. 6-12, June 1958.

ABSTRACT: This article discusses problems which must be solved before space ships can be built which accommodate man's needs sufficiently to permit weeks or months of flight. These problems arise primarily because of the continuously closed environment, hence are discussed in the light of experience with submarine design. Problem areas include: respiratory mechanisms, food and waste, radiation, psychological factors, information from human engineering studies, the crew, acceleration and deceleration, environmental temperature, waste disposal and weightlessness.

532

Pigg, L. D. 1961 HUMAN ENGINEERING PRINCIPLES OF DESIGN FOR IN-SPACE MAINTENANCE. (Aeronautical Systems Division, Air Force Systems Command, Wright-Patterson AFB, Ohio) ASD TR 61-629; ASTIA AD-271 066; Nov. 1961

ABSTRACT: Results of research on problems related to human performance of maintenance actions in space systems are reviewed. The interactions of sensory, psychomotor and motor functions are discussed, along with problems of remote-handling applications in the space environment. (AUTHOR)

533

Pigg, L.D., & W.N. Kama 1961 THE EFFECT OF TRANSIENT WEIGHTLESSNESS ON VISUAL ACUITY. (Behavioral Science Lab., Aerospace Medical Division, Wright-Patterson AFB, Ohio) WADD TR 61-184, March 1961. ASTIA AD 261 906

ABSTRACT: Visual acuity was measured on subjects while they were exposed to short periods of weightlessness aboard an aircraft flown through zero-g trajectories involving transition from 1 g to 2-1/2 g to zero g. Monocular and binocular acuity of near and far vision were measured on both Snellen and checkerboard targets. Control measurements were made on the ground and inflight at 1 g in counter-balanced sequence with the zero-g measurements. Results show that the weightless environment produced from this study has a detrimental effect on visual acuity as measured. The decrement is not considered to have practical significance. (Author)

534

Piolett, L. 1960 LE VOYAGE TERRE LUNE-SERA-T-IL UN JOUR UN VOYAGE D'AGREMENT? (THE EARTH-MOON TRIP - WILL IT ONE DAY BE A PLEASURE TRIP?) L'Air, May 1960, pp. 16-18, in French

ABSTRACT: The author presents the following hazards which must be solved before man has a 90% chance of survival of a space flight: (1) the accelerations of launching and landing, (2) extreme temperature variations, (3) the noise and vibration of the rocket, (4) the state of weightlessness, (5) ionizing and nonionizing radiation, and (6) meteoritic impact.

535

Platonov, K. K. 1959 PSIKHOLOGICHESKIE PROBLEMY KOSMICHESKOGO POLETA (PSYCHOLOGICAL PROBLEMS OF SPACE FLIGHT) Vosprosy Psikhologii (Moskva) 5(3):56-65
German Translation: Psycholgische Probleme des Raumfluges Sowjetwissenschaft: Naturwissenschaftliche Beitrage (Berlin) 1959(12):1213-1222, 1960

ABSTRACT: The psychologic effects of the conditions of space flight are reviewed with reference to published reports on the reactions of experimental subjects to these conditions. It is concluded that the adverse effects of acceleration, weightlessness, confinement, isolation, and exposure to danger may satisfactorily be counteracted by the proper conditioning and motivation of space pilots.

536

Pogrund, R.S. 1962 PHYSIOLOGICAL ASPECTS OF THE SPACEMAN
In: Brown, K., and L.D. Ely, eds., Space Logistics Engineering (New York: John Wiley and Sons, 1962) pp. 55-135

ABSTRACT: The complexity of space logistics engineering for the comfort of the astronaut in a space vehicle is described as a function of mission duration and of the operational requirements and performance capabilities expected. The following physiological parameters are reviewed: (1) vehicle-induced stresses (propulsion, noise, vibration, accelerations, zero gravity, re-entry, emergency escape); (2) internal environment of the space capsule (sources of oxygen supply, handling food, biological photosynthesis systems, methods of carbon dioxide elimination, water and waste control, toxicological considerations, temperature and humidity regulation); (3) radiation hazard shielding requirements, (low-level chronic exposure hazard); and (4) psychological stress (isolation, confinement, and sensory deprivation).

537

Pokorovski, A.V. 1956 STUDY OF THE VITAL ACTIVITY OF ANIMALS DURING ROCKET FLIGHTS INTO THE UPPER ATMOSPHERE
(Report presented at the Congres Internationale des fusees et engins guides Paris, Dec. 3-8, 1956) In Etudes Sovietiques (Paris) 106:65-70, Jan. 1957. R.A.E. Translation No. 625, ASTIA AD 124191

ABSTRACT: In the first stage of this work, vital activity of the body at high altitudes has been observed in dogs, carried in a hermetically sealed compartment in the nose of a rocket. Equipment carried in the compartment allowed observations to be made on conditions, and on the behaviour of the animals during flight, and during the free fall of the cabin from the rocket.

The second stage involved the placing of the dogs, in space suits, in a compartment not hermetically sealed. In one case the animal was ejected at about 75 to 85 km, its parachute opened, and it was subjected to all the external influences of the upper atmospheric layers during 50-65 min.

538

Pokrovskiy, G. 1961 MAN GOES OUT INTO SPACE
Krvl'ya rodiny 6: 17-18

ABSTRACT: The article deals with the first cosmic flight of Major Yu. A. Gagarin in the spaceship "Vostok", which proved that man can exist and function normally in space. K.E. Tsiolkovskiy was amongst the first scientists to point out that man in a cosmic flight would experience two distinctly different states, i.e. overloads which would be felt during the acceleration and deceleration in the atmosphere before landing, and a state of weightlessness while the spaceship is in orbit. Insignificant "g" loads would be possible during change-over from one orbit into another or before landing. "g" loads have been known to high-speed pilots, and momentary weightlessness to aerobatic pilots. Checking of a prolonged state of weightlessness had to be carried out under conditions of a real cosmic flight. Three aspects of the phenomena were observed: (1) weightlessness reduces the load on blood vessels and facilitates the heart functions. It lowers the strain of the human body, and could be used as a treatment for heart diseases; (2) it affects the intake of food, which becomes weightless; further investigation as to the food's progress in the digestive system was required; (3) the force of gravity must play an important part in man's orientation in space as it acts on the body as a whole, and on the vestibular apparatus, which governs the sensation of "Top" and "Bottom". After Major Yu. A. Gagarin's flight in space it was found that the human body withstands all unexpected and unusual conditions quite well. (CARI)

539

Pokrovskiy, I. 1961 MIRACLE OF THE TWENTIETH CENTURY.
Ekonomicheskaya Gazeta 88(941):4
(Aerospace Technical Intelligence Center, Wright-Patterson AFB, Ohio)
Translation No. MCL-1150, 13 April 1961. ASTIA AD 261 824

ABSTRACT: This report is an evaluation on the individual and technical achievements of Soviet scientists, designers, and workers in the field of cosmic flights and other fields. It emphasizes the importance of sending a man into space to make it possible for him to work in this medium.

540

Potts, P. and J. I. Bowring 1960 EXERCISE IN A WEIGHTLESS ENVIRONMENT
Physical Therapy Rev. 40(8):584-587

541

Presnyakov, A. 1961 THE SECRET OF THE FORCES OF GRAVITY.
(Aerospace Technical Intelligence Center, Wright-Patterson AFB, Ohio)
Translation No. MCL-1057, 14 July 1961. ASTIA AD 261 810

ABSTRACT: The author gives a brief review of work done in the field of gravitation. He states that the interest in the problems of gravitation is due to the study of the nature of time and space, investigations of the cosmos and progress in learning of the elementary particles of matter. For research work carried out by Professor Dmitri Dmitriyevich Ivanenko is reviewed. Considerable interest was prompted by reports of this scientist concerning the so-called field quantization, new hypothesis of cosmology, a unified theory of matter and gravitation, and antigravitation.

542

Putt, D.L. 1952 TRENDS IN U.S. AIR FORCE RESEARCH AND DEVELOPMENT
Technical Data Digest 17(1):7-12
See also J. Aviation Med. 23(4):407-408, 1952.
See also WAE Journal 60(3):43-44, Mar. 1952.

ABSTRACT: Within the context of a review of the progress made in aviation industry and research, the author summarizes briefly the recent advances in aviation medicine. Research in space medicine is still in the beginning stage, covering such tasks as protection against solar and cosmic radiation, cabin pressurization and air conditioning, and adaptation to sub-g conditions as well as the exploration of unknown factors, e.g. the possible effects of the magnetic energy developed in cutting through the earth's magnetic field at high speed. (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903; ASTIA AD 227 817, Feb. 1959)

WEIGHTLESSNESS

Q

543

Quinnel, R.K. 1956 THE HUMAN COMPONENT IN EXTRATERRESTRIAL FLIGHT
TAC Surgeon's Bulletin (Langley AFB, Va.) 6(11): 1-24, Nov. 1956
See also: Medical Newsletter 29(4): 27-40 Feb. 15, 1957

ABSTRACT: A general discussion is presented on the physiological stresses to be encountered in extraterrestrial flight such as accelerations, vibrations, cosmic radiations, and weightlessness. Within the cabin, con rol of pressurization, temperature, oxygen, carbon dioxide, and body odors is required, as well as adequate illumination and presentation of the instrument panel. Vision outside the cockpit may be important only for psychological reasons.

544

Quinnell, R.K. 1957 THE HUMAN COMPONENT IN EXTRATERRESTRIAL FLIGHT
Canad. Serv. Med. J. 13(4): 245-258

WEIGHTLESSNESS

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545

Reed, W.S. 1962 SOVIET SCIENTISTS DISAGREE WITH TITOV ON EXTENT OF SPACE SICKNESS. Aviation Week and Space Technology. May 21, 1962.

ABSTRACT: Extent of Gherman Titov's sickness during his sixth orbit has become a matter of disagreement between the cosmonaut and the Soviet medical scientists who followed his flight. Dr. V.V. Parin, academician of biomedical sciences at the National Academy of Science, Moscow, said that Titov began to have symptoms of dizziness nausea and nervousness beginning in the sixth orbit. These symptoms became worse during the sixth orbit and were somewhat eased on the seventh. Titov moved his head carefully while so afflicted. Parin reported that Titov felt somewhat better after the sleep. The Soviet doctors reported that the orbiting dogs on earlier space experiments demonstrated instability of the cardio-vascular system-changes in blood pressure, pulse and electrocardiograph traces-plus confusion of the central nervous system pattern. Titov's condition could be similarly described. (CARI)

546

Rees, David W. and Nola K. Copeland 1960 DISCRIMINATION OF DIFFERENCES IN MASS OF WEIGHTLESS OBJECTS
(Wright Air Development Division, Aerospace Medical Division, Wright-Patterson Air Force Base, Ohio) WADD TR 60-601, Project 7184; Task 71586 December 1960 ASTIA AD 252 161.

ABSTRACT: Absence of gravity results in the loss of many familiar kinesthetic cues of weight and friction necessary to man for object discrimination and manipulation. Man's ability to discriminate small differences in mass as opposed to small differences in weight was studied. Four weight series were used, each consisting of a standard (1000, 3000, 5000, or 7000 grams) and nine comparison stimuli. Judgments for mass differences were made with the same weights supported by compressed air on an air-bearing table. Thus, the frictionless aspect of a weightless environment was simulated. Results show that the mean difference limen, mean standard deviation, and Weber ratio for each standard are much larger for mass than for weight. Thus, to be detected under a weightless condition, mass increments must be at least twice as large as the weight increments required for discrimination in a normal weight-lifting situation

547

RePass, E. 1962 A BIBLIOGRAPHY ON WEIGHTLESSNESS. (Martin-Marietta Corp., Denver, Colo.) Literature search no. 23, ASTIA AD-295 142,

548

Reynolds, S. R. M. 1961 SENSORY DEPRIVATION, WEIGHTLESSNESS AND ANTI-GRAVITY MECHANISMS. THE PROBLEM OF FETAL ADAPTATION TO A FLOATING EXISTENCE.
Aerospace Medicine 32(11):1061-1068, Nov. 1961.

ABSTRACT: Sensory deprivation in relation to effects of prolonged weightlessness is approached in this discussion by reviewing embryological studies. Specifically, the problem of fetal adaptation to a floating existence is discussed. The weightless fetus is then considered in relation to weightless man in terms of established cybernetic principles. (Tufts)

549

Ritter, O.L. & S.J. Gerathewohl 1959 THE CONCEPTS OF WEIGHT AND STRESS IN HUMAN FLIGHT. (School of Aviation Medicine, Aerospace Medical Center, ATC, Brooks AFB, Texas) Rept. No. 58-154, Jan. 1959.

ABSTRACT: The concepts of weight and stress in human flight are considered. The usage of terms and expressions is analyzed, their diverse meanings disentangled, and some of the physical facts are presented together with a simple and consistent set of concepts for their description.

550

Rohles, F. H., R. E. Belleville, and M. E. Grunzke 1960 THE MEASUREMENT OF CONCEPT FORMATION IN THE CHIMPANZEE AND ITS RELEVANCE TO THE STUDY OF BEHAVIOR IN SPACE ENVIRONMENTS (AFMDC, Holloman AFB, New Mexico) July 1960, AD 241 966

551

Rohles, F.H., Jr. and H.H. Reynolds. 1962 A PROPOSED APPROACH TOWARD DETERMINING THE PSYCHOPHYSIOLOGICAL EFFECTS OF PROLONGED MANNED SPACE FLIGHT. (6571st Aeromedical Research Lab., Holloman AFB, New Mex.) ARL TDR Report No. 62-28, December 1962. ASTIA AD 293 881.

ABSTRACT: Orbital space flights are proposed to study the psychophysiological effects of prolonged weightlessness and cosmic radiation. The program presented will use animal subjects and attempts to eliminate weightlessness and cosmic radiation as deterrents to manned space flights of higher altitudes and longer duration. (Author)

552

Rohles, F.H., M.E. Grunzke & H.H. Reynolds 1962 A DETAILED ACCOUNT OF CHIMPANZEE PERFORMANCE DURING THE BALLISTIC AND ORBITAL PROJECT MERCURY FLIGHTS
(6571 st Aeromedical Research Lab., Holloman AFB, N. Mex.) ARL TDR 62-15; Proj. 6893 ASTIA AD 282 687

ABSTRACT: The insults of prolonged periods without sleep, the suturing of the physiological sensors, and the long period of restraint before launch, did not affect performance during flight; this also appeared true of the prolonged breathing of 100 per cent oxygen under reduced atmospheric pressures for the time periods of these flights. The noise and vibration accompanying launch did not affect performance during flight. Accelerations accompanying launch and re-entry in excess of 7 G's had an immediate effect upon performance; however, recovery to a prelaunch level appeared to be rapid. Adaptation to weightlessness took place during the long exposures to the weightless state, and re-entry accelerations did not have as severe effect upon performance as during the shorter flight. Eating and drinking were accomplished during weightlessness without difficulty. The visual processes, as measured, were unaffected by the rigors of space flight; this was also true of temporal response processes as well as continuous and discrete motor behavior. The pellet and water dispensers functioned properly during weightlessness. The chimpanzee appears to be a highly reliable subject for future space flights. (Author)

553

Roman, J. A. et. al. 1961 SCHOOL OF AEROSPACE MEDICINE PHYSIOLOGICAL STUDIES IN HIGH PERFORMANCE AIRCRAFT
Paper 1961 Meeting of Aerospace Medical Assoc., 27 Apr. 1961, Chicago, Ill
See also Aerospace Med. 33(4):412-419, April 1962

ABSTRACT: Survey of various studies made at the School ofAerospace Medicine, in which NF-100F aircraft are used for gathering physiological information in the following areas: (1) quantitative studies of physiological response of humans and animals to zero-gravity states of short duration (50 sec.); (2) development and testing of automatic physiological instrumentation for use in space vehicles; (3) development of monitoring and telemetering techniques for physiological information, and development of data reduction techniques for such information, (4) determination of physiological norms for human subjects in-flight under conditons of heightened alertness; and (5) screening of physiological parameters for suitability as indices of physiological functioning under in-flight conditions.

554

Roman, J.A. 1962 BIOMEDICAL MONITORING IN-FLIGHT
In (School of Aerospace Medicine, Brooks AFB, Texas) Lectures in Aerospace Medicine, 8-12 January 1962, ASTIA AD 281775

ABSTRACT: "Biomedical Monitoring" implies the automatic gathering of quantitative information relative to physiological functioning in the intact human or animal in a form suitable for evaluation, recording or storage.

Automatic monitoring of physiological parameters relies heavily on electronics techniques and has been with us for a relatively short time. The advent of semiconductors and the relative ease with which miniaturization may be accomplished in circuits employing them accounts only partly for the interest in biomedical monitoring and the strides which we have witnessed. Schemes for monitoring physio logical information in an operational situation were entirely possible with vacuum tube techniques. The impetus for the recent progress in monitoring techniques has been provided by the advent of manned space flight. This report is concerned largely with biomedical monitoring as it applies to space flight.

555

Roman, J. A., B. H. Warren, J. I Niven, & A. Graybiel 1962 SOME OBSERVATIONS ON THE BEHAVIOR OF A VISUAL TARGET AND A VISUAL AFTER-IMAGE DURING PARABOLIC FLIGHT MANEUVERS (School of Aerospace Medicine, Brooks AFB, Texas) AFSC Project 7930, Task 59615; Navy Project MR005. 13-6001, Subtask 1, Rept. 64, SAM-TDR-62-66, June 1962, ASTIA AD-287 083

ABSTRACT: The apparent displacement of a real target and a visual after-image were observed in the F-100F aircraft during periods of weightlessness averaging 45 seconds. The experimental results are used as a background from which to reconcile apparent discrepancies between the findings of different investigators.

556

Roman, J.A., B.R. Warren, J.I. Niven & A. Graybiel 1963 SOME OBSERVATIONS ON THE BEHAVIOR OF A VISUAL TARGET AND A VISUAL AFTERIMAGE DURING PARABOLIC FLIGHT MANEUVERS
Aerospace Medicine 34(9): 841-846

ABSTRACT: On the basis of short intermittent exposure to accelerations above and below 1 G in high-performance aircraft, the direction of apparent displacement of a real target and a visual after image is summarized. A real target appears to be displaced upward from center for accelerations greater than 1 G positive, and appears to be displaced downward for accelerations lwss than 1 G positive. A visual afterimage, when observed in the absence of a real target, appears to be displaced from center in a direction opposite to that observed for a real target. (From Author's Summary)

557

Roman, J.A., B.H. Warren, A. Graybiel 1963 THE SENSITIVITY TO STIMULATION OF THE SEMICIRCULAR CANALS DURING WEIGHTLESSNESS.
(School of Aero. Med., Brooks AFB, Texas, and Naval School of Aviation Med., Pensacola, Fla.) Proj. MR005.13-6001, Task no. 793002, Subtask 1, SAM-TDR 62-148, February 1963.

ABSTRACT: The sensitivity to stimulation of the semicircular canals during periods of weightlessness averaging 46 seconds was estimated by timing the duration of apparent rotation of a visual target and of the subject's perception of rotation after stimulation. Stimulation was accomplished by rolling the aircraft during periods of subgravity as well as during 1-G control maneuvers. Time intensity relationships of the stimulus were obtained by means of specialized instrumentation incorporated into the experimental subject's crash helmet.

558

Roman, J. A., B. H. Warren & A. Graybiel 1963 OBSERVATION OF THE ELEVATOR ILLUSION DURING SUBGRAVITY PRECEDED BY NEGATIVE ACCELERATIONS
(USAF School of Aerospace Medicine, Brooks AFB, Texas) SAM-TDR-62-141 February 1963

ABSTRACT: By observing apparent displacements of a real target, and visual afterimages during weightlessness preceded by positive or negative acceleration it was possible to identify these displacements as a special case of the "elevator illusion," as opposed to the oculogravic illusion. Positive and negative linear acceleration, as well as weightlessness, was obtained for this purpose in jet aircraft.

559

Roos, C.A. 1959 BIBLIOGRAPHY OF SPACE MEDICINE
U.S. Armed Forces Med. J. 10(2): 172-217, Feb. 1959
See also: National Library of Medicine, Washington, D.C., Public Health Service Publ. No. 617, 1958.

ABSTRACT: This compilation of 446 references covers aspects of space medicine such as sealed cabin problems, acceleration and deceleration, fractional and zero gravity, cosmic radiations, nutrition in space flight, survival problems, psychological and social problems, ground crew problems, and extraterrestrial aspects. Entries are arranged chronologically starting with 1958 and going back as far as 1928.

560

Roscoe, S.N. April 1960 PERFORMING MAN-SIZED TASKS IN SPACE
1960 Proceedings of the Institute of Environmental Sciences, 365-368

ABSTRACT: Within the near future the science of manned space travel will have advanced to the point of warranting the performance of man-sized tasks in space. The performance of such diverse will require the man to leave the protective environment of the ferry vehicle or space station and operate independently in free space.

Much study has been devoted to the problems of extra-vehicular protective devices for space operations. Less study has been directed toward making it possible to perform man-sized tasks while wearing such devices in space. Of particular interest are the problems of (1) providing prime power and converting it to useful forms, (2) controlling position and attitude relative to other objects, (3) performing complex discrimination, manipulation and decision functions which in turn will require, (4) special means of controlling illumination, particularly glare, and dark-light adaptation.

561

Roth, E.M. 1955 MEDICAL ASPECTS OF TRAVEL IN OUTER SPACE
Harvard Med. Alumni Bull. 20(4): 10-13, July 1955

562

Rozenblium, D. 1959 PERED POLETOM CHELOVEKA V KOSMOS (Prior to the Flight of Man into Outer Space)
Meditsinskii Rabotnik (Moskva), 38 (1786):2, May 12, 1959
See also: "Prior to Sending a Man in Outer Space Ships" Central Intelligence Agency Scient. Inform. Rep., Sept. 18, 1959, pp. 46-50. (PB 131891T30)

ABSTRACT: In any manned flight into space in a hermetically sealed cabin an artifically maintained microclimate is required. The selection of a system of air regeneration will present relatively few difficulties, since as early as the late 1930's four Soviet scientists successfully endured a period of 100 hours in a sealed cabin with a simulated environment. The inadequacy and unreliability of the sensory organs due to high speed, radial acceleration, and weightlessness will require automatic devices for navigation and piloting. Prolonged transverse accelerations are well tolerated. The observation of animals in rocket flights and of Laika in Sputnik shows that respiration and circulation are not substantially distrubed by the weightless state. It is supposed that the initial symptoms of vertigo, disruption of fine motor coordination, and illusions disappear as the organism becomes adjusted to weightlessness. Meteors and short-wave untraviolet radiation are not regarded as serious threats. Information on the intensity of cosmic radiation obtained

563

Ryabchikov, Ye. 1962 IN THE CITY OF "THE CELESTIAL BROTHERS"
(Translation Services, Branch, Foreign Technology Div., Wright-Patterson AFB, Ohio)
FTD-TT-62-1583/1+4 9 Nov. 1962 ASTIA AD 292 600
Original Source: Pravda August 7, 1962. P. 4.

ABSTRACT: This article gives a brief description of the temperature chamber, pressure chamber, and silence chamber used in the training of Russian cosmonauts. It also describes the cosmonauts' experiences in the centrifuge, weightless basin, and the training panel

564

Gublowsky, J. 1960 MAN IN A TUB.
Space World. 1: 14-15, July 1960

565

Ryker, N.J. 1962 MANNED SPACE FLIGHT
(North American Aviation, Inc., Space and Information Systems Division, Downey, Calif.) July 17-19, 1962.

ABSTRACT: Herein is described the major difference between several manned space flight missions and their effect upon the hardward design of spacecraft sub-systems.

WEIGHTLESSNESS

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566

Saenger, E. 1949 THE LAWS OF MOTION IN SPACE TRAVEL
Interavia, 4:416

567

Salaznev, V.P. 1958 ISKUSSTVENNYY SPUTNIK ZEMLI (ARTIFICIAL EARTH SATELLITE) (Moscow: Oborongis, 1958)

ABSTRACT: On the basis of domestic and foreign, chiefly American sources, the author discusses the theoretical problems involved in the construction and launching of Soviet artificial satellites, specifically Sputnik I, the world's first. He indicates the path to be followed by scientists in solving the problem of conquering space, mentioning past and future difficulties, and pointing out the main problems the artificial satellites will solve. He reviews the successive stage in the conquest of space, beginning with the launching of the unmanned earth satellite and ending with the establishment of inetrplanetary space stations and the use of space ships. Several models of the earth satellite, celestial rockets, and space stations are described. The principles of control and celestial orientation of the artificial satellite during its orbital flight are reviewed, and a description is given of the most important instruments installed in the satellite. (CARI)

568

Schaefer, H. J. 1959 A NOTE ON THE GRAVITY-FREE STATE ON A SPACE PLATFORM. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-6001.1.48 29 Jan. 1959

ABSTRACT: The gravity-free state in a satellite is fully realized only in its center of gravity. A few meters off center, forces of the order of 10^{-6} G are felt. Though they are not likely to affect physiological or sensory functions, they do influence the motion of freely floating objects twisting their trajectories into tortuous paths. The consequences of this phenomenon for intersatellite transportation are discussed for the case that an object (consort) is thrown by hand from a satellite. The apparent motion of the object in the satellite reference system is analysed. It is shown that any desired displacement can be accomplished with various widely different launching speeds and directions. If the latter parameter is properly chosen, launching speeds of centimeters per second will produce displacement of many kilometers.

569

Schaefer, K.E., ed. 1962 ENVIRONMENTAL EFFECTS ON CONSCIOUSNESS. (New York: The MacMillan Co., 1962)

ABSTRACT: Proceedings of the First International Symposium on Submarine and Space Medicine, U.S. Submarine Base, New London, Conn., Sept. 8-12, 1958. Contents include:
Noell, W.K., Effects of High and Low Oxygen Tension on the Visual System;
Wing, K.G., Effects of Certain Environmental Changes Upon the Cochlear Response of the Cat;
Therman, P.O., Neurophysiological Effects of Carbon Dioxide;
Stein, S.N., The Neurophysiological Effects of Oxygen Under High Pressure;
Taylor, H.J., Neurophysiological Effects of Nitrogen;
Davis, H., The Problem of Consciousness;
Graybiel, A., Orientation in Space, with Particular Reference to Vestibular Functions;
Gerathewohl, S.J., Effect of Gravity-Free State;
Simons, D.G., The Break-Off Phenomenon During Balloon Flight in the Stratosphere;
Lilly, J.C., The Effect of Sensory Deprivation on Consciousness;
Schaefer, K.E., Effects of Carbon Dioxide on Consciousness;
Pugh, L.G.C.E., The Effect of Acute and Chronic Exposure to Low Oxygen Supply on Consciousness;
Behnke, A.R., Effects of Nitrogen and Oxygen on Consciousness;
Panel Discussion.

570

Schechter, H.B. 1960 SOME WEIGHT CONSIDERATIONS FOR MANNED LUNAR MISSIONS. American Rocket Society J. 30(2):195-197, Feb. 1960.

ABSTRACT: The total weight requirements for three possible types of manned, round-trip, soft-landing lunar missions are investigated, all starting out from a space station circling the earth at an altitude of about 350 miles. The first and second missions follow direct hit flight trajectories and employ chemical and nuclear power plants, respectively. Thrust magnitudes needed are determined by imposing an initial landing deceleration load factor of 3 earth g. The third mission makes use of a nuclear power plant as a sort of "ferry boat" to reach a circular orbit around the moon, whereas for the landing and ascent portions at the moon, the final payload is propelled by chemical rockets. After rendezvous with and attachment to the orbiting ferry boat, the payload is returned to the earth space station.

571

Schlei, E. J., P. L. Vergamini, and J. C. Simons 1962 SOME MOTION CHARACTERISTICS OF TETHERED FREE-FLOATING WORKERS (Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio) AMRL MEMO P-13 Oct. 1962

ABSTRACT: The freedom of movement of a free-floating and weightless operator who is tethered to a spacecraft is described. The purpose is to determine how a lifeline limits his six-degrees-of-motion freedom and, if limitations do exist, to suggest schemes by which he can be tethered with minimum restrictions. The operator's motion behavior as he soars along a tether stretched between two weightless masses is also described. The worker is found to be limited only by the amount of tether slack, and can rotate about any axis without limitation, provided the tether is attached to the intended axis of rotation. (N63-19092)

572

Schmeck, H. M., Jr. 1961 RUSSIAN SUBJECT TO HEAVY STRESS; FIRST MAN TO BE EXPOSED TO PROLONGED WEIGHTLESSNESS, A VITAL FACTOR IN SPACE. New York Times, August 7, 1961, pp. 1, 6

ABSTRACT: The second Soviet astronaut has endured one trial in particular unlike anything any human has experienced before. This is a state of weightlessness lasting many hours. While many of the experiences of space flight can be estimated or simulated on earth or in the air, this is not true of long-term weightlessness. Reports from Moscow indicated that Maj. Gherman S. Titov's mental and physiological functioning was normal. One particularly important question is the effect of the heavy forces of re-entry into the atmosphere and landing on a person who has become accustomed, over a period of hours, to "zero G" or the state of weightlessness. The success with which the vehicle protects its occupant and maintains comfortable conditions for life will also, no doubt, be studied closely. (CARI)

573

Schock, G.J.D., 1957 SOME OBSERVATIONS ON ORIENTATION AND ILLUSIONS WHEN EXPOSED TO SUB AND ZERO GRAVITY. (Ph.D. Thesis, University of Illinois, Champaigne, Illinois.)

574

Schock, G.J.D., & D.G. Simons 1957 A TECHNIQUE FOR INSTRUMENTING SUB-GRAVITY FLIGHTS. J. Aviation Med. 28(6):576-582, Dec. 1957. See also AFMDC TN 58-4, Feb. 1958.

ABSTRACT: Reduced data from flights conducted during the past year emphasize that individual pilots vary in their skill in obtaining the maximum duration of zero G

from each ballistic trajectory flown. Repeated flights using the technique described greatly increases pilot skill. The longest consecutive period of zero G obtained has been seven seconds. Periods of less than + 0.025G last for as long as 22.5 seconds, with intermittent periods of zero gravity of four to five seconds. Complete trajectories of less than +0.1 G for thirty seconds or more can be easily realized.

Incidental problems arising in the use of F-94 jet aircraft as test platforms in sub-gravity research has been: (1) loss of engine oil pressure, (2) loss of hydraulic fluid from the resevoir, and (3) loss of trim tab action. The loss of engine oil pressure lasts only during the zero G trajectory and is not harmful to the engine. The oil rises in the chamber during reduced gravity conditions causing a loss of hydrostatic pressure at the oil sump located in the bottom of the reservoir. This loss of pressure is reflected in the oil pressure indicating needle dropping to zero and remaining there as long as the oil is floating in the chamber. The same conditions prevail for the hydraulic fluid, except in the F-94, with returned longitudinal acceleration the fluid tends to flow out the overflow vent located at the top of the reservoir and is dumped overboard. The loss of trim tab action is explained in the overheating of the trim tab actuator motor due to loss of air currents in the zero G state. With returned air currents the trim tab actuator motor cools and become operational.

The equipment designed to instrument sub-gravity flights is uncomplicated and has the advantages of light weight and compactness. The complete package weighs less than 15 pounds and can be fitted easily in the observer's compartment of an F-94C aircraft.

Some of the more interesting observations of recent flights have been an incident of extreme vertigo and disorientation in a pilot with more than 3,000 flying hours observations on the behavior of different fluids under sub and zero-gravity conditions, and a high incidence of motion sickness. Preliminary experiments indicate that a study of fluid behavior under extended periods of true zero G will be valuable in the planning and design of future space vehicles

575

Schock, G. J. D. 1958 SENSORY REACTIONS RELATED TO WEIGHTLESSNESS AND THEIR IMPLICATIONS TO SPACE FLIGHT. (Air Force Missile Development Ctr., Holloman AFB, N. Mex.) Proj. 7851, AFMDC TR 58-6, April 1958; ASTIA AD-135 012

ABSTRACT: The implications of a sensory-starved environment are reviewed and compared to conditions that will prevail in actual space flight. Recommendations for training for future space flight are presented. It is conjectured that in periods of weightlessness of several hours, the highly motivated space traveler would probably cope with sensory deprivation effects; but in longer periods, when rest would be a necessity, much heavier stress would be put on the individual. Ability to operate efficiently in spite of this stress can best be assured by psychiatric evaluation of experiments in simulated space cabins.

576

Schock, G. J. D. 1958 APPARENT MOTION OF A FIXED LUMINOUS TARGET DURING SUB-GRAVITY TRAJECTORIES. (Air Force Missile Development Ctr., Holloman AFB, N. Mex.) AFMDC TN-58-3; ASTIA AD-135 009; Feb. 1958

ABSTRACT: The purpose of this study was to determine the effects of linear acceleration and deceleration found in flying a ballistic trajectory on the visual perception of a target in the dark. Four subjects observed a fixed luminous target while the pilot of an F-94 aircraft executed the ballistic trajectory. During increased forward acceleration and vertical-g force, the target appeared to move downward. The reverse occurred with deceleration and decreased vertical-g-force values. During weightlessness the target appeared to stabilize and oscillate up and down as the subject made excursions into negative g and positive subgravity states, respectively. (AUTHOR)

577

Schock, G. J. D., & D. G. Simons 1958 A TECHNIQUE FOR INSTRUMENTING SUBGRAVITY FLIGHTS. (Air Force Missile Development Ctr., Holloman AFB, N. Mex.) AFMDC TN 58-4; ASTIA AD-135 008; Feb. 1958

ABSTRACT: Instrumentation was designed to achieve the maximum duration of weightlessness using F-94C aircraft. Observations on the behavior of different fluids under subgravity and weightless conditions indicate a study under extended periods of true weightlessness is worthwhile for planning and designing future space vehicles. (AUTHOR)

578

Schock, Grover J.D. 1959 A STUDY OF ANIMAL REFLEXES DURING EXPOSURE TO SUBGRAVITY AND WEIGHTLESSNESS. (Air Force Missile Development Center, Holloman Air Force Base, N. Mex.) Report no. AFMDC TN-59-12; ASTIA AD-215 463; June 1959
See also Aerospace Med. 32:336-340, April 1961.

ABSTRACT: Normal cats exposed to weightlessness display loss of labyrinthine reflexes, disorientation and confusion, with and without visual cues. Cats in which the vestibular cortical area of the brain had been removed bi-laterally seemed to be less disoriented and confused than normal animals, but also display loss of labyrinthine reflexes. Bi-labyrinthectomized cats, however, are relatively unaffected by exposure to weightlessness and display no symptoms of serious disorientation and confusion. (Author)

579

Shock, G. J. D. 1959 PERCEPTION OF THE HORIZONTAL AND VERTICAL IN SIMULATED SUBGRAVITY CONDITIONS. (Air Force Missile Development Ctr., Holloman AFB, N. Mex.) AFMDC-TN-59-13, June 1959; ASTIA AD-215 464

ABSTRACT: Quantitative experiments show that in simulated sub-gravity conditions

with decreased proprioceptive input, perception of the horizontal and vertical is greatly impaired. During actual space flight artificial gravity forces may be needed to insure adequate human orientation during weightlessness.

580

Schock, G.J.D. 1959 AIRBORNE GALVANIC SKIN RESPONSE STUDIES: A PRELIMINARY REPORT
(Air Force Missile Development Center, Holloman AFB, New Mexico) Report No. TN 59-14, June 1959, ASTIA AD 215 465
See also Aerospace Med. 31:543-546, July 1960.

ABSTRACT: Galvanic skin responses are not affected by weightlessness but instead may be attributed to emotional factors.

581

Schock, G.J.D. 1960 PERCEPTION OF THE HORIZONTAL AND VERTICAL IN SIMULATED SUBGRAVITY CONDITIONS. Reprint USAF Medical Journal 11(7):786-793.

ABSTRACT: This investigation was conduted with the aim of ascertaining the role played by the labyrinth in the perception of the body position in subgravity conditions. The subject was seated in a special rotating chair and had to orient a fluorescent rod in a dark room without any reference marks, according to his own evaluation of the true horizontal and vertical. The error relative to the real coordinates was measured with a special device. the tests were carried out under the following conditions: (1) head inclined to the left at 45° (upheld by a special support); (2) body inclined to the left at 42°; (3) body inclined to the left at 28°; (4) seated, with head and trunk erect. The tests were executed on the ground and in the water.

582

Schock, G.J.D. 1960 AIRBORNE GSR STUDIES; A PRELIMINARY REPORT
Aerospace Medicine 31(7): 543-546 June 1960

ABSTRACT: Evidence gained from subjects exposed to pre-weightlessness accelerations and weightlessness suggest changes in GSR and heart rate to be due to emotional factors rather than to weightless or positive G. Instrumentation techniques for high performance aircraft are presented for measuring GSR and heart rate of human subjects.

583

Schock, G. J. D. 1961 A STUDY OF ANIMAL REFLEXES DURING EXPOSURE TO SUBGRAVITY AND WEIGHTLESSNESS.
Aerospace Medicine 32(4):336-340, April 1961.

ABSTRACT: Several experiments were conducted to study the role of the vestibular apparatus during stakes of subgravity and weightlessness. Six cats were observed: two unoperated, two bilabyrinthectomized, and two with the vestibular cortical area of the brain removed bilaterally. Postural reflex activity of these animals was recorded on the ground and during straight and level flying (normal g conditions), and during ballistic trajectory flight (subgravity and weightless conditions). Comparisons of the responses to the various tests, with eyes open and eyes covered, were compared. (Tufts)

584

Schocken, K. 1959 THE ELECTROCARDIOGRAM IN THE ABSENCE OF GRAVITY.
(Thermodynamics Section, Research Projects Laboratory, DOD, Army Ballistic Missile Agency, Redstone Arsenal, Ala.) DV-TN-4-59; 13 Feb. 1959

585

Schocken, K., & S.J. Gerathewohl 1960 A QUANTITATIVE EVALUATION OF THE ELECTROCARDIOGRAMS OF TWO SQUIRREL MONKEYS UNDER CHANGING CONDITIONS.
(Army Ballistic Missile Agency, Redstone Arsenal, Alabama)
Rept. No. DV-TN-12-60.

ABSTRACT: The following cardiodynamic effects of changes of the gravitational force have been previously observed: (1) a marked increase in cardiac rate occurs in almost all subjects during acceleration and deceleration periods, (2) the electrocardiogram is generally normal in the zero-G state, (3) the heart rate is increased and unstable during post-acceleration weightlessness, (4) transient changes may occur in the electrocardiogram if the state of the gravitational field changes, (5) the steady cardiodynamic state seems to be the same for zero G as for the one G condition, (6) increased G loads lead to the condition of physiological stress, (7) the absence of G-forces is a mechanically stressless condition, (8) the stresses imposed by acceleration and the condition of weightlessness encountered in aircraft and missile flights are within the range of tolerance of the human and animal organism. These cardiodynamic effects are confirmed by the electrocardiographic findings of the 2 bioflights of monkeys. A rigorous statistical evaluation of the limits of normality, in a similar manner as was carried out previously in humans, is possible and can be performed as soon as sufficient statistical material is available

586

School of Aviation Medicine 1959 REPORTS ON SPACE MEDICINE - 1958
(School of Aviation Medicine, Randolph AFB, Texas)

ABSTRACT: A series of articles and reports by research scientists at the School of Aviation Medicine, USAF, including:

1. Human Performance in the Space Travel Environment, George T. Hauty
2. Supersonic and Hypersonic Human Flight, Julian E. Ward, Siegfried J. Gerathewohl and George R. Steinkamp
3. Human Engineering of the Sealed Space Cabin, Julian E. Ward and George R. Steinkamp
4. Fatigue, Confinement, and Proficiency Decrement, George T. Hauty and R.B. Payne
5. The Feasibility of Recycling Human Urine For Utilization in a Closed Ecological System [illegible]

587

Schubert, G. & H. Kolder 1961 FACTOR ANALYSIS OF SPACE ORIENTATION
Rev. Med. Aero (Paris) 2:179-180, Dec. 1961. (Fr)

588

Schubert, G. and H. Kolder 1962 FACTOR ANALYSIS OF SPACE ORIENTATION
In Riv. Med. Aero. 25:64-77, Jan.-March 1962. (Italy)

589

Schwartz, E. W. 1961 LIQUID BEHAVIOR INVESTIGATIONS UNDER ZERO AND LOW G CONDITIONS. In Benedikt, E. T., ed. Weightlessness-Physical Phenomena and Biological Effects. (New York: Plenum Press, 1961) pp. 102-110.

590

Schwichtenberg, A.H. 1960 SPACE MEDICINE AND ASTRONAUT SELECTION
Minnesota Med. 43(12): 797-812 Dec. 1960

ABSTRACT: In a manned space flight project, there is an interdependence in the fields of medicine, design engineering, and human engineering. The author describes the physical tests given during the selection of astronauts. He suggests that the knowledge and experience gained from research in aviation medicine be applied to the general medical practice.

591

Schwichtenberg, A.H. 1961 MEDICAL ASPECTS OF SPACE FLIGHT
Ann. Rev. Med. 12: 299-322, 1961

ABSTRACT: A great deal of research has been conducted in the field of space flight travel. However, the application of the knowledge gained from the research has been slow because of the lack of communication among the scientists engineers, and physicians. There are many medical implications that can be attributed to various flight stresses. The author discusses the flight stresses as well as commenting on selection of astronauts, function of man in space, and man-machine relationships.

592

Seale, L.M. & R.E. Flexman 1961 RESEARCH ON A SELF-MANEUVERING UNIT FOR ORBITAL WORKERS
In: Proceedings of the IAS Aerospace Support and Operations Meeting, Dec. 4-6, 1961 (Instit. of Aerospace Sciences, Inc., New York; assisted by IAS Aerospace Technology Panel of the I.A.S. Aerospace on Support, Orlando, Fla.)

ABSTRACT: Maintenance activities required of an orbital worker and the systems that are necessary to support him in the predicted environments are studied extensively.

Three major subsystems which comprise the orbital worker self-maneuvering system are: (1) life support systems (all equipments and structures required to sustain life), (2) support equipments (tools and other equipments necessary for the successful completion of orbital maintenance activities), and (3) propulsion, stability and control systems.

593

Segal, H. 1954 SPACE MEDICINE
J. South African Interplanetary Society 24-29, April-Sept. 1954

ABSTRACT: Medical problems under weightless conditions outside the earth's gravitational field in terms of selection of the crew, take-off, flight, landing, and life on the objective.

594

Sells, S. B., & C. A. Berry, eds. 1961 HUMAN FACTORS IN JET AND SPACE TRAVEL
(New York: Ronald, 1961)

CONTENTS:

Graybiel, A., Medical Aspects of Jet and Space Travel,
Hale, H. B., Natural Environment and the Environment of Flight,

Hekhuis, G. L., Radiobiology and the Environment of Flight,
Wilbanks, W. A., Basic Aspects of Skilled Performance,
Matheny, W. G., Human Operator Performance Under Non-normal Environmental Operating Conditions,
Sells, S. B., Group Behavior Problems in Flight,
Berry, C. A., Human Qualifications for and Reactions to Jet Flight,
Sells, S. B., & C. A. Berry, Human Requirements for Space Travel,
Norton, J. A., Protective Medicine in Jet and Space Flight,
Moseley, H. G., Air Craft Accidents and Flight Safety,
Hanks, T. G., Human Factors Related to Jet Aircraft,
Clamann, H. G., The Engineered Environment of the Space Vehicle,
Mayo, A. M., Operational Aspects of Space Flight,
Webb, H. B., Speculations on Space and Human Destiny.

595

Semotan, J. 1961 VYZAM DUSEVNI HYGIENY V ASTRONAUTICE (THE IMPORTANCE OF MENTAL HYGIENE IN ASTRONAUTICS)
Cekoslov. Psychiat. (Prague) 57(1): 61-69, Jan. 1961. In Czech, with English summary.

ABSTRACT: Possible damage to the mental facilities of astronauts during space flight is discussed in this article. The dangerous influences include weightlessness, acceleration and deceleration, noise, vibration and isolation. The author suggests a psychogenic approach to the selection of spacemen. He also describes the present and future research for the preservation and development of mental health in the space crew.

596

Sewall, H. 1946 THE CLINICAL RELATIONS OF GRAVITY AND CIRCULATION
Amer. J. Med. Science 151:491

597

Sharp, E. D. and C. W. Sears 1963 WALKING UNDER ZERO-GRAVITY CONDITIONS USING VELCRO MATERIAL
(Aersopace Medical Div. Aerospace Medical Research Labs. (6570th) Wright-Patterson AFB, Ohio)
AMRL MEMO P-23 Jan. 1963

ABSTRACT: The purpose of this study is to evaluate man's ability to walk under conditions ot weightlessness while using Velcro materials as a means of maintaining surface contact. Velcro consists of two mating pieces of fabric: a hook portion containing many mylon hooks, and a mating material, pile, consisting of many small mylon eyes or loops. When the two materials are pressed together, the hooks engage in the eyes and the two portions

adhere. It was concluded from the study that: (1) Velcro material, applied to a maximum-area, flexible shoe with a resilient, flat sole, appears to hold some promise as an aid to weightless walking; (2) under the conditions of this study, the body posture that permitted the most successful walking gait was a crouched position, knees bent and the upper portion of the body bent forward. This posture apparently best enables the center of mass of the body to maintain a straight line path parallel to the walking surface; and (3) subject-induced motions appear to play a definite part in attaining a good walking gait. Swinging the arms, the velocity with which the legs are raised off the floor, and the technique that is used in separating the Velcro material on the shoes from that on the walkway all play a part in the success or failure of maintaining useful contact with the walking surface. (N63-19093)

598

Shaw, R.F. & N.B. Marple 1961 METHODS OF DETERMINING BLOOD FLOW THROUGH INTACT VESSELS OF EXPERIMENTAL ANIMALS UNDER CONDITIONS OF GRAVITATIONAL STRESS AND IN EXTRA TERRESTIAL SPACE CAPSULES. (Columbia Univ., College of Physicians and Surgeons: Electronics Research Labs., New York) Status rept. no. P-1/168, Rept. no. CU-1-61-NASA-112-PS/ERL, 1 May 1961

ABSTRACT: The following work is described: (1) technical development of blood flowmeter instrumentation; (2) surgical considerations related to special problems of chronic implantation of flowmeter probes; (3) study of the relationship between levels of blood flow and organ activity.

599

Shepard, A.B., Jr. 1961 PILOT'S FLIGHT REPORT, INCLUDING IN-FLIGHT FILMS (Paper, Conference on Results of the First U.S. Manned Suborbital Space Flight, June 6, 1961, NASA, Washington, D.C.) Pp. 109-116

600

Shternfel'd, A. 1958 ARTIFICIAL SATELLITES. (Trans. of a book published by State Publishing House of Technical Literature, Moscow, 1958) LC or SLA PB 141351T.

601

Shternfeld, Ari. 1959 MAN IN COSMIC SPACE Soviet Space Science (New York: Basic Books, 1959) pp. 163-189

ABSTRACT: Presents an excellent, simplified discussion of work and life under conditons of weightlesness. Defines G-force for the layman.

602

Sternfel'd A. 1959 OT ISKUSSTRENNYKH SPUTNIKOV K MEKHPLANETNYM POLETAM (FROM MAN-MADE SATELLITES TO INTERPLANETARY FLIGHTS) Gosudarstvennoye Izdatel'stvo Fiziko-Matematicheskoy Literatury (Moscow), 1959 (Aerospace Technical Intelligence Ctr., Wright-Patterson AFB, Ohio) Trans. No. MCL-1301, 18 Sept. 1961. ASTIA AD 264 626

ABSTRACT: The launching of an automatically controlled rocket to Venus will enable scientists to obtain valuable scientific data. But more data will be supplied by flights around Venus, especially the flight of a manned rocket. At a definite trajectory the cosmic rocket after flying around the celestial body will automatically return to the point of take-off, traveling on inertia without any fuel consumption. That is why flights of people around Venus will be easier and sooner than the flight with landing on the surface of Venus with return to Earth. But the flight around Venus is a considerably more difficult problem than the flight around the Moon. In the latter case, the rocket is preferably in the terrestrial field of gravitation. Having overtaken the Moon, it will come back to Earth. But when a cosmic rocket will fly in the direction of Venus then at a relatively short distance from the Earth it will fall into the field of gravitation of the Sun

603

Shurley, J. T. 1960 PROFOUND EXPERIMENTAL SENSORY ISOLATION Am. J. Psychiat. 117(6):539-545.

ABSTRACT: This is a description of the sensory deprivation experiments conducted at Oklahoma City Veterans Administration Hospital. In order to simulate weightlessness, the subject was placed in a large tank filled with water slowly flowing at a constant temperature. The rest of the system consisted of automatic controls and continuous tape recorders. The subjects were volunteers who had been pre-selected on the basis of capacity for memory, ability to communicate freely, and self-observation. Light, sound, vibration, odor, and taste inputs were highly restricted. The chronological report is based on tape recordings by a subject in isolation for 4 1/2 hours. The water immersion test was not perceived as unpleasant. The subjects feeling states varied during post-exposure.

604

Siegel, R. 1961 TRANSIENT CAPILLARY RISE IN REDUCED AND ZERO-GRAVITY FIELDS American Society of Mechanical Engineers Transactions, Series E 28:165-170 June 1961

ABSTRACT: Experimental information given on the transient "capillary" rise of water into vertical tubes subjected to reduced and zero-gravity fields. The response in a low-gravity environment is of interest in studying the behavior of liquid systems for space vehicles.

605

Simons, D. G. 1955 REVIEW OF BIOLOGICAL EFFECTS OF SUBGRAVITY AND WEIGHTLESSNESS. Jet Propulsion 25(5):209-211, May 1955

ABSTRACT: Disorientation and discoordination resulting from exposure to subgravity and weightlessness depend upon the response of the sensory modalities of equilibrium, vision, and kinesthesis. These modalities are influenced by altered stimulus-sensation responses, illusions, and sensory inconsistencies. Experimental evidence of disorientation and discoordination due to exposure to subgravity and weightlessness is cited from both animal and human experiments. It is concluded that the vestibular apparatus plays a critical role in the physiological and psychological responses to subgravity exposure. The experimental evidence available to date suggests that incapacitating disorientation may occur under specific conditions. (AUTHOR)

606

Simons, D. G. 1956 REVIEW OF BIOLOGICAL EFFECTS OF SUBGRAVITY AND ZERO-GRAVITY (American Rocket Society) ARS 139-54, Circa 1956

ABSTRACT: Disorientation and discoordination resulting from exposure to subgravity and zero-gravity depend upon the response of the sensory modalities of equilibrium, vision, and kinesthesis. These modalities are influenced by altered stimulus-sensation responses, illusions, and sensory inconsistencies. Experimental evidence of disorientation and discoordination due to exposure to subgravity and zero-gravity is cited from both animal and human experiments. It is concluded that the vestibular apparatus plays a critical role in the physiological and psychological responses to sub-gravity exposure. The experimental evidence available to date suggests that incapacitating disorientation may occur under specific conditions. (AUTHOR)

607

Simons, D. G. 1957 APPLICATIONS OF SATELORB (SATELLITE SIMULATING OBSERVATION AND RESEARCH BALLOON). (Presented under the auspices of The American Rocket Society at the 8th International Astronautical Congress, Barcelona, Spain, 6-12 October 1957)

608

Simons, D.G. 1958 AREAS OF CURRENT SPACE MEDICAL RESEARCH
In Alperin, M., M. Stern, & H. Wooster, eds, Vistas in Astronautics: Proceedings of the First Annual AFOSR Astronautics Symposium (New York: Pergamon Press, 1958) pp. 299-303, Part 6, Human Factors

ABSTRACT: Effects of heavy-ray particles, the design of sealed cabins, the effects of weightlessness, and the problems of reentry into the atmosphere are briefly discussed.

609

Simons, D. G. 1961 SUBGRAVITY AND WEIGHTLESSNESS. (In Gauer, O. H. and G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine) (Boston: Little, Brown, and Co., 1961). Pp. 189-201

610

Simons, J. C. 1959 PRELIMINARY FLIGHT TEST REPORT - IN-FLIGHT STUDY OF MAGNETIC SHOES FOR ORBITAL WORKERS. (WADC, Wright-Patterson AFB, Ohio) 9 Jan. 1959

611

Simons, J.C. 1959 PRELIMINARY FLIGHT TEST REPORT, PROJECT SKYHOOK. INFLIGHT STUDY OF STABILIZATION UNIT FOR ORBITAL WORKERS
(Wright Air Development Center, Aerospace Medical Lab., Wright-Patterson AFB, Ohio) June 29, 1959

612

Simons, J. C. 1959 WALKING UNDER ZERO-GRAVITY CONDITIONS
(Wright Air Development Ctr., Wright-Patterson AFB, Ohio)
WADC TN 59-327, Oct. 1959; ASTIA AD-232 469

ABSTRACT: This is the first report on experiments with permanent magnetic sandals which enable a man to walk with an approximately normal gait under weightless conditions. All four subjects reported an immediate spatial orientation of "down" being where their feet were, as soon as their body rotation stopped. A basic index was formulated to define magnetic requirements in terms of the inductive forces required to hold a subject stationary. A vector analysis of the 1 g walking gait is made.

613

Simons, J.C. & M.S. Gardner 1960 SELF-MANEUVERING FOR THE ORBITAL WORKER. (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADD Tech. Report. 60-748. Dec. 1960. ASTIA AD 252 125.

SUMMARY (a): Various self-propulsion and stabilization systems have been flight-tested under weightless conditions. The capability of these systems is reviewed. After analyzing the basic motion and orientation problems of the orbital worker, requirements for an optimum propulsion and stabilization system are discussed.

614

Simons, J. C., & M. S. Gardner 1961 FREE FLOATING SENSATIONS AND PERFORMANCE In 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D. C. (Mt. Prospect, Ill.: Institute of Environmental Sciences, P. O. Box 191) pp. 371-378

CONCLUSIONS: A general design criterion is proposed from the many conclusions found in the table: i.e. The orientation of the designer should be pointed toward the use of the gravity-free environment as a focus. Earth oriented, behavior should not be forced into the g-free state.
The first consideration for developing hardware and optimizing performance should be the appreciation, acknowledgment and USE of weightless behavior. Restrictions and control of motion will be required; however, the potentiality of a g-free man as the most intimate man-vehicle ever conceived should guide all of our applications. The freefloater is indeed both man and machine, vehicle and driver in one. (AUTHOR)

615

Simons, J.C. & W.Kama 1962 A REVIEW OF THE EFFECTS OF WEIGHTLESSNESS ON SELECTED HUMAN MOTIONS AND SENSATIONS.
(6570th Aerospace Medical Research Laboratories, Aerospace Medical Div., (AFSC) Wright-Patterson AFB, Ohio) April 1962. ASTIA AD 282 116

ABSTRACT: The motions of the weightless free-floating worker are discussed in terms of an operator performing maintenance and supply functions between, upon, and within space vehicles. A postural coordinate system is used as a basic reference and current USAF studies concerned with rotating and translating the system are reviewed. Study techniques include physical analyses of the motions, inflight validation of the analyses and mathematical projections of probable orbital motions. Sensations to these motions and the ability to handle inertial objects is also discussed.

The motion freedom of the unencumbered surface-free worker revealed many restraint requirements and such designs as lifelines, adhesive foot-gear and self-maneuvering units are introduced to limit and control his motions. These designs are being used to determine human factor criteria for space hardware and to suggest crew selection and training procedures.
The effects of transient weightlessness on sensory, psychomotor, and motor functions have revealed minor effects; however, the perception of the postural vertical and the response of the circulatory system to the return of positive gravity are considered as pertinent problems.

616

Simons, J. C. and M. S. Gardner 1963 WEIGHTLESS MAN: A SURVEY OF SENSATIONS AND PERFORMANCE WHILE FREE-FLOATING (FINAL REPORT, OCT. 1960-FEB. 1961).
(Aerospace Medical Div. Aerospace Medical Reserach Labs. (6570th). Wright-Patterson AFB, Ohio)
AMRL-TDR-62-114 March 1963

ABSTRACT: The effect of surface-free behavior on work performance in space

has been investigated to determine what techniques should be developed to aid the orbital workers. While they performed gross motor activities under weightless conditions, subjects reported their sensory and performance experiences during Keplerian parabolas in a C-131B aircraft, in both lighted and dark cabin conditions. Their experiences were categorized into sensation influences upon orientation and body-motion influences upon body attitude and position control. Unique examples of short-term weightless behaviors were found, and their causes are briefly discussed. Potential applications of these weightless responses to hardward development and to crew training and selection are discussed, and significant areas for future research are proposed. (Author)

617

Simons, J.D., Jr. April 1960 EFFECTS OF EXTREME ALTITUDES, AND THE NEED FOR SIMULATION
1960 Proceedings of the Institute of Environmental Sciences, 5-10

618

Sinnamon, E.G. & W.S. Wray 1962 BIBLIOGRAPHY OF AVIATION MEDICAL ACCELERATION LABORATORY PUBLICATIONS, 1950-1960
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-6211, Sept 27, 1962

ABSTRACT: A bibliography with abstracts and indices is presented which covers all of the published work of the Aviation Medical Acceleration Laboratory during its first decade, 1950-1960. The primary facility at this laboratory is the 50-foot radius human centrifuge with its gimbal-mounted gondola. This device is capable of producing acceleration levels up to 40 G and with computer control can realistically simulate flight profiles of air and space vehicles. The subject matter covered by the publications includes aviation and space medicine, the effects of acceleration on the animal and human organism, human performance under acceleration stress, dynamic stimulation of aircraft and space vehicles, biochemistry, physiology, psychology, and engineering. Included are formal reports, progress reports and articles which appeared in the open literature. The material is coded and grouped under subject headings and indexed by author, title and report number or journal citation. ASTIA numbers are given for all reports available under that system.

619

Sisakyan, N. 1961 MANNED SPACE FLIGHT PROBLEMS DESCRIBED
FBIS, USSR & East Europe, Nr. 145, July 28, 1961

ABSTRACT: Successful completion of a series of experiments with satellite ships made it possible to start preparing for man's flight into space. Results of research have shown that the limits of endurance could be considerably expanded,

620

Sisakyan, N. 1961. MAN AND SPACE
Pravda 85(15575): 6, 26 March 1961
(Aerospace Technical Intelligence Center, Wright-Patterson AFB, Ohio)
Trans. No. MCL-1149, 27 July 1961 ASTIA AD 261 823

ABSTRACT: Soviet science and technology never ceases to amaze mankind with its ever increasing achievements in the study of space. On March 25 the fifth sputnik, weighing an impressive 4695 kilograms and carrying a four-legged cosmonaut -- the dog Zvezdochka -- and other biological specimens, was launched from the Soviet Union and returned again, on the same day, to a pre-selected landing site, by a command from the ground. The attention of the entire world is attracted to the flights of Soviet space ships, the outstanding results of our scientists when investigating outer space. This Soviet and world interest is due mainly to the fact that each such flight enriches science with new important facts on the rules that govern the influence of space conditions on living organisms, gives valuable information on the operation of the multitude of complex research instruments, automatic devices and the equipment of the spaceship. We are acquiring ever newer information on the unknown depths of space. Finally, we are getting a clear concept of the increasing power of our rocket systems, capable of sending increasingly heavier ships into space with unfailing accuracy

621

Sisakian, N.M., O.G. Gazenko & A.M. Genin 1961 NEKOTORYE PROBLEMY KOSMICHESKOI BIOLOGII (SOME PROBLEMS OF SPACE BIOLOGY)
Zhurnal obshchei biologii (Moskva) 22(5): 325-332, Sept.-Oct. 1961
English Translation: (Office of Technical Services, U.S. Dept. Commerce) U.S. Joint Pub. Research Serv., Washington, No. 12097 (CSO:6503-N) Jan. 23, 1962

ABSTRACT: The field of space biology is reviewed in regard to three basic problems: (1) the effects of extreme conditions of space on terrestrial organisms, (2) the biological bases for support of space flights and life on other planets, and (3) extraterrestrial forms and conditions of life. Suggestions for partial or complete regenerative cycles in space ships include: regenerative cycle of water by physical or physico-chemical methods, oxygen regeneration by electrolysis of water or biochemical conversions by means of anaerobic bacteria, and food regeneration by chemical synthesis of basic biochemicals with subsequent biosynthesis. The more feasible method seems to be utilization of photosynthetic processes of unicellular algal suspensions. Speculations on exobiology discuss hypotheses of the ecosphere of the sun, and interstellar migration of microorganisms in light of some suggestive findings concerning the composition of meteorites. (Aerospace Medicine 33(8): 1029-1030, Aug. 1962)

622

Sisakyan, N.M. & V.I. Yazdovskiy 1962 PHYSIOLOGICAL RESPONSES OF COSMONAUTS DURING SPACE FLIGHT
(Aerospace Information Division, Washington, D.C.) AID Rept. No. 62-202
Dec. 19, 1962 ASTIA AD 294 572
Original source: Pervyye Kosmicheskiye Polety Cheloveka (First Space Flights of Man) Moskva, Ozd-vo AN SSSR, pp. 176-198

provided one makes intelligent use of the organism itself, and even moreso of the proper technical means. The state of weightlessness is considered one of the characteristic factors of space flight. Expériments carried out on animals which were returned to earth proved that their 24-hour period in a state of weightlessness had no negative effect on their main functions. When a very careful analysis was carried out, some slight changes in the activity of the blood circulation apparatus had been discovered. (CARI)

623

Sisakyan, N., V. Parin, V. Chernigovskiy & V. Yazdovskiy 1961 SPACE BIOLOGY MEETING
FBIS USSR & East Europe, Nr. 192, Oct. 4, 1961

ABSTRACT: This is a report on the general meeting of the biology department of the U.S.S.R. Academy of Sciences and of the papers presented at that meeting. The authors stress the fact that all of the studies of outer space conducted by Soviet scientists have been for peaceful purposes exclusively. They also state that the young science of space biology gives rise to its own specific methods of research, differing basically from conventional ones. These are methods of biological radiotelemetry and new techniques of experimentation, automatically affected by special instruments according to a predetermined program. The report furnished certain data obtained by Soviet scientists and lists some of the problems to be solved by space biology such as weightlessness and radiation effects. A new science, exobiology, examines the pecularities of extraterrestrial forms of life on the planets of the solar system. The author of another paper found that the physiological, biochemical, morphological, and immunological changes registered in experimental objects after space flights, proved to be of reversible nature. They did not show specific effects of cosmic radiation, weightlessness, and g-forces. The best explanation is that these changes were the organisms' generalized reaction to a complex irritant. (CARI)

624

Sisakyan, N.M. 1961 BIOLOGIIA I KOSMICHESKIE POLETY (BIOLOGY AND SPACE FLIGHT) Priroda (1): 7-16, 1961
See also: "Soviet Literature on Life Support Systems", Air Information Division, Wright-Patterson AFB, Ohio.. AID Report 61-59 April 28, 1961 ASTIA AD 256 235

ABSTRACT: Soviet experiments with animal-bearing rockets show that at heights of 78-85 km and speeds of 2,000 km/hr or at 39-46 and 4,100 km/hr catapulting is the reliable emergency escape method and causes no great functional disturbances in the animal. It has also been found that 3-10 minutes of weightlessness causes no great functional lesions to the animals cardiovascular or respiratory system. Experiments indicate that the body can more easily withstand the transition from acceleration to weightlessness than the reverse. No changes, genetic or otherwise, have so far been noted in the bacteria and phages contained in the second Soviet space ship. (CARI)

625

Sisakyan, N.M. & V.I. Yazdovskiy 1962 METHODS AND TECHNIQUES OF BIOMEDICAL CONTROL IN SPACE FLIGHT
(Aerospace Information Division, Washington, D.C.) AID Report No. 62-201, Dec. 19, 1962. ASTIA AD 294 573
Original Source: Pervyye Kosmicheskiye Polety Cheloveka (First Space Flights of Man) Moskva, Izd-vo AN SSSR, pp. 167-174

ABSTRACT: Physiological measurements performed on Vostoks I and II included electrocardiography (with two sets of leads), pneumography, and registration of pulse rate. In addition, kinetocardiography was performed on Vostok II. The pulse rate was monitored continuously by means of a cardiophone which transformed the R peaks of electrocardiographs into rectilinear pulses of 0.1 to 0.2 sec duration. These were modulated by an auditory frequency of 3 kc and were transmitted continuously by a signal transmitter on a frequency of 19.95 mc. Other measurements were transmitted periodically. During reentry all physiological parameters were registered by means of a self-contained onboard system. After ejection of the cosmonaut, registration was carried on by means of a self-contained device located on his person. Transmitted data on pulse frequency was recorded on undulating and on magnetic tapes. (Author)

626

Sisakyan, N.M. & V.I. Yazdovskiy 1962 RESULTS OF POSTFLIGHT MEDICAL EXAMINATIONS OF G.S. TITOV
(Aerospace Information Division, Washington, D.C.) AID Report No. 62-204 Dec. 19, 1962 ASTIA AD 294 571
Original Source: Pervyye Kosmicheskiye Polety Cheloveka (First Space Flights of Man) Moskva, Izd-vo AN SSSR pp. 125-153

627

Sisakyan, N.M., V.V. Parin et al. 1962 PROBLEMS OF SPACE BIOLOGY AND PHYSIOLOGY
(Joint Publications Research Service. New York) JPRS-16083, Nov. 7, 1962 ASTIA AD 299 909

628

Sisakyan, N.M. 1963 PROBLEMS OF SPACE BIOLOGY (PROBLEMY KOSMICHESKOY BIOLOGII)
(Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio)
Trans. No. FTD-MT-62-78 ASTIA AD 299 677
Original Source: Izadtel'stvo Akademii Nauk SSSR pp. 1-462

ABSTRACT: Experimental and theoretical works carried out chiefly within the last years, are presented. The first part includes theoretical and survey articles, encompassing the main problems of cosmic biology and giving general

presentation concerning results and perspective of researches. The second part is devoted to an account of the results of experimental researches conducted under the conditions of real space flights on ships-satellites in 1960-1961. The third part summarizes the results of the biological experiment on the second artificial satellite of the Earth with the dog Layka -- the experiment which searches in the cosmos. In the fourth part are entered experimental laboratory and methodic works. (Author)

629

Slager, U.T. 1962 SPACE MEDICINE
(Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1962)
Library of Congress Catalog Card No. 62-12491

ABSTRACT: Contents include papers on the following subjects: "The Concept of Space Flight"; "Development of the Space Vehicle"; "The Concept of Space Medicine "Pressure and Oxygen in the Upper Atmosphere and Space"; "Meteoritic Material in the Upper Atmosphere and Space"; "Experimental Space Simulation"; "The Biological Effects of Low Pressure"; "The Temperature During Flight in the Atmosphere"; "The Temperature During Orbital Flight"; "Experimental Space Simulation"; "The Biological Effects of Temperature Variations"; "Radiation in Space"; "Experimental Space Simulation"; "Interaction of Electromagnetic Radiations With Matter"; "The Biological Effects of Non-Ionizing Radiation"; "Ionizing Radiations in Space"; "Experimental Space Simulation"; "Mode of Action of Ionizing Radiations"; "The Biological Effects of Ionizing Radiation"; "Dynamics of Space Flight"; "Experimental Simulation of Space Flight Acceleration"; "The Biological Effects of Acceleration"; "The Dynamics of Weightlessness"; "The Experimental Simulation of Weightlessness"; "The Biological Effects of Weightlessness"; "Noise and Vibration in Space Flight"; "Experimental Space Simulation"; "The Biological Effects of Sound and Vibration"; "Metabolic Requirements in Space"; "Experimental Space Simulation"; "The Biological Effects of Life Support Systems Imbalance"; "Life-Support Systems"; "Ionizing Radiation"; "Particulate Matter"; "Toxic Chemical Compounds"; "Psychological Stress in Space" "Experimental Space Simulation"; "Psychological Effects of Space Flight"; "The Space Environment"; and "Biology of Far Space".

630

Slater, A. E. 1950 THE BALANCING MECHANISM OF THE INNER EAR
J. Brit. Interpl. Soc. 9:18-23

631

Slater, A. E. 1952 SENSORY PERCEPTION OF THE WEIGHTLESS CONDITION
Ann. Report Brit. Interplanet. Soc. :342-348

632

Slater, A. E. 1952 SENSORY PERCEPTIONS OF THE WEIGHTLESS CONDITION
In Kölle, H. H., ed., Probleme aus der astronautischen Grundlagenforschung (Vortrage gehalten anlasslich des III Internationalen Astronautischen Kongresses in Stuttgart, vom 1 bis 6 September 1952) (Stuttgart: Gesellschaft fur Weltraumforschung, 1952) pp. 219-225
See also Brit. Interpl. Soc., 1952, pp. 342-348
See also In Carter, L. J., ed., Realities of Space Travel (London: Putnam, 1957) pp. 266-274

ABSTRACT: Human organisms can function without the three following sensations of gravity: (1) tension in the muscles used for balancing (2) sensation of pressure against any support, and (3) weight and pressure of internal organs. The fourth sensation of gravity is mediated by the otolith organs, which provides information of directions, changes in direction, of gravitational pull or any other linear acceleration. During weightlessness, it is possible that the message to the brain from the otoliths may result in contradictory messages. Many experiments had caused many investigators to believe that the real function of the otoliths is not the transmission of information but (a) the resulation of muscles for maintenance of equilibrium, and (b) the regulation of eye movements during changes in position of the head to facilitate continuous fixation of ~~objects~~

633

Slater, A.E. 1957 THE PROBLEM OF WEIGHTLESSNESS
Spaceflight 1(3):109-113, April 1957.

ABSTRACT: Weightlessness is discussed as it relates to: (1) vision; (2) bodily sensations, including pressure on the skin where it takes the weight, tension of the muscles used in balancing, and pressure of internal tissues on each other due to weight; and (3) the balancing organs of the inner ear. Various experiments testing both animals and humans are described using both the upward and downward arcs flying the full parabola to produce the weightless state. Some of the periods of weightlessness have lasted up to 30 seconds. Subjective reports of sensations during weightlessness are given from one group of experiments. Eight subjects liked the sensation, three were indifferent to it, and five found it unpleasant and suffered from motion sickness. The answer to the problem of weightlessness, so far, is that it depends on who is being made weightless. But what will happen for longer much longer-periods than 30 seconds remains a problem still

634

Slater, A. E. 1957 SENSORY PERCEPTIONS OF THE WEIGHTLESS CONDITION. In L. J. Carter, ed., Realities of Space Travel (New York: McGraw-Hill, 1957) pp. 266-274.

635

Slater, E.T.O., A.E. Slater & H.E. Ross 1950 SYMPOSIUM OF MEDICAL PROBLEMS ASSOCIATED WITH SPACE FLIGHT
Brit. Interplanetary Soc. J. 9(1): 14-37 Jan. 1950

ABSTRACT: Three papers are presented: "Psychological Problems of Space-Flight" by E.T.O. Slater; "Balancing Mechanisms of Inner Ear" by A.E. Slater; and "Lunar Spacesuit" by H.E. Ross

636

Slater, J. V., ed. 1962 BIOLOGICAL SYSTEMS INTERPLANETARY ENVIRONMENT (Space Sciences Lab., University of California, Berkeley, Calif.) TR NASA Grant NsG-9460, Semiannual status rept., series 3, issue 3, NASA N62-12476, Feb. 1962.

ABSTRACT: In studies of weightlessness, theoretical analysis of particle flow during convection and diffusion indicates that flow rate in a difusion cell is proportional to the component of gravity in the direction of the linear part of the cell.
The influence of relative humidity and other environmental factors on embryonic development in Tribolium has been under investigation. Desiccation or high relative humidity (78 percent) had little influence on wing development at 30 degrees C (optimum temperature for minimal wing damage), although the total number of pupal deaths and molting failures rose considerably. Tempertures lower than 25 degrees C drastically affected development in the absence of atmospheric water. Pupae held in a head-down position are little affected as far as wing development, but the total number of molting failures increases sharply. This was not evident at 30 degrees but at 38 degrees was quite obvious. Over three times as many abnormalities occurred when the organisms were held in any position as compared with the controls. Pupal deaths rose sharply after 16 hours exposure to pure CO_2, although wing differentiation remained relatively unaffected. Phenotypes of known mutants were irduced in Tribolium by the use of various agents, including boric acid, insulin, temperature changes, radiation, shaking, ether, and dietary changes. Post-irradiation incubation at 30 degrees C results in minimal abnormalities.

637

Slayton, D.K. & A.B. Shepard 1961 ASTRONAUTS DISCUSS MERCURY TRAINING
Aviation Week & Space Technol., 74(25):67, 7[illegible], 73-75, 77, 79

ABSTRACT: This article written by two astronauts describes the training program for Project Mercury. Various methods were used to simulate flight stresses. A weightless state was produced for 15-30 seconds in the interior of an aircraft. A human centrifuge was used to produce high acceleration and high altitude. A special chamber producing temperatures of 250° was used in training for working under heat loads. Survival training on water included exercises in distilling water and learning methods of sun protection. The overall psychological effect of the training period was to instill confidence in the astronauts.

638

Smith, A.H., C.M. Winget & C.F. Kelly 1959 PHYSIOLOGICAL EFFECTS OF ARTIFICIAL CHANGES IN WEIGHT. Naval Research Review, pp. 16-24, April 1959.

639

Smith, G.B., Jr., S.J. Gerathewohl et al. 1962 BIOASTRONAUTICS (National Aeronautics and Space Administration, Washington, D.C.) NASA-SP-18, NASA N63-11508

ABSTRACT: This publication contains papers presented at Session L of the NASA-University Conference on the Science and Technology of Space Exploration, at Chicago, Illinois on November 1-3, 1962. The following papers are presented: "Environmental Biology" by G.B. Smith, Jr. (NASA. Manned Spacecraft Center); "Physiological and Behavioral Sciences" by S.J. Gerathewohl and B.E. Gernandt (NASA. Ames Research Center); "Bioengineering" by Richard S. Johnston (NASA. Manned Spacecraft Center); "Exobiology" by R.S. Young (NASA. Ames Research Center)

640

Smith, G.B., 1962 ENVIRONMENTAL BIOLOGY.
In: Proceedings of the NASA-University Conference on the Sciences and Technology of Space Exploration, 1:395-398. NASA SP-18
Washington, D.C.: National Aeronautics and Space Administration, December 1962

ABSTRACT: Environmental factors in space flight and their effects on man are discussed as they relate to promoting and maintaining are included: (1) biodynamics, involving noise and vibrations, sustained accelerations and impacts, and the effects of weightlessness; (2) radiations from the sun, the stars, the Van Allen belt, and nuclear-reactor propulsion or power systems; (3) life support, consisting of providing food, water, oxygen, etc.; and (4) medical selection and maintenance. The National Aeronautics and Space Administration has used the skills of various federal agencies, the academic world, and industry, as well as its own centers in these endeavors.

641

Smith, R.W., & J.W. Altman 1961 SPACE PSYCHOLOGY: SOME CONSIDERATION IN THE STUDY OF ASTRONAUTS' BEHAVIOR.
(American Institute for Research, Pittsburg, Pa.) April 1961.

ABSTRACT: The following environmental factors and their potential implications for human behavior are discussed: altered atmospheric characteristics, high gravitational loads, weightlessness, temperature, radiation, noise and vibration isolation and confinement, sexual deprivation, time, and encounters with alien factors.

642

Smith, W.G. 1958 TESTING TOMORROW'S SPACE PIONEERS.
Science Digest 43(3):10-16, March 1958.

ABSTRACT: A popularized account of the numerous and often grueling tests men now are undergoing in order to prepare for human flight into space: research in space medicine, increasingly long periods of time spent in simulated space flight conditions, studies in the effect of weightlessness on the human body, and so forth, is presented here. Partially solved and as yet unsolved problems are discussed.

643

Sokolov, V.A. 1961 STAGES ON A GREAT ROAD
Air Information Division, Wright-Patterson AFB, Ohio AID Rept. No. 61-156
ASTIA AD 269 794
Original Source: Nauka i zizhn' April 1961. Pp. 5, 8ff.

644

Solliday, R.E. 1961 EVALUATION OF PROJECT MERCURY SIMULATOR.
(Naval Air Test Center, Patuxent River, Md.) Proj. TED PTR RAAD-3058
FT 2123-68, Rept. No. 1, 21 Feb. 1961.

645

Stallings, Jr., H. D. & S. J. Gerathewohl 1957 PRODUCING THE WEIGHTLESS STATE Flying 61:33-34, 80-82. Nov. 1957.

ABSTRACT: This is a report of weightlessness studies conducted at S.A.M. in the T-33 and F-94C aircraft flying the "keplerian Trajectory."

646

Stallings, H. D., & S. J. Gerathewohl 1959 THE WEIGHTLESS MAN
Space Journal 2(2):13-14, 41-45, Dec. 1959

ABSTRACT: The condition of zero gravity is discussed and its effects on man are described.

647

Stapp, J.P., 1958 BIODYNAMICS OF MANNED SPACE FLIGHT
Air University Quart. Rev., 10(2): 847-852

648

Stapp, John P. 1962 MEDICAL PROBLEMS OF SPACE FLIGHT (Presented at Symposium on Space Medicine, Miss. State Medical Ass'n Jackson, Miss. 8-10 May 1962)

649

Státní Lékařská Knihova (National Medical Library) 1959 THE ANNUAL OF CZECHOSLOVAK MEDICAL LITERATURE 1957
Praha, Czechoslovakia: Statní Zdravotnicke Nakladatelstvi (Prague 1, Czechoslovakia: State Health Publishing House)

650

Statni Lékařská Knihovna (National Medical Library) 1961 THE ANNUAL OF CZECHOSLOVAK MEDICAL LITERATURE 1959
Praha, Czechoslovakia: Statni Zdravotnicke Nakladatelstvi (Prague 1, Czechoslovakia: State Health Publishing House)

651

Steinkamp, G. R. 1960 HUMAN FACTORS IN SPACE FLIGHT. J. of the Arkansas Medical Society 56:338-342, Feb. 1960

ABSTRACT: Presents a discussion of the human factors to be considered in the planning of manned space flight, with reference to the work of the Department of Space Medicine of the USAF School of Aviation Medicine. Topics include the time element, weightlessness, and the psychologic selection and training of space crews

652

Steinkamp, G. R., & G. T. Hauty 1960 IMPLICATIONS DERIVED FROM SIMULATED SPACE FLIGHTS. (Unpublished manuscripts, 1960)

653

Steinkamp, G. R., G. T. Hauty 1961 SIMULATED SPACE FLIGHTS. In B. E. Flaherty, ed., Psychophysiological Aspects of Space Flight. (New York: Columbia Univ. Press, 1961) pp. 75-79

654

Still, E. W. 1960 EQUIPPING MAN FOR A FLIGHT TO THE MOON
Engineering, (London) 189(4907):634-635, May 6, 1960.

ABSTRACT: A review is presented of a paper read before the British Interplanetary Society on April 28, 1960. A resume of the United States Space Program was given, followed by a discussion of the environmental requirements for interplanetary travel and the engineering techniques being developed to meet these requirements. (Aerospace Medicine 31(10):869, Oct. 1960)

655

Stone, Irving 1954 MARTIN TEAM PUSHES ANTIGRAVITY STUDY Aviat. Wk. 61:42-44, 46, 48, 18 Oct. 1954

ABSTRACT: Among projects of the Advance Design Department are the space ship, and a satellite vehicle.

656

Strong, C.L. 1963 THE AMATEUR SCIENTIST: HOW TO REPEAT CAVENDISH'S EXPERIMENT FOR DETERMINING THE CONSTANT OF GRAVITY
Scientific American 209(3): 267-280

ABSTRACT: On 21 June, 1798, Henry Cavendish read a report before the Royal Society of London describing an experiment substantiating Newton's estimated value for G. This article shows how to construct the equipment to repeat this experiment, and provides calculations of the value of G from Newton's equation ($F=GMm/d^2$). (CARI)

657

Strughold, H., H. Schaefer & H. Strughold 1951 WIE WIRD SICH DER MENSCHLICHE ORGANISMUS VORAUSSICHTLICH IM SCHWEREFREIEN RAUM VERHALTEN? (What is the Probable Behavior of the Human Organism in Gravity Free Space?)
Weltraumfahrt 2:81-88

658

Strughold, H. 1952 FROM AVIATION MEDICINE TO SPACE MEDICINE
J. Avia. Med. 23(4):315-318, 329
See also Air University Quarterly Review, Summer 1958

ABSTRACT: A brief outline of the development of space medicine is given. The lower layer of the atmosphere supports propeller (up to 60,000 feet) and jet

(up to 80,000 feet) flight and is the realm of conventional aviation medicine. Space medicine is concerned with an additional dimension, vertical, and its province is rocket flight which has no vertical limit. The transition from lower atmosphere to space conditions is gradual and various physiological functions of the atmosphere cease at different altitudes. These 'space-equivalent' altitudes are: for anoxia, 52,000 feet; body fluids boil at 65,000 feet; heavy primaries of cosmic radiation penetrate to 120,000 feet; ultraviolet solar radiation, to 135,000 feet; optical appearance of the sky, 400,000 feet; and penetration of meteorites, 500,000 feet. The so-called upper atmosphere of physicists is, for all physiological purposes, equivalent to free space. Aviation at present is in an amphibious stage, in a transition between conventional flight and space flight. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space Medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903; ASTIA AD-227 817; Feb. 1959)

659

Strughold, H. 1955 SPACE EQUIVALENT CONDITIONS WITHIN THE EARTH'S ATMOSPHERE: PHYSIOLOGICAL ASPECTS. Astronautica Acta 1:32-40
German: Weltraumfahrt 6:2-5, 1955

ABSTRACT: Within the astronomically defined atmosphere conditions are found that are physiologically equivalent to those existing in free interplanetary space. Those that occur at certain topographically fixed levels of the atmosphere are termed static space equivalent conditions. These levels are identical with the "functional borders' between atmosphere and space. Some of these space equivalent conditions are caused by the loss of certain vitally important atmospheric factors. The loss of these factors during flight results in anoxia, boiling of body fluids, and the impossibility of utilizing the ambient air for pressurization of the cabin.
Other static space equivalent conditions are caused by the appearance, in full force, of certain extraterrestrial factors such as cosmic rays, meteors, etc. These space equivalent conditions show variations in the vicinity of the earth, effected by the solid body of the earth and its magnetic field.
The state of zero-gravity as it is encountered in flight is defined as a dynamic space equivalent condition. This condition is not associated with any height or distance from the earth. Since some of the biologically significant space equivalent conditions are encountered in present manned rocket flight, space flight is now a reality. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space Medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903; ASTIA AD-227 817; Feb. 1959)

660

Strughold, H. 1956 MEDICAL PROBLEMS INVOLVED IN ORBITAL SPACE FLIGHT. Jet Propulsion 26:745-748, 756, 788, Sept. 1956
See also School of Aviation Medicine, Randolph AFB, Texas, Epitome of Space Medicine, Item 32

ABSTRACT: Discussion of medical problems involved in circumplanetary or orbital

space flight including: the state of weightlessness, its sensomotor effect, and its effect upon the general wellbeing of satellite-vehicle occupants; the optical properties of the environment and the visual appearance of light sources; physiological day-night cycling; and problems of human engineering of the space cabin involving pressurization, supply of oxygen, removal of carbon dioxide, photosynthetic gas exchange, and the event of sudden decompression of the cabin. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903; ASTIA AD-227 817; Feb. 1959)

2nd ABSTRACT: Circumplanetary or orbital flight chosen for discussion of some of the most important medical problems involved in space operations with reference to state of weightlessness, optical properties of environment and visual appearance of light sources, physiological day-night cycling, and problems involved in human engineering of space cabin. Bibliography.

661

Strughold, H. 1956 A SIMPLE CLASSIFICATION OF THE PRESENT AND FUTURE STAGES OF MANNED FLIGHT. J. Avia. Med. 27:328-331, August 1956
See also School of Aviation Medicine, Randolph AFB, Texas, Epitome of Space Medicine, Item 31

ABSTRACT: The final achievement of a space flight to the moon or to Mars will be the end result of a gradual evolution. The stages of this evolution are examined under three main categories in this article: (1) the physiological and mechanical properties of the environment; (2) the speeds attained by rockets; (3) and distances they travel over and away from the earth. (CARI)

662

Strughold, H. 1957 MECHANORECEPTORS, GRAVIRECEPTORS
J. Astronautics 4:61-63, Winter 1957.
See also Air Force School of Aviation Medicine, Randolph AFB, Texas
Epitome of Space Medicine, Item 39.

ABSTRACT: Mechanoreceptors or gravireceptors are sensing devices located in the skin, in the skeletal muscles and in the connective tissue. These devices aid man's perception of the position and movement of his limbs and of the whole body. This article contains a discussion of the anatomy of these mechanoreceptors and their physiological function under normal gravitational and zero-gravity conditions.

663

Strughold, Hubertus. 1958 MAN-CARRYING SATELLITE?
Sci. Dig. 43:inside back cover, Feb. 1958

664

Strughold, H. 1958 INTRODUCTION (In M. Alperin, M. Stern, and H. Wooster, Vistas in Astronautics: Proceedings of the First Annual AFOSR Astronautics Symposium) (New York: Pergamon Press, 1958) Part 6 Human Factors, Pp. 281-284.

665

Strughold, H. 1958 STAYING ALIVE IN SPACE
Air Force 41(4):84-87, Apr. 1958

666

Strughold, H. & O. L. Ritter 1958 THE GRAVITATIONAL ENVIRONMENT IN SPACE. (Paper, Second International Symposium on the Physics and Medicine of the Atmosphere and Space, San Antonio, Texas, November 1958)

ABSTRACT: The gravitational field concept is and always will be the gravitational concept par excellence in astronomy, geophysics, and also in the fast developing field of astronautics.

667

Strughold, H. 1958 HUMAN FACTORS
In Alperin, M., M. Stern, & H. Wooster, eds., Vistas in Astronautics: Proceedings of the First Annual AFOSR Astronautics Symposium (New York Pergamon Press, 1958) pp. 281-284

668

Strughold, H. 1959 THE MEDICAL ASPECTS OF MANNED SPACE FLIGHT
(In: H. Seifert, Ed., Space Technology (New York: John Wiley and Son, Inc., 1959) Chapt. 28.

669

Strughold, H., & O. L. Ritter 1960 THE GRAVITATIONAL SITUATION IN SPACE.
In. Benson, O. O., & H. Strughold, eds. Physics and Medicine of the Atmosphere and Space (New York: John Wiley & Sons, Inc., 1960) Chapter IX

670

Strughold, H. 1960 LECTURES IN AEROSPACE MEDICINE SUMMATION
In Lectures in Aerospace Medicine, 11-15 January 1960 (School of Aviation Medicine, USAF Aerospace Medical Center, Brooks AFB, Texas)

671

Strughold, H. 1960 THE SPACE FLIGHT SITUATION: SENSORY PHYSIOLOGICAL ASPECT (Paper presented at the Symposium on the Psychophysiological Aspects of Space Flight, May 1960, School of Aviation Medicine, Aerospace Medical Center (ATC) Brooks AFB, Texas)

672

Strughold, H. 1961 SENSORY-PHYSIOLOGICAL ASPECTS OF THE SPACE FLIGHT SITUATION
In B. E. Flaherty, Ed. Psychophysiological Aspects of Space Flight (New York, N. Y., Columbia Univ. Press, 1961) Pp. 57-65).

ABSTRACT: A review of the physiological function of the peripheral, extra-labyrinthine, mechanical sense organs (skin pressure, muscle tension, and posture sense receptors) under normal gravitational conditions is followed by a discussion of their functions during conditions of zero gravity. Tests in parabolic flight maneuvers have confirmed the assumption that these predominantly proprioceptive senses are not affected by zero gravity. However, experimental data on man's tolerance to weightlessness over longer periods of time are not yet available, and provision of artificial gravitation (by rotation or slight continual linear acceleration) may become a necessity.

673

Strughold, H. 1961 BIOPHYSICS OF THE SPACE ENVIRONMENT. Lectures in Aerospace Medicine, 16-20 January 1961 (School of Aviation Medicine USAF Aerospace Medical Center, Brooks AFB, Texas)

674

Strughold, H. 1962 HOW BIOASTRONAUTICS LOOKS AT THE MOON
Jour. Mississippi State Med. Assoc., 3 (9): 397-403. Sept. 1962

ABSTRACT: To create artificially, as far as possible, an ecological optimum for terrestrial Moon visitors is a challenge to space medicine and bioastronautics. For example, the lunar atmospheric density is less than 10^{-10} of the terrestrial atmosphere. Exposed to this environment, the unprotected human body faces anoxia at zero altitude and symptoms of bullism. Although the Earth is essentially a dense atmospheric environment with mild radiations, the lunar environment is essentially a radiation-vacuum environment. Lunar surface gravity is about 17% that on Earth, or 1/6 g, and will greatly affect human metabolism circulation, muscle activity, and blood pressure. A day-night cycle of 27.3 days' duration does not allow time for regulation of the selenonaut's sleep-wakefulness cycle, determined by the internal physiological clock inherited from Earth. The magnetic field intensity is less than 1/400 that on Earth, and full solar illumination (140,000 lux) is immediately felt. Consideration is given also to the problem of vision, photosynthetic regeneration, and macro- and microclimates.

675

Stubbs, R.A. 1960 SOME ENGINEERING CONSIDERATIONS FOR THE MANNED ORBITING VEHICLE. Can. Aeronaut. J. 6:375-379, Nov. 1960.

ABSTRACT: Cabin pressure, temperature, and constituent gases, along with man's tolerance to accelerations during launch, orbit, and reentry are discussed in this paper. (CARI)

676

Stutman, L. J. and R. N. Olson 1959 EFFECTS OF LIMITED PERIODS OF ZERO GRAVITY ON THE CARDIOVASCULAR SYSTEM. Circulation 20:776.

677

Stutman, L. J., & R. Olson 1960 EFFECTS OF ZERO GRAVITY UPON THE CARDIOVASCULAR SYSTEM. U. S. Armed Forces Medical J. 11:1162-1168, Oct. 1960

ABSTRACT: Some preliminary investigations of the effects of zero gravity upon the cardiovascular system. Position in zero gravity field does not seem to affect the cardiovascular system. Hypotheses are proposed for the potential circulatory difficulties that will hamper a person's return to earth.

678

Stutman, L. J. & R. Olson 1961 EFFECTS OF ZERO GRAVITY UPON THE CARDIOVASCULAR SYSTEM. PRELIMINARY OBSERVATIONS.
Rev. Med. Aero (Paris) 2:171-172, Dec. 1961

679

Sullivan, J. 1962 MAN AGAINST SPACE -HIGH G AND ZERO G
Science World, 4(5): 4 April 1962.

680

Surosky, A.E., D.A. Hill, & J.S. di Rende 1952 GRAVITY-ZERO GRAVITY--ENVIRONMENTAL CONTINUUM. In 1959 Proceedings of the Institute of Environmental Sciences, Annual Technical Meeting, April 22-24, 1959, La Salle Hotel, Chicago, Illinois (Institute of Environmental Sciences, Mt Prospect, Ill.) Pp. 189-192

ABSTRACT: Gravity, a universal environment, is rapidly assuming a critical

role as an environmental parameter. Its decrease with increasing altitude and its rapid effective variation from zero to several g's leads to some unusual design problems. This paper conjectures on the nature of gravity and future utilization of its gradient. The effects of the gravity-zero gravity continuum on men and equipment are discussed. Some thoughts are presented concerning the "gravity" environment in the test laboratory. (Author)

681

Sutton, G. P. 1961 FUTURE EXTENDED SPACE OPERATIONS. Lectures in Aerospace Medicine, 16-20 January 1961. School of Aviation Medicine, Brooks AFB, Texas)

WEIGHTLESSNESS

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682

Taylor, A. A., B. Finkelstein and R. E. Hayes 1960 FOOD FOR SPACE TRAVEL AN EXAMINATION OF CURRENT CAPABILITIES AND FUTURE NEEDS (Air Research and Development Command, Andrews AFB, Washington, D.C.) ARDC-TR-60-8 Jul. 1960 ASTIA AD 241 869, Jul. 1960

ABSTRACT: The state of progress and present capabilities in nutrition, food technology; and food service supporting equipment for manned space flight are described and evaluated in terms of future needs.

The study is broad in scope. It describes feeding in very short to very long space missions. Preflight feeding provisions are described as well as partially regenerative systems and, finally, the requirements of a closed ecology are considered. A section is devoted to permissable preflights foods Varied menus are offered for flights of short, medium, and long duration in an ascending order of variety, consumer acceptance, and support equipment.

683

Thompson, A. B. 1959 PHYSIOLOGICAL AND PSYCHOLOGICAL CONSIDERATION FOR MANNED SPACE FLIGHT. (Vought Astronautics, Chance Vought Aircraft Inc., Dallas, Texas) 1 June 1959

684

Thompson, A. B. August 1961 SELF MANEUVERING UNIT FOR ORBITAL MAINTENANCE WORKERS. (Life Sciences Sect., Vought Astronautics Div., Chance Vought Corp., Dallas, Texas) Contr. AF 33(616)-8197, Proj. 8119, Task 60900. Report AST/E1R-13566)

ABSTRACT: This report covers the Life Sciences portion of a study for the design of a device to provide self-propulsion and stabilization for an orbital maintenance worker. Specific items covered include an analysis

of typical tasks required of the worker, establishment of a reference axis system for the maneuvering unit design, tests on pressure suit mobility and areas for improvement, determination of moments of inertia of a 95th percentile man for establishment of stabilization force requirements, vision problems of the worker in space and how they affect rendezvous and rates of translation and rotation, establishment of limit rotation and translation rates, and control system and stabilization and propulsion unit design considerations and recommendations.

Least data was available on vision in empty space, hence, a series of experiments was conducted to better define the problems involved. These are included in the appendices. From the human factors standpoint it appears feasible to meet the requirements of an orbital worker within present technology.

685

Thompson, A. B. 1962 PHYSIOLOGICAL CONSIDERATION IN DESIGNING FOR ARTIFICIAL GRAVITY IN MANNED ROTATING SPACE SYSTEMS. (Paper, 33rd Annual Meeting of the Aerospace Medical Assoc., 9-12 April 1962, Atlantic City, N. J.)

ABSTRACT: If future manned orbital flights prove long term weightlessness to be an unacceptable physiological stress, one practical method of achieving simulated gravity will be to rotate the vehicle such that the resulting centrifugal force provides an apparent gravity vector. A few significant drawbacks to this technique will impose design restrictions on the vehicle if they are to be made physiologically acceptable to the crew. These parameters are discussed and physiological design limits defined. An acceptable design enveloped is presented with limits as to radius of rotation, maximum angular velocity, minimum and maximum G, and limit coreolis accelerations in per cent of apparent gravity and rate of crew movement. (Aerospace Medicine 33(3):372, Mar. 1962)

686

Thompson, L. N. 1952 MAN WITHOUT GRAVITY; THE PHYSIOLOGICAL AND PSYCHOLOGICAL PROBLEMS OF SPACE FLIGHT. Flight, London 61:298-300 , 14 March 1952

ABSTRACT: The principal physiological functions of the human body such as respiration, circulation, and digestion, are primarily muscular in action, and, therefore, independent of gravitational pull. The author summarizes other problems that will arise in actual space flight, such as the need for atmospheric circulation because of lack of convection currents, prevention of blackouts during high take-off accelerations, protection from radiation, the possibility of infection by alien viruses and germs encountered on other planets, and the need of proper preparation against psychological crises on extended flights.

687

Titov, G. 1961 TITOV ADRESSES SCIENTIFIC MEETING
(FBIS USSR & East Europe, No. 199, October 13, 1961)

ABSTRACT: Cosmonaut German Titov said he was confident that Soviet cosmonauts would be the first to fly to the moon. It would be happy to pilot a spaceship once more, he declared. German Titov was addressing a meeting of propagandists of scientific knowledge held at a polytechnical museum tonight.

It is possible to live and work in the state of weightlessness. This is the main conclusion which, in Titov's opinion,can be drawn from his 25-hour flight around the earth on 6 and 7 August. The cosmonaut added that the state of weightlessness proved somewhat different from what the scientists thought about it before the flight.

German Titov pointed out that the noise and vibrations in the cabin did not exceed admissible norms. The vibration, for instance, did not at all hamper him in following the instruments. Titov said that were he to fly again around the earth he would be able to distinguish one sea from another by the color of the water.

The cosmonaut regretted that he had failed to take good photographs of the earth from aboard the ship. "The boys who will fly after me are sure to get better photographs" he added.

Daniel Petrucci, an Italian doctor who spoke at the meeting, expressed admiration at the Soviet achievements in space exploration. (CARI)

688

Titov, Gherman S. 1962 GHERMAN TITOV FIRST MAN TO SPEND A DAY IN SPACE. (New York: Crosscurrents Press, 1962)

CONTENTS: The Soviet cosmonaut's autobiography as told to Pavel Barashev and Yuri Dokuchayev, Novosti Press Agency correspondents.

689

Titov, G. 1962 MY DAY IN SPACE
Spaceflight 4(5): 146-150 Sept. 1962

ABSTRACT: This is an abridged version of the speech made by the Russian astronaut German Titov on May 3, 1962, at the 3rd Space Science Symposium in Washington,

D.C. Various aspects of his 17-orbit flight of August 6-7, 1961, discussed included launching, entering orbit, actual flight, re-entering the atmosphere, and landing. The basic physiological functions conformed well to flight loads and stresses. The flight indicated that man can withstand the effect of weightlessness for 24 hours. Some motion sickness was encountered which later abated, but eating, drinking, muscle coordination, and task performance remained good. The flight was preceded by two preparatory stages, a training program consisting of theoretical, special physical, medico-biological, technical, and flight factors; and an immediate preflight period.

690

Titov, G.S. 1962 REPORT OF MAJOR GHERMAN S. TITOV AT FIFTH PLENARY MEETING OF COSPAR ON MAY 3, 1962
(Committee of Space Research (COSPAR), The Hague (Netherlands))

ABSTRACT: Major Gherman S. Titov's speech, given at the Fifth Plenary Meeting of COSPAR, includes details of his flight on August 6-7, 1961, in the spacecraft Vostok II. Major Titov reviews the purpose and accomplishments of his flight. He indicates that reentry into the earth's atmosphere was accomplished by means of a parachute mechanism. The physical sensations he encountered during the flights are discussed.

691

Tobias, C. A., & J. V. Slater 1961 CERTAIN ASPECTS OF SPACE BIOLOGY
(Space Sciences Laboratory & Donner Laboratory of Biophysics & Medical Physics, Univ. of Calif., Berkeley, Calif.) USAEC & NASA Series No. 2; Issue No. 7, Aug. 1, 1961

CONCLUSIONS:
1) Space flight for man involves a great many physiological and psychological stresses. It is imperative that we carry out further research to understand man's homeostatic responses to these stresses and their limits.
2) Acceleration forces greater than 1 "g" cause profound chronic alterations in animal longevity, development, and physiology.
3) The condition of weightlessness presents a challenge to the biophysicist, for it presents a new environment, previously untested. It will probably cause chronic alterations in:
   a) growth, differentiation and development.
   b) longevity and metabolic physiology, with perhaps beneficial effects.
4) Underlying physical causes for the effects of weightlessness probably involve alterations in convection patterns. These appear to change the mode of mixing and of phase changes and might also result in reduced cell division.
5) Radiation hazards, particularly from flares and from heavy primaries, present a serious problem. For long voyages shielding must be applied. For the most

space radiations accelerators are available or could be built to evaluate biological effects. Two types of studies are of great interest:
a) neurological effects of radiation.
b) developmental effects in embryonic forms.
6) Knowledge in biology is gained slowly and many experiments need to be done. It would be useful if each satellite in the physical programs, particularly those that are to be recovered, would leave some space for a biological experiment.
7) Complete knowledge of planetary life will be gained only when man himself can go to the planets, hence the approaches described above are of some immediate significance.
(AUTHOR)

692

Tobias, C.A. & J.V. Slater 1962 OUR VIEW OF SPACE BIOLOGY WIDENS
Astronautics 7(1): 20-22, 47-52, Jan. 1962

ABSTRACT: Biological research in the space program is important. Knowledge of man's ability to withstand acceleration, deceleration, temperature changes, weightlessness, vibration and radiation, is necessary to safely put a man in space. Various phenomena both observed and considered for future research are listed.

693

Toong, Tau-Yi 1962 SIMILITUDE CONSIDERATIONS IN SPACE ENVIRONMENTAL SIMULATION
(Directorate of Research Analysis, Holloman AFB, N. Mexico)
AFOSR/DRA-62-16, Aug. 1962 ASTIA AD 283 353.

ABSTRACT: Simulation of space environment has been examined on the basis of similitude considerations. Examples are given to indicate how subgravitational effects can be studied in an earth-bound laboratory. Conjectures are also made as to possible effects of subgravity on human locomotion and heartbeat. It appears that much understanding of the subgravity effects on man also can be achieved by the use of similtude rules. The similitude considerations presented in this note can also be applied to the simulation of other more exotic space environmental conditions. (Author)

694

Trusela, R.A. and R.C. Clodfelter 1960 ZERO G SPACE BOILERS. Society of Automotive Engineers Journal. 68:56-57, September 1960

ABSTRACT: Visual observations during zero-g flight tests show that bubbles do not combine. Film boiling will probably predominate in zero-g environments

WEIGHTLESSNESS

U

695

Unterberg, W., & J. Congelliere 1962 ZERO GRAVITY PROBLEMS IN SPACE POWERPLANTS: A STATUS SURVEY. (Paper, ARS Space Flight Report to the Nation, New York, Oct. 9-15, 1951, revision received 4/23/62)
ARS Journal 32(6):862-871, June 1962

ABSTRACT: One of the fascinating facets of space flight is the existence of a state of apparent weightlessness called zero gravity, experienced by matter situated within space vehicles when these move solely under the action of gravitation, e.g., in freefall or in orbit around Earth. Strictly speaking, the term "zero gravity," hereafter called zero g, is a misnomer, since the effect is caused by the vehicle and its contents both experiencing the same gravitational acceleration, which varies with the locale (Earth, moon, etc.) but which is never zero. It is the acceleration of the contained matter relative to the vehicle which is zero.

The principal effect of zero g is the absence of body forces. The vehicle and its contents are both "falling" at the same rate, so that there is no direction with respect to inertia, no "up" or "down". Every body, of course, retains its mass but does not exert any weight forces on its environment. In the case of liquids with free surfaces, there is no hydrostatic force since no directional "head" exists. Therefore, buoyancy and natural convection cannot exist under zero g.

This paper deals with the effect of zero g on the operation and design of space powerplants with emphasis on the physical phenomena involved. The principal aim is to survey the present status of zero-g technology and hence to indicate the zero-g efforts required for the future. (AUTHOR)

696

Usachev, B. 1958 MAN IN FLIGHT AND CHANGE IN GRAVITY
Trans. from Sovetskaya Aviatsiya (USSR), Aug. 22, 1958, p.3
(Office of Technical Services, Washington, D.C.)
1960 60-23534

697

Usachev, B. 1958 MAN IN FLIGHT AND CHANGE IN GRAVITY
Trans. from Sovetskaya Aviatsiya (USSR), Aug. 22, 1958, p.3
(Office of Technical Services, Washington, D.C.)
1960 60-23534

698

U.S. Adjutant General's Office 1958 MILITARY ASPECTS OF SPACE EXPLORATION
Adjutant General's Office. Washington, D.C.) Spec. Bibliography No. 16;
June 1958

ABSTRACT: This bibliographic survey was made to throw light on available unclassified literature that points up the military implications of space exploration. The materials are arranged in alphabetical order by title within major and subordinate subject groups. The major groups are miscellaneous; United States space effort; Soviet Russia space effort; satellites, trends and developments (electronics, navigation, orbits, propulsion, guidance control, and telemetry); environmental factors and problems (acceleration, survival, weightlessness); exploration of the moon and Mars; space ships and stations; international and legal aspects; and conferences, conventions, and symposia

699

U. S. Air Force 1952 THE BEGINNINGS OF RESEARCH IN SPACE BIOLOGY AT THE AIR FORCE MISSILE DEVELOPMENT CENTER, HOLLOMAN AIR FORCE BASE, NEW MEXICO, 1946-1952 (Air Force Missile Development Ctr., Holloman AFB, N. Mex.)
ASTIA AD-208 018

ABSTRACT: The first installment toward fulfilling the need for examining the history of Air Force participation in space-biology research. A serious study of the origins of biological projects, their gradual evolution, and their scientific and technical contributions is of considerable value in avoiding old mistakes or duplicating previous effort, and for suggesting new paths of endeavor in the planning and pursuit of the more complex programs required in the immediate future. The V-2 and Aerobee rocket experiments and balloon flights are reviewed, with emphasis upon the biomedical information obtained therefrom. Experiments included fungus spores, fruit flies, mice, hamsters, cats, dogs, and monkeys as subjects. The effect at high speed and altitude of G forces, subgravity, and cosmic radiation were major factors explored. Experience gained in rocket and balloon launching, instrumentation and recovery techniques, and the growing collection of scientific data particularly related to cosmic radiation and subgravity problems marked the practical beginning of Air Force research in space biology.

700

U.S. Air Force Missile Development Center 195/ MAJOR ACHIEVEMENTS IN SPACE BIOLOGY AT THE AIR FORCE MISSILE DEVELOPMENT CENTER, 1953-1957 (Air Force Missile Development Ctr., Holloman AFB, N. Mex.) ASTIA AD 208 016

ABSTRACT: This historiographical effort was prepared as part of a larger history of aeromedical research at Holloman AFB. Important technological advances, discussed in the initial portion of this study, contributed to outstanding accomplishments in two broad fields of space biology research - cosmic radiation and controlled artificial environments. Scientific and engineering progress in these latter fields is the main theme of this publication, which culminates with a review of the record-making Manhigh II flight.

701

U S. Air Force 1958 HISTORY OF RESEARCH IN SUBGRAVITY AND ZERO-G AT THE AIR FORCE MISSILE DEVELOPMENT CENTER, 1948-1958. (Holloman AFB, N. Mexico) ASTIA AD 208 017

ABSTRACT: Weightlessness, the weird condition of subgravity which man has never before experienced and survived--except for the initial split-second of short-distance free fall-- has recently become a major field of serious scientific research. Man now approaches this condition as his fast-climbing fighter flattens out to intercept at enemy bomber, and he may soon experience it for long duration on multimonth interplanetary excursions. In recent years man has gone to considerable expense and personal risk to fly Keplerian trajectories in high-performance aircraft in order to experience a force of less than normal gravity for fractions of a minute.

702

U. S. Air Force 1958 REPORTS ON SPACE MEDICINE - 1958 (Air University, School of Aviation Medicine, Randolph AFB, Texas) Feb.1958

CONTENTS:

Hauty, G. T., Human Performance in the Space Travel Environment,
Ward, J. E., S. J. Gerathewohl, & G. R. Steinkamp, Supersonic and Hypersonic Human Flight,
Steinkamp, G. R., Human Engineering of the Sealed Space Cabin,
Hauty, G. T., & R. B. Payne, Fatigue, Confinement, and Proficiency Decrement
Hawkins, W. R., The Feasibility of Recycling Human Urine for Utilization in a Closed Ecological System,
Hawkins, W. R., & G. T. Hauty, Space Cabin Requirements as seen by Subjects in the Space Cabin Simulator,
Gerathewohl, S. J., Weightlessness - The Problem and the Air Force Research Program.

703

USAF School of Aviation Medicine 1958 EPITOME OF SPACE MEDICINE (USAF, School of Aviation Medicine, Randolph AFB, Texas) ASTIA AD-159 052

CONTENTS:

On the physical process of explosive decompression, by Fritz Haber
Possible methods of producing the gravity-free state for medical research, by Fritz Haber and Heinz Haber
Life on Mars in view of physiological principals, by H. Strughold
Study on subgravity states, by Fritz Haber
The Physiological day-night cycle in global flights, by H. Strughold
Physics and engineering of rapid decompression: A general theory of rapid decompression, by Fritz Haber, and H. C. Clamann
Escape and Survival at high altitude, by Fritz Haber
Comparative ecological study of the chemistry of the planetary atmospheres, by H. Strughold
Medical problems of space flight, by H. Strughold, E. J. Kendricks, H. Haber and S. J. Gerathewohl
Producing the weightless state in jet aircraft, by S. J. Gerathewohl, Oskar Ritter, and H. D. Stallings

704

U. S. Air Force 1960 PROCEEDINGS OF WADC SPACE TECHNOLOGY LECTURE SERIES, VOLUME 1 TECHNICAL AREAS. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 59-732; ASTIA AD-235 424

ABSTRACT: This report is a consolidation of the papers presented by members of the WADC laboratories at its Space Technology Lecture Series between 7 Oct. 1958 and 11 Dec. 1958. The papers were prepared for the purpose of cross-education and therefore are directed toward an audience representing many disciplines of science and engineering. The presentations contained basic technical as well as state-of-the-art information in at least sixteen unique technical areas and subsystems directly related to space technology. The topics covered in this report are as follows: Propulsion; Flight Mechanics and Structures; Flight Control; Guidance; Communications; Secondary Power; Supporting Subsystems; Reconnaissance; and Vehicle Defense, technical areas: International Geophysical Year - The Ground Work for Space Flight; Environment of Space; Mechanics of Space Flight; Electromagnetics; Space Medicine; and Materials

705

U.S. Air Information Division 1960 SOVIET RESEARCH ON GRAVITATION. AN ANALYSIS OF PUBLISHED LITERATURE. (Science and Technology Section, Air Information Division, Washington, D.C.) AID Report. 60-61, Oct. 1960. ASTIA AD 246 700.

CONTENTS:

Correlation of Stanyukovich's public statements on weightlessness with views expressed by other Soviet-area scientists;

The problem of gravitation;
Status of Soviet research on gravitation;
Correlation of Soviet and Western Research;
General references;
Bibliography - Soviet area;
Bibliography - Western world;
Annual total of publications on gravitation in USSR and other Soviet-area countries;
Biographies;
Map showing geographic locations of outstanding specialists on gravitation in the Soviet area;
English translations of articles in the Russian language.

706

USAF Air Information Division 1961 ITEMS OF INTEREST: NEW INDICATIONS IN SOVIET SPACE TECHNOLOGY. (Air Information Division, Science and Technology Section, Washington, D.C.) AID Report 61-40, 28 Mar. 1961. ASTIA AD 254 409

ABSTRACT: Academician N.M. Sisakyan discusses certain biological data obtained in experiments with animals during vertical and orbital flights.

707

U.S.A.F., Air Information Div. 1961 SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS (Science & Technology Section, Air Information Division) AID Work Assignment No. 22, Rept. 4; AID Rept. 61-109; July 1961 ASTIA AD 261 452

ABSTRACT: This is the fourth in a monthly report series reviewing Soviet developments in life support systems as reflected in Soviet publications. This report is based on materials made available at the Air Information Division during June 1961. Items are selected from Soviet open literature and include scientific publications and literature of a popular type.
The materials in this report deal with the following topics:
I Space Medicine and biology
II. Space physiology
III. Space psychology
IV. Space vehicle ecology

708

U.S.A.F., Aerospace Information Div. 1961 SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS
(Science and Technology Branch, Aerospace Information Division) AID Work Assignment No. 22, Report 6 AID Rept. 61-143 October 27, 1961
ASTIA AD 267 926

ABSTRACT: This is the sixth in a monthly report series reviewing Soviet developments in life support systems as reflected in Soviet publications. It reviews Soviet developments in space biology, medicine, vehicle ecology, and life support instrumentation. This report is based on materials made available at the Aerospace Information Division during September 1961. Items are selected from Soviet open literature and include scientific publications and literature of a popular type.

709

U.S.A.F., Aerospace Information Division 1961 SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS
(Science and Technology Branch, Aerospace Information Division) AID Work Assignment No. 22, Report 7 AID Report 61-168 December 20, 1961
ASTIA AD 271 154

ABSTRACT: This is the seventh in a monthly report series reviewing Soviet developments in life support systems as reflected in Soviet publications. This report is based on materials made available at the Aerospace Information Division during October-November 1961. Items are selected from Soviet open literature and include scientific publications and literature of a popular type.

The materials in this report deal with the following topic: Space medicine and biology.

710

U.S.A.F., Air Information Division 1961 FURTHER DETAILS ON GAGARIN FLIGHT
(Science and Technology Branch, Air Information Division) AID Rept. 61-113 July 27, 1961 ASTIA AD 261 454

ABSTRACT: The present brief report recounts certain details found in three articles published by USSR scientists and discusses the implications of this information. The first article was written by Professor G.V. Petrovich and published in the Vestnik of the Academy of Sciences USSR. The second is a TASS interview with Professor V.V. Dobronravov. The third was written by Inna Yavorskaya, scientific secretary of the Interplanetary Travel Commission of the Academy of Sciences USSR

711

U.S. Air Force 1961 PERIODICAL REPORT ON AEROMEDICINE: BIOPHYSICAL ASPECTS OF GAGARIN'S FLIGHT. (1126th USAF FAG, Arlington Hall Station, Arlington, Va.) Rept. 1452517

ABSTRACT: The authors point out that the design of the spacecraft "Vostok I" incorporated many years of work by numerous groups of scientists and engineers. It takes into consideration the data yielded by probes on geophysical, ballistic and space rockets, satellites, and space ships as well as the data on properties of space surrounding the earth.

The problems discussed by the authors are varied. The problem of meteorite danger was investigated in particular detail. Radiation danger was examined with equal zeal. The problem of temperature conditions arose because of the problem of acceleration is reviewed. Although the authors avoid stating Gagarin's reaction to weightlessness, they do include it as a very real problem in space flight. The authors then give a brief description of the interior of the space cabin and the function of television cameras throughout the flight. (CARI)

712

USAF 1961 PERIODIC REPORT ON AEROMEDICINE: THE COMMUNIST PROGRAM ON BIOLOGY (1126th USAF FAG, Arlington Hall Station, Arlington 12, Va.) Rept. 1452516.

ABSTRACT: The author tells of the intention of the Soviet Union to determine the laws governing the extreme conditions of stresses on the animal and human organisms, this being a theoretical prerequisite for the substantiation of the most advantageous conditions needed to insure safe flight.
The author then discusses the three following problems: hypoxia, astronaut selection, and danger in weightlessness. (CARI)

713

U.S.A.F., Foreign Tech. Div. 1962 EARTH-SPACE-EARTH (SELECTED ARTICLES) (Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio) Trans. No. FTD-TT-62-1416 Oct. 11, 1962 ASTIA AD 292 224
Original Source: Zemlya-Zosmos-Zemlya, (Sbornik Materialov, Opublukovannykh V Gazete "Pravda" Izdatel'stvo "Pravda", (Moskva), 24, Pp. 10, 13, 14, 27, 30, 31, 45-47, 51, 52, 56, 57 and 61. 16 Aug. 1962)

ABSTRACT: This publication contains articles by the following titles: "Vostok-3 in Outer Space"; "News from Outer Space"; "Vostok-4 in Orbit"; "News from Outer Space"; "Research Program is Being Executed Successfully"; "Conversation in Outer Space"; "Food of Gods"; "Precisely According to Program"; "Before the Completion of a Historical Flight"; "and "Bood Wishes to Nationa of the World."

714

U.S. Air Force 1963 NEW GERMANY (SELECTED ARTICLES)
(Translation Services Branch, Foreign Technology Division, WP-AFB, Ohio)
FTD-TT-62-1584/1+4 Jan. 17, 1963 ASTIA AD 295 769
Original Source: German Newspaper, Neues Deutschland, August 14, 1962, Pp. 1 & 2

ABSTRACT: This publication contains a group of articles praising the flights of spaceships Vostok III and Vostok IV

715

USAF 1960 HERALD OF THE ACADEMY OF SCIENCES OF THE USSR (SELECTED ARTICLES)
(Foreign Tech. Div. Air Force Systems Command, Wright-Patterson AFB, Ohio)
Trans. no. MCL-1188/1+2 of Vestnik Akademii Nauk SSSR, ASTIA AD-268 871

ABSTRACT: A NEW STAGE OF LUNAR STUDY: A review is presented of the structural and physical characteristics of the moon. The composition and formation of the surface, possible existance of atmosphere, and temperature of the moon are discussed in relation to studies conducted in the USA, France, Russia and Ireland. FLIGHT OF THE SECOND COSMIC SHIP: A report is given of the press conference held on August 24, 1960, by the Presidium of the USSR Academy of Sciences. The purposes and the preliminary results of the Soviet flight of August 19, 1960 which carried experimental animals and other living organisms around the earth are discussed.

716

U.S. Aerospace Technical Intelligence Center 1961 DETAILS OF THE LEGENDARY FLIGHT
(Aerospace Technical Intelligence Center, Wright-Patterson AFB, Ohio)
Trans. No. MCL-1035 16 April 1961 ASTIA AD 261 805
Original Source: Komsomol'skaya Pravda 91(11031): 1-3

717

USAF School of Aviation Medicine 1959 BIOASTRONAUTICS. ADVANCES IN RESEARCH (School of Aviation Medicine, Randolph AFB Texas) ASTIA AD 226 473.

CONTENTS:

Definitions and subdivisions of space (bioastronautical aspect) by H. Strughold
Bio-paks: Instrumentation and biomedical research
Primates in space
Center of gravity and moments of inertia measurements for seat plus a rhesus monkey, by H.G. Clamann
Summary of immunochemical analyses on sera from humans exposed in a simulated altitude chamber, by W.G. Glenn
Survival of terrestrial micro-organisms under simulated Martian conditions, by J.D. Fulton
Photosynthetic gas exchangers and recyclers used in closed ecological system studies, by W.A. Kratz
Man in space, by B. Balke
Physiological instrumentation of man during flight, by C.H. Kratochvil
Carbon monoxide phenomena in green plants systems, by S.S. Wilks, R.M. Adams, J.A. Green and E.G. Shaw.

718

U.S. Joint Publications Research Service 1962 THE EFFECTS OF CHANGES IN THE GRAVITATIONAL FIELD ON THE COORDINATION OF MAN'S VOLUNTARY MOVEMENTS (Joint Publications Research Service, Washington, D.C.) JPRS-15539, 2 Oct. 1962.

ABSTRACT: A study is made of the effect of changes in the gravitational field on the coordination of man's voluntary movements. The coordination of man's voluntary movements is disturbed by heightening of the gravitational field. Limits of the disturbances depend upon the condition and training of the person appearing in the field and are proportional to the logarithm of acceleration of force of weight. Systematic execution of the disturbed movement habit in a heightened gravitational field will lead to the restoration of coordination of movements. The indicated restoration will depend on the condition and training of the person appearing in this field, on the magnitude of gravitation and, in separate periods, is proportional to the logarithm of the time of the fulfillment of the movement. These deductions may be applied to the case of zero gravitation.

719

U.S. Air Force 1959 DISCOVERER III BIOMEDICAL DATA REPORT. (Directorate of Bioastronautics Projects, Air Force Ballistic Missile Division, Headquarters ARDC, Los Angeles, Calif.) WDZPB Report No. 2, ASTIA AD 241 853

ABSTRACT: Four C-57 black mice lived through the stresses of launch and accelerative forces produced by the two stage Discoverer vehicle and through more than 500 seconds of weightlessness. Speciment activity correlated with ignition and burn-out of each stage and marked activity occurred during weightlessness. Speciment activity correlated with ignition and burn-out of each stage and marked activity occurred during weightlessness. The life support system of the Mark I biomedical recovery capsule functioned satisfactorily from lift-off to 790 seconds. The atmosphere, continuously moved through a ducted gas control system, varied between 330 mm Hg oxygen partial pressure, maintained a low pCO_2 and low relative humidity (below 60%) with a constant but relatively low temperature of 56° F. During flight, no leaks occurred in the capsule or oxygen system and the latter functioned normally to maintain a satisfactory cell pressure between 6.3 to 7.0 psia from an oxygen cylinder maintaining approximately 1200 psig.
The primary biomedical mission objective was not achieved because of failure of the Discoverer III vehicle to gain sufficient velocity, resulting in a prolonged ballistic trajectory, rather than the programmed orbit. However, part or all of secondary mission objectives were achieved

720

U.S. Air Force 1960 AEROMEDICAL FIELD LABORATORY MEETS THE CHALLENGE OF BIOASTRONAUTICS. Holloman Monthly News Bulletin 5(1):6,8, 11-12, Nov. 1960.

ABSTRACT: The research problems in this field presently under consideration and development by Holloman's Aeromedical Field Laboratory are discussed in this article.

721

U.S. Air Force 1960 AEROMEDICAL FIELD LABORATORY MEETS THE CHALLENGE OF BIOASTRONAUTICS. Holloman Monthly News Bulletin 5(1):6,8, 11-12, Nov. 1960.

ABSTRACT: The research problems in this field presently under consideration and development by Holloman's Aeromedical Field Laboratory are discussed in this article.

722

U.S. Dept. of Health, Education & Welfare 1954 BIBLIOGRAPHY OF SPACE MEDICINE (U.S. Dept. of Health, Education & Welfare, Public Health Service, National Library of Medicine, Reference Division, Washington, D.C.) Public Health Service Publication No. 617; Public Health Service Bibliography Series No.

ABSTRACT: This bibliography contains information on the following topics: sealed cabin problems; acceleration/deceleration; fractional and zero gravity; cosmic radiation; survival problems; psychological and social problems; ground crew problems; and extra-terrestrial aspects.

723

U. S. Armed Services 1961 FUTURE SPACE SHIPS MAY HAVE TO BE PROVIDED WITH ARTIFICIAL GRAVITY IF SUBSEQUENT INVESTIGATIONS SHOW A REPETITION OF GHERMAN TITOVS EXPERIENCE THAT PROLONGED WEIGHTLESSNESS CAUSES VESTIBULAR DISTURBANCES ASTAR No. 2089, Sept. 27, 1961

ABSTRACT: Pravda recalled that would-be cosmonauts were subjected to brief periods of weightlessness in training. Some felt excellent in such state -- others had unpleasant sensations such as sickness, dizziness, loss of balance, sensation of rotating and so on. It was found however that people were so bothered could adapt themselves to weightlessness with training. Space shots with animals indicated that man could endure zero gravity up to twenty four hours without danger to life or health. Yuri Gagarins one orbit flight brought no unpleasant sensations. Titovs sustained flight in zero gravity did not bring any pathological disturbances Some changes however were observed in function of vestibular apparatus but they did not have any effect on the ability of the astronaut to work. During acceleration Titov suffered no unpleasant consequences but in spite of his good subjective condition, the astronaut had somewhat quickened heartbeat which reached one hundred eighteen to one hundred thirty-four beats per minute. These changes in heartbeat and respiration rate were caused by flight factors taken together. (CART)

724

U.S. Directorate of Research and Development FUNDAMENTALS OF ASTRONAUTICS (Directorate of Research and Development, Headquarters U.S.A.F., Washington, D.C.) ASTIA AD 252 825

ABSTRACT: This paper is intended to serve as a brief refresher for some of the physics and physiology of space flight. It will also define some of the more

important astronautical terms and concepts. The author defines the separate layers of the Earth's atmosphere including the troposphere, stratosphere, ionosphere, and exosphere. He then discusses the solar system including the planets, satellites, asteroids, and sun. The physics of space flight is discussed with particular emphasis on rocket propulsion, thrust, specific impulse, mass ratios, thermal efficiency, and propulsion efficiency. The subject of human factors in space flight concentrates largely on the aspects of cabin environment requirements, waste disposal, weightlessness, isolation and sensory deprivation, cosmic radiation, and limited G forces.

725

U.S. Naval Air Development Ctr. 1958 STATUS REPORT ON ANIMAL SATELLITE (Naval Air Development Center, Johnsville, Pa.) NADC Letter Report AE-1412

ABSTRACT: Progress which has been made in the biosatellite program since its initiation on February 27, 1958, is listed. The preparations for this animal satellite which has not been put in orbit were made with cooperation of the Franklin Institute.

WEIGHTLESSNESS

V

726

van Liere, E.J. 1957 SPACE MEDICINE
West Virginia Med. J. 53(8): 297-301 Aug. 1957

ABSTRACT: An outline is made of some of the physiologic problems encountered in space flight, including those arising from accelerations, weightlessness, rapid decompression, and hypoxia. As a result of such flights physicians will have to treat such things as radiation sickness, ultraviolet and thermal burns, cosmic ray damage, sterility, accidents due to meteors, and fractures sustained by assuming incorrect position when acceleration begins. Mention is made of the emotional strain and physical and mental fatigue which are conducive to bringing about neuroses in spacemen.

727

van der Wal, L. 1961 LIQUID-GAS INTERFACE IN ZERO-G.
(Space Technology Labs., Inc., Los Angeles, Calif.) Rept. No. 7230-0001-RU-000; Contract AF 04(647)619; BSD TR-61-15; ASTIA AD-269 757; 30 June 1961

ABSTRACT: In the investigation of the behavior of a liquid-gas mixture in a zero-g field, an experiment unit was installed in an Atlas re-entry nosecone test vehicle. The experiment unit houses a movie camera, placed so as to observe and record the interaction of gas and water contained in a plastic cube during the 25-minute near-zero-g conditions present on an ICBM flight. Temperature and pressure changes are also recorded. (AUTHOR)

728

Velasco de Pando, M. 1958 ARTIFICIAL SATELLITES AND INTERPLANETARY TRAVEL: PHYSIOLOGICAL EFFECTS OF CHANGE IN GRAVITY.
Revista de la Real Academia de Ciencias de Madred 52(2):141-145, 1958
Abstract: J. Aviation Med. 30(4):294. April 1959

729

Velasco do Pando, M. 1959 ARTIFICIAL SATELLITES AND INTERPLANETARY TRAVEL: PHYSIOLOGICAL EFFECTS OF CHANGE IN GRAVITY.
A.M.A. Proceedings, April 1959.

ABSTRACT: This is the corrected and extended version of part of an analytical study (Sec. 13) on the launching of space rockets, which was published in a previous issue of the same journal (52(1):11-61, 1958). An attempt is made of correlating mathematically basic physiological and physical parameters. If j represents the effects of gravity experienced by a traveler within the space vehicle ("Sensible Gravity"), the following formula applies:

$$j = \frac{d^2y}{dt^2} + \frac{ga^2}{(a+y)^2}$$

in which y is the altitude, t the time, g the gravitational acceleration on the surface of the earth, and a the terrestrial radius. In this formula the expression $\frac{d^2y}{dt^2}$ represents the effective vertical acceleration and $\frac{ga^2}{a+y}$ 2 the effects of terrestrial acceleration at the altitude y.

The validity of the formula is tested for the following conditions: (1) the vehicle rests on the terrestrial surface; (2) the vehicle travels unaccelerated at a given altitude (this being the case when the upward acceleration equals the weight of the vehicle); (3) the vehicle travels at a given altitude and at a given acceleration and (4) the vehicle travels through outer space with the rocket motor shut off(the occupants are in a state of weightlessness). In conclusion, the author derives optimal values for escape velocity and trajectory of the hypothetical space ship.

730

Vloynkin, Yu. M., V.I. Yazdovskiy et al. 1962 THE FIRST MANNED SPACE FLIGHTS (Pervyye Kosmicheskiye Polety Cheloveka)
Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio, Transl. No. FTD-TT-62-1619 Dec. 7, 1962 ASTIA AD 294 537
Original Source: Mediko-Biologicheskiye Issledovaniya (Moskva)

ABSTRACT: Contents include material on the following subjects:
Training cosmonauts in controlling the ship
Life Support in space flight
Microclimatic conditions in a spaceship cabin
Food and water supply

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Life support and recovery systems
Radiation protection
The biological effect of cosmic radiation in spaceships
Measures providing radiation safety on the flights of Gagarin and Titov
The protective properties of space suits
Emergency supply pack of the cosmonaut
Systems for landing the cosmonaut
Familiarization-training flights on aircraft under weightlessness conditions
Psychological investigations
Organization and method of carrying out physical training exercises
Results of the medical examination of the astronauts
Methods of physiological investigations and medical monitoring during spaceflight
The physiological reactions of the astronauts in flight

732

Voas, R. B. 1961 PROJECT MERCURY ASTRONAUT TRAINING PROGRAM. In The Training of Astronauts. (National Academy of Sciences, National Research Council) Publication No. 873, pp. 22-40

ABSTRACT: A general over-all outline of the training program is given. A brief discussion is presented of the astronaut selection procedure and basic considerations for the training program. Training in vehicle operation includes lectures, field trips, and study programs of the various capsule systems. Simulators for training in attitude control during orbit and retrofire navigation, control of tumbling, environmental control of the cabin, and management of physiological problems are discussed. Training in various scientific disciplines is described with the various lecture courses that each astronaut takes. Training conditions such as disorientation, weightlessness, reduced pressure are described and simulated for the astronauts. A physical training program for the trainees is discussed pertaining to weight control, breathing control, and general physical conditioning. Countdown procedures and ground communications and recovery-survival methods are part of ground activity training. Maintenance of flight skills as a method to maintain vigilant decision making is accomplished by regular flights in high-performance jet aircraft. The significance of this program on future space flight is discussed. (J. Aerospace Medicine 33(11):1403, Nov. 1962)

733

Voas, R. B. 1963 TRAINING MAN FOR SPACE (Paper, Lectures in Aerospace Medicine, School of Aviation Medicine, Brooks AFB, Texas, 4-8 February 1963)

734

von Beckh, H. J. A. 1953 UNTERSUCHUNGEN UBER SCHWERLOSIGKEIT AN VERSUCHSPERSONEN UND TIEREN WAHREND DES LOTRECHTEN STURZFLUGES (INVESTIGATION OF WEIGHTLESSNESS OF HUMANS AND ANIMALS DURING VERTICAL DIVES) In Space-Flight Problems; being a Complete Collection of all Lectures Held at the Fourth Astronautical Congress, Zurich, 1953 (Biel: Laubscher, 1953) pp. 196-202

735

Von Beckh, H.J.A. 1954 EXPERIMENTS WITH ANIMALS AND HUMAN SUBJECTS UNDER SUBGRAVITY AND ZERO GRAVITY CONDITIONS DURING THE DIVE AND PARABOLIC FLIGHT. J. Aviation Med. 25(3):235-241, June 1954.

ABSTRACT: Certain species of chelonia (turtles) are found on parts of the South American continent. Tests were conducted on the turtles under sub-and zero-gravity conditions. This article is a report on the observations made during the tests and studies of the data recorded.

736

von Beckh, H. J. A. 1955 LA GRAVITACION CERO (ZERO G)
In Fisiologia del vuelo (Physiology of Flight)
(Buenos Aires: Alfa, 1955) pp. 99-110

737

von Beckh, H. J. A. 1955 ASPECTOS FISIOLOGICOS DEL VUELO ESPACIAL (PHYSIOLOGICAL ASPECTS OF SPACE FLIGHT) In Fisiologia del vuelo (Physiology of Flight) (Buenos Aires: Alfa, 1955) pp. 111-123

738

von Beckh, H.J.A. 1955 VELOCIDAD, ACCERACION, GRAVITACION.
Riv. nac aeronaut. Sept. 1955

739

von Beckh, H. J. A. 1956 GRAVITY CHANGES IN AIRCRAFT AND SHIPS.
J. Brit. Interplanetary Soc. 15(2):73-81. March - April 1956

740

von Beckh, H.J. 1958 FLIGHT EXPERIMENTS ABOUT HUMAN REACTIONS TO ACCELERATIONS WHICH ARE FOLLOWED OR PRECEDED BY THE WEIGHTLESS STATE
(Air Force Missile Development Ctr., Holloman AFB, N. Mex.) AFMDC-TN-58-15
Dec. 1958 ASTIA AD 154 108

ABSTRACT: Flight experiments which simulated Pre-weightlessness and Post-weightlessness acceleration were conducted in jet aircraft. It was shown that alternations of acceleration and the weightless state decrease the acceleration tolerance of the subject and the efficiency of the physiological recovery mechanisms. The implications for planning of manned space flight are (1) thrust values and re-entry profiles must take the lower acceleration-tolerance into consideration; and (2) adequate G-protection must be designed for the pilot, to prevent dangerous effects of unavoidable high accelerations. (Author)

741

Von Beckh, H.J. 1959 FLIGHT EXPERIMENTS ABOUT HUMAN REACTIONS TO ACCELERATIONS WHICH ARE FOLLOWED OR PRECEDED BY THE WEIGHTLESS STATE
Aerospace Medicine 30 (6): 391-409, June 1959

ABSTRACT: Alternation of weightlessness and acceleration results in a decrease of acceleration tolerance and of the efficiency of physiologic recovery mechanisms. This indicates that acceleration thresholds of reversible and irreversible injury will be lower in space flight conditions than in the one G field of man's earthly environment. Defects of circulation, muscular effectiveness, vision, and of conscious judgment will occur at lower acceleration values and will probably continue for longer times than they do under present normal flight conditions. In an astronautical venture depending upon the skill of a human pilot, a blackout, lapse of judgment or even the slightest reduction in efficiency at a crucial time, could undoubtedly cause the failure of the mission.

The implications for planning of manned space flight are, first, that thrust values and reentry profiles must take the lower acceleration tolerance into consideration and second, that adequate G protection must be designed for the pilot to prevent dangerous effects of high acceleration.

742

von Beckh, H.J. 1959 FLIGHT EXPERIMENTS ABOUT HUMAN REACTIONS TO ACCELERATIONS WHICH ARE FOLLOWED OR PRECEDED BY WEIGHTLESSNESS
In: International Astronautical Congress, Proceedings of the IXth, 1958 (Wien: Springer - Verlag, 1958, Pp. 507-525)

ABSTRACT: Alteration of weightlessness and accelerations results in a decrease of acceleration tolerance and of the efficiency of physiologic recovery mechanism The implications for planning manned space flight are, first, that thrust values and re-entry profiles must take the lower acceleration tolerance into consideration, and second, that adequate G protection must be designed for the pilot, to prevent dangerous effects of unavoidable high accelerations

743

von Beckh, H.J. 1959 WEIGHTLESSNESS AND SPACE FLIGHT
Astronautics 4(2):26-27, 84-86, Feb. 1959.

ABSTRACT: Deterioration of neuromuscular coordination and disorientation are considered to be originated by the weightless state per se. However, more complex problems arise during extended space flights, as well as during alternate acceleration and weightlessness, such as occurs during the ascent and re-entry of space vehicles. Results of experiments in jet aircraft are cited to show that the weightless state aggravates other physiological conditions, which, in combination, pose serious problems to man in space flight. Subjects reported experiences of increased susceptibility to or severity of acceleration effects when they entered positive G states immediately after experiencing weightlessness. Subjects who normally blacked out at 5 G could tolerate only 3.5 to 4 G in the experiments. In the opposite case, when acceleration preceded weightlessness, physiological recovery mechanisms seemed disturbed. Blackout lasted longer, and more severe discomfort and chest pains were reported. Cinematographic observations, registrations of heart rate, electrocardiograms, and galvanic skin responses corroborated the subjective reports. It is suggested that extended weightlessness may lead to lessened muscle tone and strength, as well as to inconveniences to the cardiovascular system. The heart, having transported the blood without the force of gravity during the weightless state, would need a certain time for adaptation after re-entry into the gravity field of the earth or of another planet. (Aerospace Med. 30(6):456, July 1959)

744

von Beckh, H.J. 1959 SPACE FLIGHT HAZARDS CAUSED BY WEIGHTLESSNESS (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, 27-29 April 1959)

ABSTRACT: The lack of neuromuscular coordination and optical illusions, as they might possibly affect the efficiency of the human operator of a space vehicle, are discussed. However, it should be expected that more difficulties would arise from the alternation of high G loads and weightlessness which increases discomfort and the lowers human tolerance to G loads. (J. Aviation Med. 30(3):208, March 1959)

745

von Beckh, H. J. 1959 INVESTIGATIONS ON THE EFFECT OF WEIGHTLESSNESS ON THE HUMAN BODY. Weltraumfahrt (Germany) 10(1):21-28, March 1959

746

von Beckh, H.J. 1960 A SUMMARY OF MOTION SICKNESS EXPERIENCES IN WEIGHTLESS FLIGHTS CONDUCTED BY THE AEROMEDICAL FIELD LABORATORY. (Paper, Symposium on Motion Sickness in Weightlessness Research, March 1960, Wright-Patterson AFB, Ohio)

747

von Beckh, H.J. 1961 THE INCIDENCE OF MOTION SICKNESS DURING EXPOSURES TO THE WEIGHTLESS STATE
(In: "Space Medical Symposium", Astronautik (Stockholm), v. 2, no. 4, 1961, pp. 217-224)

ABSTRACT: Although motion sickness is approximately 30 per cent in weightlessness experiments using fighter aircraft with the subject restrained, it is much higher in a cargo aircraft with the subject unrestrained. Because the subjects were exposed to acceleration before and after weightlessness, it was difficult to distinguish between those effects due to acceleration and those due to weightlessness. During burnout and re-entry, the vagal symptoms decrease an operator's ability to perform. However, if weightlessness is able to produce motion sickness, then the operator might suffer long-term vagal sumptoms which would incapicate him to a high degree. Also included is the applicability of the Weber-Fechner in this respect

748

von Diringshofen, H. 1943 AENDERUNG DER LAGE DES MENSCHEN IM SCHWEREFELD DER ERDE (Change of the Human Position in the Field of Gravity of the Earth)
Deutsche Medizinische Wochenschrift (Stuttgart) 69: 498

749

von Diringshofen, H. 1943 DER MENSCH IM VERANDERTEN SCHWEREEELD (Man in the Changed Field of Gravity)
Klinische Wochenschrift (Berlin) 22: 450

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von Diringshofen, H. 1944 DER BLUTKREISLAUF IM VERAENDERTEN SCHWEREFELD (Blood Circulation in Changing Field of Gravity)
Deutsche Medizinische Wochenschrift (Stuttgart) 70:150, 17 March 1944.

751

von Diringshofen, H. 1948 DAS GESUNDHEITLICHE PROBLEM DES WELTRAUMFLUGES: DAS FEHLEN DER SCHWERKRAFT (HEALTH PROBLEMS OF SPACE FLIGHT: ABSENCE OF GRAVITY) Grenzgeb. Med. 1:144-145, 1948

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von Diringshofen, H., H. Schaefer and H. Strughold, 1951 WIE WIRD SICH DER MENSCHLICHE ORGANISMUS VORAUSSICHTLICH IN SCHWEREFREIEN RAUM VERHALTEN? (What Is The Probable Behavior of the Human Organism in Gravity-Free Space?)
Weltraumfahrt, 2:81-88, 1951

753

von Diringshofen, H. 1952 MEDIZINISCHE PROBLEME DER RAUMFAHRT (MEDICAL PROBLEMS OF SPACE FLIGHT) In Gartmann, H., ed., Raumfahrtforschung (Space Flight Research) (Munchen: Oldenburg, 1952) pp. 167-182

754

von Diringshofen, H. 1956 PROBLEMS OF WEIGHTLESSNESS
Medizinische 1956(52):1846-1847, 29 Dec. 1956

755

Von Diringshofen, H. 1958 RAPIDITA DELLA DIMINUZIONE DELLA GRAVITA COME IMPORTANTE FATTORE DELLA SENSAZIONE DI ASSONYA DI PESA (STEEPNESS OF G-FALL AS AN IMPORTANT FACTOR FOR THE SENSATION OF WEIGHTLESSNESS) Rev. Med. Aeronaut. (Paper, International Congress of Aviation Medicine, Louvain, Belgium, Sep. 1958)

756

von Diringshofen, H. 1959 FLUGMEDIZINISCHE PROBLEME DER GEWICHTSLOSIGKEIT (Aeromedical Problems of Weightlessness)
Munch. Med. Wchnschr. 101(32):1326-1328, 1345-1349, 1959, (in German).

ABSTRACT: The transition from air flight to space flight makes weightlessness one of the most important problems of aerospace medicine. The condition of weightlessness has been already experienced up to a duration of 50 seconds in parabolic flight. The sensations observed therein of stall, fall, and vertigo emanate from the organ of equilibrium. The confusion of the equilibrium center in the brain may also affect the vegetative nervous system and provoke nausea. The type and strength of these distrubances is determined by the following factors: (1) individual sensitivity, which can be reduced by training, (2) abruptness of transition, from gravity to weightlessness, and (3) irregularities in this transition. In a state of free weightless suspense, body rotations with additional tilting ofthe head may cause Coriolis accelerations in the labyrinth, thus bringing about strong nausea. In the course of protracted weightlessness, one must expect increasing phychical and physical enervation with subsequent reduced resistance to acceleration. Such conditions cna be prevented by previous rigorous aero-gymnastics as well as by aerodynamical parabolic flights. It seems reasonable that carefully selected fliers may sustainnot only short periods of weightlessness but also a prolonged weightless conditon in space flight without serious disturbances, provided they are well trained, remain strapped in their seats, and have become adjusted to the extraordinary sensory perceptions of a weightless environment. To what extent weightlessness may affect blood circulation cannot yet be predicted since disturbances experienced by fliers in from 20- to 30- second parabolic flights may as well be due to the transition or irregularities in the transition to weightlessness. A partial reduction of gravity, say to 1/3 G, may even produce pleasant sensations, such as we experience when we completely relax in a warm bath tub.

757

von Diringshofen, H. 1959 CERTAIN OBSERVATIONS ON PHYSIOLOGY OF THE SENSES DURING THE PASSAGE FROM THE STATE OF ACCELERATION TO ZERO GRAVITY Riv. Med. Aero. (Roma) 22:15-25, July-Sept. 1959

758

von Diringshofen, H., 1959 SINNESPHYSIOLOGICSCHE BEOBACHTUNGEN BEIM UBER-GANG VON BESCHLENNIGUNGEN ZUR GEWICHTSLOSIGKEIT (Sensory-Physiological Observations During the Transition from Acceleration to Weightlessness Raketentechnik und Raumfahrtforschung (Stuttgart) 3(2):33-35, April 1959.

ABSTRACT: This is a review of three experiments concerning the immediate physiologic effects to short exposure to gravity. The test results indicate that acclimitization takes place when weightlessness extends over long periods. Nausea and other disagreeable sensations are experienced less frequently by those individuals engaged in a mind-absorbing task. The author suggests that the changes in G force during the various accelerative launching stages may be particularly inducive to "space sickness"

759

von Diringshofen, H. 1959 SENSORY-PHYSIOLOGICAL OBSERVATIONS DURING THE TRANSITION FROM ACCELERATION TO WEIGHTLESSNESS
Raketentechnik und Raumfahrtforschung (Stuttgart) 3(2): 33-35 (In German)
See also: J. Aerospace Medicine 30(8): 621-622
See also: U.S. Joint Publications Research Service, Feltman Research and Engineering Labs., Picatinny Arsenal, Dover, N.J., Picatinny Arsenal Translation No. 61, Pp. 1-8, Nov. 1959 ASTIA AD 228 967

ABSTRACT: A review of three experiments is presented concerning the immediate physiologic and psychologic effects of short exposures to subgravity. (1) About 20 years ago, the author induced weightlessness by vertical dives in a Ju-87 aircraft for durations of 7-8 seconds (radial acceleration 8 G). The psychologic reaction was a pleasant one, and the sensation of "slumping", which usually introduces weightlessness episodes, was not perceived. (2) In 1954, while in Argentina, the author achieved weightlessness in parabolic flight for durations of 12-14 seconds, preceded by an acceleration of 5 G lasting 5 seconds. Transitional accelerations of 2 G preceding weightlessness lasted 2 seconds. Disagreeable sensations of "slumping" and of falling through empty space were distinctly perceived for about 5 seconds after the onset of weightlessness, leading over eventually to a sensation of floating in space. (3) In a "subgravity

tower" designed by Dr. T. Lomonaco at the Aeromedical Research Institute in Rome, weightlessness was produced in a seat suspended from and catapulted upward by rubber straps fastened to the top of a 15-m.-high tower. Initial acceleration was 3 G and lasted .5 second. Three launchings were carried out consecutively, inducing weightlessness for 2, 1.3, and .8 seconds, respectively. At the point of transition from acceleration to weightlessness a very disagreeable sensation of falling was perceived. The findings of these three experiments, in conjunction with results of more extensive experiments carried out in the United States by Gerathewohl and others, can only be considered preliminary to weightlessness conditions in space travel. There is evidence to the effect that acclimatization takes place when weightlessness extends over longer periods. It appears that nausea and other disagreeable sensations are experienced less frequently by individuals actively engaged in navigation or in other mind-absorbing tasks than by "passive" riders. In conclusion, the author speculates on the possibility that changes in G force during the various accelerative launching stages may be particularly inducive to "space sickness".

760

von Diringshofen, H. 1961 INTERNATIONALES SYMPOSIUM UBER LUFT-UND RAUMMEDIZIN (International Symposium on Aerospace Medicine)
Weltraumfahrt (Frankfurt), 12(1):11-12, (in German), Feb. 1961.

ABSTRACT: The symposium, sponsored by the Aviation Medicine Institute of the Argentine Air Force, was held 6-13 Oct. 1960, at the School of Medicine, University of Buenos Aires. Discussions centered on the psychological aspects of space flight, acceleration forces, and acceleration tolerance. Films of rocket-sled studies and of weightlessness during aircraft maneuvers and during free fall in a pressure suit from a balloon gondola were shown. Discussions made clear the differences in European and American outlooks on the relative importance of psychological tests in the evaluation of space flight candidates. Attention was also given to the physiology of respiration and the effects of oxygen lack on the endocrine system, tissue damage caused by decompression, and the human engineering problems of space flight

761

von Diringshofen, H. 1962 HYDROTHERAPY AS A PARTIAL SIMULATOR OF WEIGHTLESSNESS IN SPACE MEDICINE.
Arch. Phys. Ther. (Leipzig) 14:307-311, July-August 1962 (Ger)

762

von Gierke, H.E. & E.P. Hiatt 1962 BIODYNAMICS OF SPACE FLIGHT
In: Singer, S.F., ed., Progress in the Astronautical Sciences, 1: 343-401

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763

Wade, J. E. 1962 PSYCHOMOTOR PERFORMANCE UNDER CONDITIONS OF WEIGHTLESSNESS. (6570th Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio) MRL-TDR-62-73; ASTIA AD-285 549; June 1962

ABSTRACT: Subjects operated three different sets of switches as they were flown through 0-g trajectories in a C-131B aircraft. Pushbutton, toggle, and rotary switches were each paired with a master push-button switch to form the three sets used to turn an indicator light on and off. The subjects were instructed to perform the task as fast as possible by alternate actuation of the two switches of each set. Each subject also performed in straight and level flight with each set of switches for control data. Performance data, along with aircraft accelerative forces in three dimensions, were recorded on a high-speed oscillograph. Small but statistically significant decrements were found in speed of operation of all three sets of switches in the 0-g environment in comparison with performance at 1 g. The toggle switch set showed the greatest decrement, the rotary switch set the least decrement. The push-button switch set was operated most rapidly in both 1-g and 0-g conditions. (AUTHOR)

764

Waggoner, C.E. & C.W. Nixon 1962 SELECTED SPEECH DURING WEIGHTLESSNESS. (Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio) Final Report. MRL-TDR-62-45, May 1962. ASTIA AD 284 688

ABSTRACT: Certain characteristics of human speech exhibited under 1-g conditions may be different under weightless conditions. If such differences exist, they might interfere with satisfactory speech communication under conditions of zero gravity. Standard speech materials recorded under conditions of 0 g. 1 g, and 2-1/2 g's were evaluated by both objective and subjective methods. Results indicate that speech production is not significantly altered by brief periods of zero gravity. Reception of speech also seems to be unaffected. Both speakers and listeners indicate good speech intelligibility under conditions of weightlessness.

765

Walton, H. Jr. 1957 A DEVICE FOR ARTIFICIAL PRODUCTION OF ALTERNATING GRAVITATIONAL FORCES
Journal of Aviation Medicine 28 (3): 291-294, June 1957

ABSTRACT: As far as the author is aware, the devices described above represent

novel ways of producing gravity free state for intermittent periods. Among the few proposals that have been made for a device to test gravity free state at ground level was one by Haber and Haber who proposed to use express elevators for gravity free experiments. The use of the gravitron is expected to furnish some new knowledge in several experimental fields. In medicine, new information may be gained concerning the physiology of gravity free state; in psychology, coordination in conditions of changing gravity. It may be useful as a physical testing device to find out the physical behavior of systems in the gravity free state (e.g. convection, diffusion, dilution, and heat transfer of gases and liquids) and as a testing device for equipment designed to function in the gravity free state -- for example, the function of clocks, and electrical instruments, etc. An objection can be made against the use of such a device on grounds that rapid changes in acceleration appear to cause excessive nausea. However, a device such as the gravitron might be useful just for the study of such a syndrome

766

Ward, J.E. 1957 REQUIREMENTS FOR PRESENT-DAY EXPERIMENTAL ZERO GRAVITY PARABOLAS. (USAF, School of Aviation Medicine, Randolph AFB, Texas) Rept. No. 57-121. See also J. Aviat. Med. 29(6):428-432 ASTIA AD-143 896

ABSTRACT: In simplified form, graphs are presented which allow rapid determinination, without calculation, of parabolic entry velocity, angle of climb at entry, and vertical altitude traveled during the trajectory as a function of the total duration of zero gravity and minimum speed attained during the parabola (determined by stalling speed) by the experimental aircraft.

767

Ward, J.E. & D.G. Simons 1958 PROSPECTS AND LIMITATIONS OF HUMAN FLIGHT BEYOND THE ATMOSPHERE. THE ELUSIVE SPHERE OF INTEREST
(Paper, International Council of the Aeronautic Sciences, Sept. 12, 1958, Madrid, Spain)

768

Ward, J.E. 1958 REQUIREMENTS FOR EXPERIMENTAL ZERO GRAVITY PARABOLAS. J. Aviation Med. 29(6):428-432, June 1958.
See also (School of Aviation Med., USAF Aerospace Medical Ctr., (ATC) Brooks AFB, Texas) Research Rept. No. 57-121.

ABSTRACT: In simplified form, graphs are presented which allow rapid determination, without calculation, of parabolic entry velocity, angle of climb at entry, and vertical altitude traveled during the trajectory as a function of the total duration of zero gravity and minimum speed attained during the parabola (determined by stalling speed) by the experimental aircraft.

769

Ward, J.E., S.J. Gerathewohl & G.R. Steinkamp 1958 SUPERSONIC AND HYPERSONIC HUMAN FLIGHT. (School of Aviation Medicine, USAF, Randolph AFB, Texas) USAF Reports On Space Medicine - 1958 (Reprinted with permission from the Institute of Aeronautical Sciences, Jan. 1958) Reprint no. 797.

ABSTRACT: Man's sense organs are not designed to function at hypersonic speed. Traveling at supersonic speeds creates problems in the delay of visual perception and changes of direction bringing about accelerative effects. Man in space must have artificial sensing and monitoring devices to sense environment changes and to make split-second decisions. Escape and survival from vehicles traveling at supersonic and hypersonic speeds offers a great many complex physiological and engineering problems.

770

Ward, J. E. 1958 BIOMEDICAL CONSIDERATION OF WEIGHTLESSNESS. (Paper presented at the Amer. Astronaut. Soc. Meeting, Palo Alto, Calif. 18 Aug. 1958

771

Ward, J. & S.J. Gerathewohl 1958 PSYCHOPHYSIOLOGIC AND MEDICAL STUDIES OF WEIGHTLESSNESS (Second International Symposium on the Physics and Medicine of the Atmosphere and Space, Randolph AFB, Texas, November 1958.)

ABSTRACT: The characteristics of flight trajectories for eight types of vehicles to produce weightlessness of maximum duration are shown in Table I. Although over one minute of exposure can be obtained by high performance craft, this technique has some shortcomings.

772

Ward, J.E., W.R. Hawkins, and H.D. Stallings Jr. 1959 PHYSIOLOGIC RESPONSE TO SUBGRAVITY. MECHANICS OF NOURISHMENT AND DEGLUTITION OF SOLIDS AND LIQUIDS (Air University, School of Aviation Medicine, USAF, Randolph AFB,Tex.) Report 59-2, Jan. 1959.

ABSTRACT: In order to study the mechanics of nourishment during weightlessness, 165 subgravity parabolas were flown in an F-94C aircraft. 25 experimental subjects attempted to drink from an open container, a container fitted with pierced lid and plastic straw, and a plastic squeeze bottle. Drinking from open containers proved to be more difficult than had been anticipated. Only a small quantity of liquids should be taken at one time.

773

Ward, J.E. & W.R. Hawkins 1959 PHYSIOLOGIC RESPONSE TO SUBGRAVITY I. MECHANICS OF NOURISHMENT AND DEGLUTITION OF SOLIDS AND LIQUIDS J. Aviation Med. 30(3):151-154

ABSTRACT: To study the mechanics of nourishment during weightlessness, 165 subgravity parabolas were flown in an F-94C aircraft. Twenty-five experimental subjects attempted to drink from an open container, a container fitted with pierced lid and plastic straw, and a plastic squeeze bottle. Observations were made regarding deglutition of solids, including swallowing of both well and poorly masticated boli. Drinking from open containers proved to be more difficult than had been anticipated. For reasons of safety closed containers such as squeeze bottles, must be used to transfer liquids to the mouth under conditions of zero-gravity; the use of straws is not practical. Deglutition of liquids or well masticated solids can be accomplished with little or no difficulty in the weightless state. However, a large solid bolus of food is a potential aspiration problem. Regurgitation of stomach contents may become a serious annoyance during orbital flight. Only a small quantity of liquids should be taken at one time. Movements or abdominal pressures, which may initiate vomiting, must be avoided

774

Ward, J. E., W. R. Hawkins, & H. D. Stallings 1959 PHYSIOLOGIC RESPONSE TO WEIGHTLESSNESS: Initiation of Micturition. (School of Avia. Med., USAF Aerospace Medical Center, (ATC) Brooks AFB Texas) Research Rept. No. 59-35, Aug. 1959.

See Also Aerospace Medicine 30:572-575, August 1959.

SUMMARY: Twenty-six subjects were exposed to a total of thirty-seven separate jet aircra flights during which zero gravity parabolic flight maneuvers were performed. T capability of subjects to initiate micturition during weightlessness following a period of hydration was studied. Only one subject was unable to void in the zero gravity state but was able to micturate in straight and level flight. Four subjects were unsuccessful in either situation. With one exception, all five of these subjects had two hours or less jet flying experience. A majority (58 per cent) of the subjects noted a slight to marked decrease in urinary urgency when exposed to weightlessness. The consideration is offered that the floor of the urinary bladder may be the primary sensory zone for the sensation of bladder fullness. Scheduling of body waste elimination should be incorporated into the crewman's standard operating procedures and check list. Special consideration must be given to the design and development of a satisfactory urine receptacle.

775

Warren, B.H. 1962 WEIGHTLESSNESS - A PHYSIOLOGICAL PROBLEM IN SPACE In: Lectures in Aerospace Medicine, Air Force, School of Aerospace Medicine, Aerospace Medical Div., Brooks AFB, Texas. Armed Forces Press Service, 1962, 447 pp.)

ABSTRACT: Prolonged weightlessness could easily cause serious physiological

problems. For example, the disuse of reflexes of the autonomic nervous system might cause them not to respond. In that case, an abrupt acceleration might cause blood to pool in the extremities reducing the vital organ blood supply. Disorientation is another physiological problem of weightlessness. The answer to physiological problems of weightlessness depend upon the attainment of prolonged periods of true weightlessness

776

Warren, Bruce H. 1963 A COMPARISON OF PHYSIOLOGICAL CHANGES OCCURRING DURING WATER IMMERSION AND BED REST
Paper: 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 28 - May 2, 1963

ABSTRACT: Human water immersion experiments have been performed by several investigators under the assumption that the resulting "hypodynamic" environment simulates certain conditions of weightlessness. Bed rest has also been used as a method for studying the hypodynamic state. In the present investigation a controlled comparison of these techniques was made. Twelve healthy male volunteers took part in these experiments. Each subject was studied during two 6-hour water immersion periods and one 6-hour bed rest period. Physical and psychological variables were kept as constant as possible. Electrocardiograms were traced continuously and blood pressures were recorded automatically. Blood and urine samples were collected for physical and chamical determinations. A tilt table was used to produce gravitational stress for measuring cardiovascular responses before and after each hypodynamic period. An analysis of the data revealed that the direction of change of a physiological parameter during water immersion coincided with the direction of change of the same parameter during bed rest. The biological relationship of the above hypodynamic factors to weightlessness can only be hypothesized. Further evaluation of physiological changes occurring during water immersion and bed rest appear warranted, however, before either is accepted as a better tool than the other for studying the hypodynamic state in man. In over thirty hypodynamic periods above, no significant differences were noted in the physiological parameters measured during water immersion and bed rest which could not be attributed to factors other than an increased hypodynamic state during water immersion

777

Warren, J.K. 1962 ASTRONAUTICA E MEDICINA (ASTRONAUTICS AND MEDICINE) Rassenga medica e culturale (Milano) 39(9): 15-18, 51 Sept. 1962.

ABSTRACT: Results of recent American and Russian research projects and space missions are reviewed concerned with man in space as affected by magnetic fields, solar radiations, gravitational forces, weightlessness, accelerations, decelerations, and psychological factors. Pictures of a space environment simulator and gondola to study disorientation and the effects of accelerative forces are included. (Aerospace Medicine 34(3): 271, March 1963)

778

Watson, J.T. 1961 GRAVITATIONAL CONTROL RESEARCH
(Report, Faculty of the Graduate School of Southern Methodist University as Partial Fulfillment of the Requirements for the Degree of Master of Science in Electrical Engineering) Feb. 1961. ASTIA AD 253 588.

ABSTRACT: Success in attaining control over gravitation seems unquestionably tied to a better understanding of gravitation. At the present time, most of the work being done towards gaining gravitational control is centered around the quest for better knowledge concerning the nature of gravitation. This report will be concerned with some of the more applicable theories and research The information will be discussed in four sections: Introduction, Characteristics of Gravitation, Theories of Gravitation, and Current Research Effort. Some of the material will, of necessity, fall into more than one category.

779

Webb Associates 1962 FORCE FIELDS
In: NASA Life Sciences Data Book (National Aeronautics and Space Administration, Washington, D.C.) Contract NASr-89. June 1962

ABSTRACT: This handbook provides 28 pages of charts and summaries from the various force fields. Areas covered include: acceleration (experience, impact, transverse G limits, acceleration terminology, variations in G tolerance, G vector and consciousness, direction of force, maximum tolerable acceleration profiles, G protection by water immersion); tolerance to tumbling; deceleration (abrupt transverse, positive and negative G decelerations, tolerance to vertical impact, human impact sensitivity, impact tolerance); G fields in rotating space vehicles; vibration, (response, tolerances, physiological effects, psychophysical factors, performance functions, transmission, oxygen consumption, respiratory ventilation, and tracking performance); resonance of the abdominal wall; oscillations; high dynamic pressures; and blast injury.

780

Weiss, R. 1962 ZERO-GRAVITY PARABOLA TECHNIQUES
(Lear, Inc., Grand Rapids, Michigan) Contract AF 33(657)7199; ASTIA AD-278 680
(Paper, 6th National Convention of Military Electronics, June 26, 1962, Washington, D. C.)

ABSTRACT: Among the environmental effects encountered by a space voyager is a state of weightlessness. The effects of this weightless state on both the pilot and the equipment on board are actively being investigated. The simplest method of producing a weightless state is by dropping a body and allowing it to fall without the influence of any outside forces. A second method is to fly a ballistic trajectory in either a manned aircraft or a manned or unmanned missile. Payload, space, and economic considerations favor the manned aircraft scheme, and this method is discussed. (AUTHOR)

781

Weiss, R. & L. Siegler 1963 DISPLAY SYSTEMS FOR SUB- AND ZERO-GRAVITY FLIGHT (Behavioral Sciences Laboratory, 6570th Aerospace Medical Research Laboratories Aerospace Medical Division, AF Systems Command, Wright-Patterson Air Force Base, Ohio) Technical Documentary Report No. AMRL-TDR-63-11, proj. no. 7184, task no. 718405. ASTIA AD 402 382.

ABSTRACT: A study was performed of the controls and pilot displays used to fly a C-131B and KC-135 aircraft in a Keplerian trajectory to create zero-gravity conditons. Evaluation criteria for this maneuver were proposed and applied to two basic instrumentation systems which were developed. An analog simulation was formulated and these results will be used to further improve the systems. Recommendations are made for improved instrumentation which should enable consistent flights of 10 seconds at zero-gravity plus or minus 0.0005g

782

Welch, B.E. 1962 PHYSIOLOGIC NECESSITIES IN SIMULATED LUNAR FLIGHTS In USAF School of Aerospace Medicine Lectures in Aerospace Medicine, 1962. Pp. 77-96

ABSTRACT: The primary purpose of including man in a space mission is to utilize man's full and unique capabilities toward successful mission completion. This means, therefore, that the man portion of the space mission must be at maximum effective performance consistent with the mission profile. To insure that man will be at maximum effectiveness, it is necessary to satisfy the various physiologic requirements that man places on the space vehicle system. These physiologic requirements are not necessarily unique to space operations and, for this discussion, will be classified somewhat arbitrarily into atmospheric and metabolic requirements. This paper will be divided into two parts; the first consisting of data collected during space cabin simulator experiments.

783

Welle, B. 1962 COSMONAUT TRAINING PROGRAM FBIS, USSR & East Europe, No. 70, April 10, 1962.

ABSTRACT: Special efforts are surely being made to improve the training program of future cosmonauts. German Titov experienced several disturbances--slight vertigo and sickness. This was probably because of the influence of weightlessness on the middle ear, the organ of equilibrium. This effect disappeared almost completely when Titov assumed his normal resting position and made no strong movements with his head. Experts are now investigating whether this is a biological effect, or an individual peculiarity of Titov's. A scientist stated that better methods will strengthen the organ of equilibrium. In other words, cosmonauts must spend even more time than previously on rotating disks

and swings, on apparatuses which move in three directions simultaneously. If, despite all training, the troublesome effects show up during future flights, if they interfere with the ability to work of the cosmonauts, then-- the principle possibilities are already known--artificial gravity will be created in the space crafts which will amount to about one-fourth or even only one-tenth of the Earth's gravity. Currently, stress is laid on cosmonauts exercising under considerable weight. (CARI)

784

Weybrew, B. B. & J. W. Parker, 1960 BIBLIOGRAPHY OF SENSORY DEPRIVATION, ISOLATION AND CONFINEMENT.
(USN Medical Research Lab., New London Submarine Base, Conn.)
Task MR005.14 2100.04.04, Memo. Rep. 60 1, Jan. 1960.

ABSTRACT: This bibliography contains 146 publications in the area of sensory deprivation, isolation, and confinement. The entries are categorized as follows: review articles, anecdotal literature, and experimental literature--reduction of level or variability of stimulation, confinement peculiar to space flight, confinement peculiar to submarine environment, sociological and prison confinement, animal studies, theoretical articles, and miscellaneous. (Tufts)

785

Whistsett, C.E., Jr. 1963 SOME DYNAMIC RESPONSE CHARACTERISTICS OF WEIGHTLESS MAN. (6570th Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio) Report No. AMRL-TDR 63-18. April 1963.

ABSTRACT: By segmenting the body into 14 idealized masses, a mathematical model is developed to approximate the mass distribution, center of mass, moments of inertia, and degrees of freedom of a human being. An analysis of the model reveals that the segment moments of inertia about the mass centers of the hands, feet, and forearms are negligible, when compared to the total body moments of inertia, although the torso moment of inertia is not negligible. Some selected problems in thrust misalignment, free-body dynamics, stability of rotation, and torque application are solved analytically to predict man's dynamic response characteristics in space. Preliminary experiments indicate that the torque which weightless man can exert by applying a sudden twist to a fixed handle varies as a half-sine wave, and is approximately 67% of his maximum torque under normal gravity conditions.

786

Whiteside, T.C.D. 1960 HAND-EYE CO-ORDINATION IN WEIGHTLESSNESS.
(Flying Personnel Research Committee, Gt. Britain) F/PRC/1175
ASTIA AD 279666, May 1960

ABSTRACT: Test were conducted to repeat previous experiments but without

visual information on performance yet with a visual fixation point so that eye movement might be controlled. The intention was to plot results on a' time scale by taking the Cartesian co-ordinates of each point made by the subject and plotting "X" against time and "Y" against time. In this way it was thought to demonstrate the presence of any adaption times or recovery trends. None were shown in this investigation but other interesting observations were made.

The most immediate practical conclusion to be drawn from this small investigation is that if a pilot is in the cabin of an aircraft which has "ditched" and filled with water, he will be unable to locate without difficulty such a familiar emergency control as a hood jettison handle if he cannot see it.

787

Whiteside, T.C.D. 1960 THE EFFECTS OF WEIGHTLESSNESS ON SOME POSTURAL MECHANISMS
(Paper, 1960 Meeting of the Aerospace Medical Assoc. May 9-11, 1960, Miami Beach, Fla.)

ABSTRACT: The performance of an aiming task in which a subject has to point to the center of a target before him, depends on the coordination of visual information with intact proprioceptive and efferent mechanisms. When the task is carried out with the eyes closed, some verification of performance is still possible -- especially if the hand is brought back to touch the nose as in the well-known clinical test. Such an aiming test with eyes closed has been carried out while the subject was exposed to different G forces including zero-G. In addition, subgravity was simulated by water immersion. The results of these tests are reported in this paper.

788

Whiteside, T. C. D. 1961 HAND-EYE COORDINATION IN WEIGHTLESSNESS
Aerospace Medicine 32(8):719-725, Aug. 1961

ABSTRACT: To study hand-eye coordination under conditons that would eliminate the variable of visual monitoring of performance yet with eye movement controlled, Ss were required to point at graph paper situated some 20 to 25 inches from his chest at chest level. A thimble with a point was worn on the index finger so that accurate measurements could be made. A mirror was located in such a manner that the S saw a target situated to one side but could not see his hand and arm. The aiming task was performed under normal conditions, under simulation of subgravity (immersion in water up to neck), under zero g in an aircraft flying the well-known parabola, and under acceleration (2g) on the centrifuge. Practical implications of the findings were indicated. (Tufts)

789

Whitsett, C. E. 1963 A MATHEMATICAL MODEL TO REPRESENT WEIGHTLESS MAN (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, April 29-May 2, 1963)

ABSTRACT: To maneuver and work in space, the astronaut of the future must be equipped with a system to provide propulsion, stabilization, and life support. The most desirable characteristics of this self-maneuvering and life support system are maximum freedom of motion for the man, and minimum mass for the system. These criteria make the system dynamics heavily dependent upon the dynamic response characteristics of the human body. A gap exists, however, between anthropometric data and dynamic parameters needed to design a self-maneuvering unit for the astronaut. A mathematical model which will represent the biomechanical properties of the human body is needed to bridge this gap. The purpose of this paper is to describe such a model. It is concerned with only those major dynamic effects which result when the human body is subjected to unbalanced forces, and not the physiological and psychological problems of manned space flight. The development and analysis of the model is followed by the description of an effort to validate the model experimentally. (CARI)

790

Winter, K. 1961 DER ERSTE SCHRITT INS WETTALL (The First Step into the Universe) Weltrumfahrt (Frankfurt), 12(4):101-103, July-August 1961, in German

ABSTRACT: This is a description of Yu. Gagarin's orbital flight as compiled from open Soviet literature and newspapers. Education, training and background of Soviet astronauts are similar to those in the United States. According to Gagarin's own notes, he ate and drank, wrote, and was not adversely affected by weightlessness. Gagarin wore a space suit throughout the flight. Preparation for the flight included parabolic flight, centrifuge rides, and parachute jumps.

791

Wolazek, O. 1959 ON THE TECHNICAL REALIZATION OF SUBGRAVITY AND WEIGHTLESSNESS Proceedings of the Xth International Astronautical Congress, 1959 (Wien: Springer-Verlag, 1960)

ABSTRACT: Considers the problem of a technical realizatior of sub-gravity and weightlessness on earth and under the full effects of the force of gravity. Practical methods are presented with the aim of conducting research work in space technics and medicine.

WEIGHTLESSNESS

X

Yasdovskiy, Y.J. 1958 BIOLOGICAL EXPERIMENTS ON ROCKETS AND ARTIFICIAL EARTH SATELLITES. (Paper, presented at the Rocket and Satellite Symposium during the Fifth Reunion of the Committee Special Annee Geophysique Internationale, Moscow, July 30 - August 9, 1958)

ABSTRACT: The safety of living organisms during rocket flights can be guaranteed only under conditions which protect the organism from the action of a whole complex of unfavorable external factors: high degrees of rarefaction of the air, the absence of molecular oxygen, cosmic rays, ultraviolet radiation, meteors, weightlessness, etc. This paper discusses the programs conducted by the Russians to (1) select the most suitable biological specimen for conducting the experiments (2) develop methods of investigating the physiological functions of an animal suitable for use under the conditions of flight on a rocket, (3) determine the possibility of guaranteeing the conditions necessary for the animal to live with the aid of a small, regenerating, hermetically sealed cabin during rocket flights to an altitude of 100 km, and (4) determine the possibility of utilizing an ejectible cabin to recover animals and apparatus from high altitudes. A good description is given of the Laika experiment.

WEIGHTLESSNESS

Y

793

Yazdovshii, V.I., E.M. Yuganov & I.I. Kas'ian 1960 USTANOVOCHNYI REFLECKS INTAKTNYKH ZHIVOTNYKH V USLOVIIAKH VEVESOMOSTI (Postural Reflexes of Intact Animals Under Conditions of Weightlessness)
Akademiya Nauk SSSR. Izvestiya. Seriya Biologicheskaya (Moscow) 25: 762-767.

ABSTRACT: During a rocket flight, two white rats and two white mice were enclosed in a sealed cabin of the regenerative type with normal atmospheric conditions. The postural reflexes were studied during a sevenfold increase in gravity and a nine-minute period of weightlessness. Food and drink were accessible throughout the entire flight. The studies resulted in data concerning individual and species differences for motor activity during weightlessness. The animals were more coordinated within 40-45 seconds of weightlessness. The first signs of adaptation to weightlessness were made after 40-45 seconds.

794

Yazdovskiy, V. I., Yuganov, Ye. M., and I. I. Kas'yan. 1960 THE ADJUSTING REFLEX OF INTACT ANIMALS IN ZERO-GRAVITY CONDITIONS. Letopis'Zhurnal' nykh Statey. 46. (from periodical: Izvestiya Akad. Nauk USSR, Seriya Biol. Nr. 5.

795

Yazdovskiy, V.I., & R.M. Baevskii 1962 MEDICO-BIOLOGICAL CONTROL IN COSMIC FLIGHT. (Joint Publications Research Service, Washington, D.C.) JPRS 16205, 15 Nov. 1962. ASTIA AD 299 170.
Translation from Akademiya Nauk SSR. Vestnik 32(9):9-15, 1962.

ABSTRACT: The task of this article is to give a general idea of the character of radiotelemetric systems of medicobiological control in their current state i.e. the state in which they were utilized partim in the vehicles "Vostok-3" and "Vostok-4" and to indicate the ways of their imporvement in view, of the guarantee of bio-medical control in subsequent cosmic flights covering greater distances and having longer duration. (Author)

796

Yazdovskiy, V.I., E.M. Yuganov, & I.I. Kasyan 1963 POSTURAL REFLEXES IN INTACT ANIMALS UNDER CONDITIONS OF WEIGHTLESSNESS (National Aeronautics and Space Administration) NASA TT F-130, March 1963

ABSTRACT: Experiments were conducted on two albino rats and two albino mice to study their postural reflexes under conditions of alternately increased and decreased gravity and to determine the time required for development of adaptive reactions in the weightless state.

797

Young, R.S. 1961 BASIC RESEARCH IN ASTROBIOLOGY (In: Advances in the Astronautical Sciences, Volume 6, Ed. by H. Jacobs and E. Burgess, The Macmillan Company, New York, 1961) pp. 317-327

ABSTRACT: The sea urchin eggs and sperm were used in tests to determine the effect of zero gravity on two basic cellular phenomena: fertilization and cell division. The sperm and eggs were mixed at the end of the acceleration phase of the flight and fertilization occurred during weightlessness. The techniques and results are discussed in detail

798

Young, W. R. 1959 WHAT IT'S LIKE TO FLY INTO SPACE. Life 46(15):132-149 13 April.

ABSTRACT: This article describes training tests for astronauts and provides full page photos (including cover in color) of weightlessness tests. Author, Life science editor, participated in 90 zero-gravity experiments in a modified Convair 131-B Aircraft...."power-dived from about 12,000 ft. until it reaches an airspeed of 285 mph. Then it is sharply pulled up into a 30° climb. For the next 15 seconds the plane arcs through the air....weightlessly." Very clear article describing gravity and zero-gravity research work being done at various U. S. Laboratories. (CARI)

799

Yuganov, Ye. M., I. I. Kas'yan, & V.I. Yazdovskiy 1960 MUSCULAR TONUS UNDER CONDITIONS OF WEIGHTLESSNESS. Izvestiya Akademii Nauk, Seriya Biologicheskaya, 25(4):601-606. July-Aug. (Academy of Medical Sciences USSR). (Translation). NASA TT F-131, March 1963

ABSTRACT: The authors of this article report experiments which were performed on a rabbit to determine the nature and extent of change in the muscular tonus of a living organism when it is subjected to the alternating action of gravity and weightlessness. On the basis of the data collected, it was concluded that vertical shifting of the eye of a rabbit in space indicates a decrease in the tonic tolerance of the ocular musculature during weightlessness. It is suggested that oculogravitational and agravitational illusions are connected with vertical shifts of the eye. These shifts are caused by reflex action of the otolith apparatus. The nature and extent of counterrotation of the eye of a rabbit in space was recorded by direct filming. The muscular tonus was estimated from the condition of the tonic labyrinthine reflex of counterrotation of the eye. No experimental data on the subject has been found either in Soviet or in foreign literature. The only information available seems to consist of theoretical assumptions concerning the possibility of changes in muscular tonus during weightlessness. It has now been recognized that weightlessness is not dangerous to life and that it does not cause any substantial change in the cardiovascular and respiratory systems.

800

Yuganov, Y. M., N. N. Gurovskiy, I. I. Kas'yan, A. M. Konovalov, V. A. Yasubov, & V. I. Yasdovskiy 1961 SENSORY REACTIONS AND THE STATE OF VOLUNTARY MOVEMENTS OF MAN UNDER CONDITIONS OF WEIGHTLESSNESS. Izvestiya Akademii Nauk SSR (Seriya Biologicheskaya) (Proceedings of Academy of Sciences USSR, Biological Series) (Moscow) (6):897-903, Nov-Dec. 1961

ABSTRACT: A study was carried out of the pattern of sensory reactions and of the changes in some indices of voluntary movements of man under the conditions of a short exposure to imponderability reproduced in an aeroplane flight. It was shown that under these conditions in healthy persons no adverse sensory reactions do arise in most cases. During the initial period of imponderability the exactness of the motor function is reduced and the time of voluntary movements somewhat increases. This change however is of a transient character and becomes less pronounced in reiterated flights or disappears altogether. When a man is fixed in an arm-chair simple motor acts can be performed under the conditions of imponderability fairly rapidly and precisely. (CARI)

801

Yuganov, Ye. M., I.I. Kas'yan, N.N. Gurovskiy, B.I. Yakubov, & V.I. Yazdovskiy 1961 SENSORY REACTIONS AND VOLUNTARY MOVEMENTS IN MAN DURING WEIGHTLESSNESS
In: Akademiya nauk SSSR. Izvestiya. Seriya biologicheskaya, no. 6, 1961, 897-904

ABSTRACT: A study was conducted with 39 men, 22 to 28 years old, in 40 flights in an airplane in which weightlessness occurred for periods of 35 to 40 sec. Weightlessness was created by movement of the aircraft along a parabolic curve. The amount of overload at the start and the end of flight along the parabola, and the condition of weightlessness were controlled visually. The data obtained indicated that 38 men experienced a "very pleasant feeling of unusual lightness," and only one in the first flight noted an unpleasant sensation in the epigastric region. The data obtained indicated that there was no change in the analytical and synthetic cortical function during brief periods of weightlessness. All the subjects adjusted quite rapidly to weightlessness. The precision of muscular efforts was determined by experiments conducted with 14 men trained to exert muscular efforts on a special dosimeter from which the visual reading of its indicator movement was impossible. The table indicates that the performance precision remained practically unchanged only in 4 men out of 14. Ten subjects committed errors of 150-1250 g. The errors in the performance precision during weightlessness were apparently due to the fact that the subjects did not have to make any effort in holding the hand in a given position. Twelve subjects participated in a study of movements preparatory to taking food and movements of swallowing liquid, semiliquid, and solid foods under conditions of weightlessness. Five men out of 12 noted slight difficulty in swallowing liquid and semiliquid foods. During weightlessness, a number of individuals showed changes in the indexes characterizing voluntary movements. These disturbances are probably connected with changes in the character and degree of the stimulation of the neuroreceptor apparatus of the statokinetic and vestibular sensors. Thus it seems that man is able to adapt himself to the conditions of space flight and weightlessness.

802

Yuganov, Ye. M., P.C. Isakov, I.I. Kaciyan, D.V. Afanasiev & G.I. Pavlov 1962 MOTOR ACTIVITY OF INTACT ANIMALS UNDER CONDITIONS OF ARTIFICIAL GRAVITY
(Akademiya nauk SSSR. Isvestiya. Seriya Biologicheskaya, no. 3, 1962, 455-460)

ABSTRACT: The minimal effective value of artificial gravity necessary to maintain the body posture and coordination of movements of mice and rats under conditions of weightlessness as in the parabolic flight of an aeroplane was determined. Artificial gravity was created in a small size contrifuge which produced radial accelerations varying from 0.05 tp 1.0 g. Accelerations of 0.28 to 0.3 g were sufficient for prophylaxis of the unfavourable effect of weightlessness upon the motor reactions of the animals. There are 2 figures and 1 table. English-language references are: Beckh H.J. 1959. Flight experiments about human reactions to accelerations which are followed or preceeded by weightlessness. Aerospace medicine, 30, 6, 391-409; Graveline D.E., Balke B., McKensie R., Hartmann, B. 1961. Psychobiologic effects of water immersion induced hypodynamics. Aerospace medicine, 32,5.

803

Yuganov, E. M. P. K. Isakov et al 1963 MOTOR ACTIVITY OF INTACT ANIMALS UNDER CONDITIONS OF ARTIFICIAL GRAVITY.
Fed. Proc. 22:589-592, May-June 1963.

804

Yugov, Y., A. Serov 1958 BEFORE MAN'S FLIGHT INTO SPACE.
Soviet Press (Embassy of the USSR, Washington., D.C.)
Translation No. 553, 5 Nov. 1958.

ABSTRACT: Outlines both biological problems solved and yet to be resolved for manned rocket space flights and summarizes briefly some accomplishments of Soviet space biology, which include some Sputnik II findings and some results of preceding investigations on animal - carrying rocket flights.

WEIGHTLESSNESS

Z

805

Zylstro, D. 1960 ASTRONAUTS WILL REQUIRE LESS SLEEP
Missiles and Rockets. 6:33-34, 29 February 1960

WEIGHTLESSNESS

ANONYMOUS

806

Anon. 1950 ELEVATORS TO HELP DETERMINE EFFECTS OF REDUCED GRAVITY ON SUPERSONIC PILOTS, Tech. Data Digest, 9(19):11-12

ABSTRACT: Discussion, in nontechnical terms, of the problems involved in space travel, with particular attention to problems of weightlessness, orbital phenomena, travel time to planets and stars, and surface conditions on the planets. The importance of space exploration for scientific studies is discussed.

807

Anon. 1952 MAN WITHOUT GRAVITY: THE PHYSIOLOGICAL AND PSYCHOLOGICAL PROBLEMS OF SPACE FLIGHT. Flight 61:298-300, March 14, 1952

ABSTRACT: The principal physiological functions of the human body, such as respiration, circulation, and digestion, are primarily muscular in action and therefore independent of gravitational pull. The action of the labyrinthic fluid in the inner ear is determined by mass inertia rather than by weight. The otolith organs on the other hand require a gravitational field for their normal operation.
However, it is not known what nervous impulses would be transmitted by the otolithic organs under true zero g conditions; experimental evidence allows the assumption that vision and somatic sense organs would partly compensate for disturbances in the balancing mechanisms of the inner ear. The author summarizes other problems that will arise in actual space flight, such as the need for atmospheric circulation because of lack of convection currents; prevention of blackouts during high take-off accelerations, protection from radiation, the possibility of infection by alien viruses and germs encountered on other planets, and the need of proper preparation against psychological crises on extended flights. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space Medicine Bibliography) (Technisch Documentatie en Informatie centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903; ASTIA AD-227 817; Feb. 1959)

808

Anon. 1952 THEY'RE OFF. THE MONKEYS AND THE MICE: PHYSIOLOGICAL RESEARCH ON ANIMALS LEADING TO HUMAN SPACE FLIGHT.
Western Aviation 32(11):12

ABSTRACT: Two monkeys and two mice have survived a ride to an altitude of 200,000 feet in Aerobee and V-2 type rockets fired from Holloman Air Force Base at Alamogordo, New Mexico. The experiment was carried out by the U.S. Air Force Air Research and Development Command. The monkeys had been anesthetized to prevent them from interfering with the recording instruments. The mice were placed in two separate drums, one smooth on the inside, the other provided with a small shelf. An initial acceleration of 15 g for less than one second was followed by 3 to 4 g for about 45 econds. At the peak of the trajectory the animals were weightless. Films taken during the flight showed the "floating" mouse in a state of complete disorientation and unable to coordinate its movements. The mouse in the drum provided with a shelf was able to hold on to it and command its body at will. A statement by major Charles Yaeger on his reactions during near-zero conditions (while following a ballistic trajectory) confirmed the fact that proper performance of the pilot is not impaired under such conditions. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space Medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-160903, Feb. 1959. ASTIA AD 227 817.

809

Anon. 1957 SOVIET EXPERIMENTS ON EFFECT OF WEIGHTLESSNESS ON HUMANS
Esti Hirlap (Budapest), 8 Nov. 1957

ABSTRACT: An article in a Budapest daily revealed that "A correspondent of the Daily Worker (presumably London) reports from the Soviet capital that 16 Soviet fliers have performed experiments on themselves to determine what effects the absence of the gravitational force of the Earth has on the human organism. This is a sign that the Soviet scientists are preparing to send men into space. They have established by means of repeated experiments on weightlessness that the human organism can adapt itself to such circumstances. One of them on whom such experiments have been done a number of times, was able to correctly orient himself and perform coordinated movements during levitation (lebeges)."
The article then reported that Professor Romadin placed the speed of the second Soviet artificial satellite at only 2.5 kilometers per second less than would be needed to completely overcome the Earth's gravitation. The professor also said that the power developed during the few seconds of the rocket's ascent is more than the capacity of the Kuybyshev hydroelectric works.

810

Anon. 1957 MAN IN SPACE
Brit. Med. J. (London), 2(5052):1041-1042, 2 Nov. 1957.

ABSTRACT: The possibility of human space travel is discussed in general. The hazards and problems of space travel (confinement, acceleration, barometric pressure, radiations, meteorites, food, re-entry problems) and possible means of overcoming them are briefly considered.

811

Anon. 1957 SPACE MEDICINE
MD 1(3):27-33, Dec. 1957

ABSTRACT: In commenting on space travel, the author first gives a history of mans attempts to find out more about their environment. Psychologists explain man's stubborn desire for space travel through the "escapist" urge. Another urge might be man's desire to conquer physical obstacles. Also, curiosity plays an important role. The amount of time required to travel from Earth to Mars or Venus has been computed and is reported in this paper. The author also comments on certain problems to be encountered in a space flight such as weightlessness and lack of oxygen.

812

Anon. 1958 HOMO SPACIENS
Physician's Bulletin 23:67-69

ABSTRACT: The question of man's traversing the upper atmosphere and the vacuum of outer space poses medical problems which are both challenging and formidable. In the main, it will be necessary to devise measures for his protection and his physiologic maintenance. This presumably, will require man's enclosure in a hermetically sealed shell encompassing an environment to which he is accustomed.

Physiologically, man in a space vehicle presents a variety of major problems. Most conspicuous, of course, is his vital need for oxygen. Then, too, exhaled carbon dioxide will need to be eliminated. The problem of the disposal of human waste material is, as yet, unsolved.

Beyond the sphere of earth's gravitational pull, man will have to cope with "weightlessness" just as soon as the rocket's propulsive motor is cut off. Space man's environ[illegible]ld be one of absolute monotony. Heron has demonstrated experimentally that monotonous situations may produce striking mental abnormalities in normal human subjects.

The aim of space medicine is essentially to aid engineers in creating approximately the same environmental conditions for man in space that prevail near the earth's surface.

813

Anon. 1958 SPUTNIKS AND SPACE SHIPS BREAKING THROUGH THE BIOLOGICAL BARRIER. USSR no. 4:17-19, 1958

ABSTRACT: A general article which covers the physiology of cosmic flight; overcoming hazards of space; how much speed can the body endure; weightlessness and acceleration; altitude and survival; and the space age.

814

Anon. 1958 SATELLITES PAVE WAY FOR SPACE TRAVEL. FBIS USSR/East Europe No. 186, Sept. 24, 1958.

ABSTRACT: The problems during the third stage of rocket investigations included the checking of all the results obtained during the flight of animals up to a height of 212 kilometers. During the so-called "active" stage of the flight, with the intense noise and G-force, the rate of pulse and breathing and the blood pressure of nonanesthetized animals increased as a rule. When the state of weightlessness set in, these physiological indices remained at a high level for the first two to three minutes, but by the fifth or sixth minute they returned to the initial level. Animals which were anesthetized showed no changes in the rate of pulse and breathing and in blood pressure during the state of weightlessness. Telemetric data obtained during the ascent of the rocket showed that the heartbeat was almost trebled. But subsequently, while acceleration rose, the rate of the heartbeat fell. The rate of breathing also rose three to four times under the influence of maximal acceleration; this is apparently due to the considerable increase in the weight of the dog. (CARI)

815

Anon. 1958
The New York Times, Feb. 10, 1958. p. 14

ABSTRACT: Description of a manned sphere, 10 ft in diameter which could be lifted to 100,000 feet altitude by balloon, then released and a rocket motor boost it to 3400 mph, raising the sphere to 600,000 feet altitude. It would then begin a free-fall that would produce 2.5 minutes of weightlessness. It is primarily designed to give training in weightlessness but could give some experience in acceleration, deceleration and isolation as in space flight. (CARI)

816

Anon. 1958 MOUSE IN LIQUID SUIT SHOWS HOW MAN MAY SURVIVE STRESS OF GRAVITY IN SPACE TRIPS
Wall Street J. 8 Feb. 1958

817

Anon. 1958 CORNELL PROBES WEIGHTLESSNESS
Science News Letter 73:39
See also Aviation Week 68(2):26-28, Jan. 13, 1958

818

Anon. 1958 AIR GROUND TELEMETRY SYSTEM FOR THE ACQUISITION OF PHYSIOLOGICAL DATA DURING SUB-GRAVITY CONDITIONS (Aeromedical Lab., Holloman AFB) 8 May 1958.

ABSTRACT: Airborne system, teltmeter, tape facility, mounting and installation of all equipment, galvanic skin resistance, skin temperature measurement, heart rate, blood pressure, respiration rate and depth, amplifiers, transducers, physiological console, etc.

Anon. 1958 FEW PHYSIOLOGICAL CHANGES NOTED IN MONKEY'S WEIGHTLESS FLIGHT Aviation Week, 69(25):23. 22 Dec. 1958.

ABSTRACT: The longest weightless period achieved thus far with a primate (13.3 min.) produced no significant physiological changes in a 1-pound squirrel monkey fired 300 miles into space in an Army Jupiter intermediate range ballistic missile nose cone as part of a joint Navy-Army medical experiment. Enclosed in a small metal cylinder placed inside a larger capsule, "Gordo" was placed supine with his knees drawn over his chest and equipped with gear to measure his heart action, blood pressure respiration, pulse rate, and voice response. Special instruments were installed to measure the temperature and pressure inside the smaller cylinder. A physiological telemetric system developed by Captain Norman L. Barr, chief of the Navy's aviation and space medicine program, and a telemetric system developed by the Army provided information.

820

Anon. 1958 ZERO GRAVITY TESTS SHOW MAN CAN ADJUST TO SPACE Aviation Week (December 22, 1958) pp. 52-55

ABSTRACT: Weightlessness in space may not cause the serious crew problems many biomedical scientists have envisioned. No serious decrement in man's performance should occur as a result of zero gravity. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space Medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903; ASTIA AD-227 817; Feb. 1959)

821

Anon. 1958 THE HUMAN FACTOR IN SPACE TRAVEL Air University Quarterly Review 10 (2):1-151; Summer 1958

ABSTRACT: This issue deals with the human factor in space travel and discusses the following subjects: Air Force human factors, basic factors, biodynamics, the engineered environment, observations in high altitude sealed-cabin baloon flight, human performance, human requirements, weightlessness of manned space operations. This issue deals over these subjects by 12 chapters. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space Medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. TDCK-16903; ASTIA AD-227 817; Feb. 1959)

822

Anon. 1958 SOVIETS RECOVER RESEARCH ROCKET DOGS
Aviation Week 69: 61-63, 3 Nov. 1958

ABSTRACT: Izvestia reports two dogs, Belyanka and Pestraya, were recovered from 280 miles altitude in a single-stage research rocket launches from the "middle latitudes of Soviet European territory" on Aug. 27, 1958, with a 3,/26-lb. payload. This is reported as being the second launching of such a rocket. The felt-lined cabin, which landed "in a selected area," contained "a generation system, a self-contained system for recording the biological functions of the animals, and a special motion picture camera." The rocket was stabilized "during the entire flight, including the inertial part of its flight," to ensure the necessary conditions for the experiment. The rocket also carried instruments for measuring concentration of free electrons, ion composition of the atmosphere, concentration of positive ions, electron temperature, air pressure, micro-meteorite impingement, ultraviolet region of the solar spectrum, infrared radiation of the earth, and the earth's atmosphere.

823

Anon. 1958 CORNELL PROBES WEIGHTLESSNESS
Aviation Week 68(2):26-28, Jan. 13, 1958
See also Science News Letter 73:39, 1958

824

Anon. 1958 SPUTNIK II THROUGH RUSSIAN EYES
Astronautics 3: 48-49, 62.

ABSTRACT: Although silent on launching vehicle and means of propulsion, these translations from the Soviet press offer hitherto unreleased data on structure of the satellite and the biological experiments performed.

825

Anon. 1959 ROCKET TECHNOLOGY AND SPACE RESEARCH
(Picatinny Arsenal, Feltman Research and Engineering Labs., Dover, N.J.)
Translation No. PA-61, Nov. 1959. ASTIA AD 228 967
See also Raketentech. u Raumfahrtforsch., V. 3, No. 2, Apr. - June 1959

ABSTRACT: Included in this report are observations on the physiology of the senses during the transition from acceleration to weightlessness.

826

Anon. 1959 RABBIT AND TWO DOGS RECOVERED FROM SPACE
Science 130:258

ABSTRACT: From Soviet announcements, two dogs and a rabbit on a 4000-lb payload were launched into space on July 2, 1959, and successfully recovered. According to the Soviet press, instruments aboard the missile sent back information on the animal's reaction to weightlessness, and information on the ultra-violet part of the solar spectrum, the structure of the ionosphere, and the direction and speed of air streams at various altitudes. Among commentator's reports: "This has proved we can bring animals back alive," and "It means much in the preparation for space flights by human beings."

827

Anon. 1959 NINE MINUTES OF WEIGHTLESSNESS IN SPACE
Weltraumfahrt (Germany) 10(3):62, Sept. 1959

828

Anon. 1959 WEIGHTLESS EXPERIMENTS DETAILED Aviat. Week 70:34, April 6, 1959

829

Anon. 1959 THEY FLOAT THROUGH THE AIR
Astronautics 4:42-43, Feb. 1959

830

Anon. 1959 ARTIFICIAL EARTH SATELLITES NO. 3, 1959.
Iskusstvennyye Sputniki Zemli, no. 3 (National Aeronautics and Space Administration, NASA Techn. Transl. F-8, April 1960)

CONTENTS: Presented are abstracts of 13 articles on artificial earth satellites and related subjects, which comprise the third of a series of publications by the Academy of Sciences USSR.

831

Anon. 1960 NONTITLED
Discovery 21: 482-486, 1960

ABSTRACT: A concise summary with illustrations of the experiments carried out in Sputnik V, launched Aug. 19, 1960, based on information from official Russian sources. The bio-medical experiments carried out in the 10,000 lb. satellite were designed to provide data on specific features of the vital activity of different animal and plant organisms during a space flight, the biological action of space-flight conditions on living organisms (overstrain, prolonged weightlessness, the transition to and from weightlessness), the action of cosmic rays on the vital activity and heredity of animal and plant organisms, systems for maintaining life and well-being during space flight (air regeneration, temperature, regulations, food and water supply, sanitation, etc.). In addition to dogs, Belka and Strelka, the biological payload included 21 black and 19 white mice, the seeds of different varieties of onions, peas, wheat, and maize, Nigella, actinomycete fungi, Chlorella in liquid and solid nutritive media, sealed ampules of cultures of intestinal bacteria (type KK-12, B, "aerogenes") butyric fermentation bacteria, a culture of staphylococci, two varieties of phages (T-2 and 13-21), DNA, HeLa cells, and pieces of preserved human and rabbit skin. Also the container carried four automatic bioelements with a culture of butyric

832

Anon. 1960 DOGS ADJUST QUICKLY TO FLIGHT.
TASS, Radioteletype in Russian to Europe (Moscow), August 22, 1960. 0110 GMT. (translation. Excerpts)

ABSTRACT: P. Fedorov reports that television observations were conducted from the moment the spaceship was launched and practically to the beginning of its descent. The dogs were reported to have pricked up their ears and looked with perplexity into the inside of the cabin. During the first seconds the dogs felt uneasy and agitated. As the speed of the ship increased they were gradually pressed to the floor by the increasing force of gravity. Strelka pressed down with her paws, tried to resist, and looked from side to side with alarm. Then the animal stood stock still. The ship was in orbit. After great changes in the load the condition of weightlessness was reached. The dogs "hung" in the cabin. Their paws and heads hung down weakly and at first sight the animals appeared lifeless. Having accustomed themselves to weightlessness, the animals began to eat. During the day they got worried from time to time, but they gradually settled down.

fermentation bacteria, two enclosed in a sperical thermostat and two in an unheated container. The various microbiological and cytological specimens were intended to provide data on the effect of space-flight conditions on growth and genetic change. The oxygen concentration was to be maintained at 20 to 25 percent, with a carbon dioxide concentration no higher than 1 percent; the temperature was to be between 15° and 25° C, the relative humidity at 39 to 70 percent, and the pressure at one atmosphere. The feeding method was similar to that used with Laika. The physiological information recorded during the flight included arterial blood pressure, electrocardiograms, frequency of respiration, body temperature, and movements. Data transmitted to earth stations by radio-telemetry included cabin temperature, pressure, humidity, and control data on the functioning of the life-support system. Television was employed to study the motor activity of the dogs, and transducers mounted on each cradle provided additional data on their movements. Ionizing radiation dosimeters placed near the dogs and on their suits measured radiation dose from cosmic rays. Pre- and post-flight studies included metabolism, blood and urine, cardiovascular, immunological, and (for the rats only) nervous activity and their typological peculiarities. The post-flight examination showed that the rats, like the dogs, took the trip well. The Arknik also investigated cosmic radiation and short-wave solar radiation. Measurement techniques and some experimental results are given.

833

Anon. 1960 MAN IN SPINNING TANK OF WATER WILL TEST EFFECTS OF WEIGHTLESSNESS IN SPACE. Army Navy Air Force Journal. 97:21, 23 April 1960.

834

Anon. 1960 DOGS ADJUST QUICKLY TO FLIGHT.
TASS, Radioteletype in Russian to Europe (Moscow), August 22, 1960. 0110 GMT. (translation. Excerpts)

ABSTRACT: P. Fedorov reports that television observations were conducted from the moment the spaceship was launched and practically to the beginning of its descent. The dogs were reported to have pricked up their ears and looked with perplexity into the inside of the cabin. During the first seconds the dogs felt uneasy and agitated. As the speed of the ship increased they were gradually pressed to the floor by the increasing force of gravity. Strelka pressed down with her paws, tried to resist, and looked from side to side with alarm. Then the animal stood stock still. The ship was in orbit. After great changes in the load the condition of weightlessness was reached. The dogs "hung" in the cabin. Their paws and heads hung down weakly and at first sight the animals appeared lifeless. Having accustomed themselves to weightlessness, the animals began to eat. During the day they got worried from time to time, but they gradually settled down.

835

Anon. 1960 SATELLITE RETURNS SAFELY
FBIS USSR & East Europe, No. 163, 22 Aug. 1960.

ABSTRACT: After 18 revolutions the second Soviet spaceship landed safely. The animals returned safely and hungry. (CARL)

836

Anon. 1960 DESCRIPTION OF THE EXPERIMENTS PERFORMED DURING THE FLIGHT OF THE SECOND RUSSIAN SPACE-SHIP SATELLITE
Pravda, 4-6 Sept. 1960. R.A.E. Translation No. 921

837

Anon. 1960 EFFECTS OF WEIGHTLESSNESS ARE REDUCED WHEN SPECIMEN IS STRAPPED INTO SEAT
Business Week, no. 1601, p. 94, May 7, 1960

838

Anon. 1960 MAN IN SPINNING TANK OF WATER WILL TEST EFFECTS OF WEIGHTLESSNESS IN SPACE. Army, Navy, Air Force J. 97:21, 23 April 1960

839

Anon. 1960 ZERO GRAVITY TROUBLES: AIR FORCE FINDS BUBBLES MISBEHAVE, TUBES WON'T FEED IN WEIGHTLESS STATE. Machine Design 32:30, 9 June 1960

840

Anon. 1960 SECOND SOVIET SPACESHIP (Official Report)
Pravda 4: 3-4; Sept. 1960

841

Anon. 1960 LOCKHEED WEIGHTLESSNESS SIMULATOR BEING BUILT.
Missiles and Rockets 6(18):32, 2 May 1960.

ABSTRACT: The first insight into how a man will behave under the conditions of long periods of weightlessness in outer space will be gained through experiments with Lockheed's null gravity simulator.

842

Anon. 1960 LUNAR JOURNEY
Lancet (London) 1(7134): 117-118, 21 May 1960

ABSTRACT: The physiological problems of orbital and space flight are briefly reviewed, including: (1) the typical aviation stresses of acceleration, low barometric pressure, and temperature and humidity extremes, for which adequate measures of protection are available; (2) prolonged weightlessness, the "breakoff phenomenon," and primary cosmic radiation, about which little is known; and (3) problems of lunar flight which will require further development of existing techniques, such as increased acceleration stress, the mental strain of extended flight, the additional radiation hazard of the Van Allen belts, and the necessity for the provision of large quantities of food and oxygen.

843

Anon. 1960 NUTRITION IN SPACE
Nutrition Revs. 18(11):325-329, Nov. 1960

ABSTRACT: The present state of research on the nutritional problems of space travel is reviewed. Consideration is given to such subjects as the development of regenerative systems; the digestibility, toxicity, and general acceptability of algae as food; eating patterns and food preferences during extended periods of isolation, feeding programs during balloon trials (which provide short-term situations comparable to manned space flight); and the development of concentrated, synthetic diets for space travelers. The effects of such stresses as acceleration, deceleration, weightlessness, noise and vibration, and space radiation upon food supplies and food intake are also discussed.

344

Anon. 1960 DESIGN FOR ZERO-G DINING
Machine Design, 32(26):12 22 Dec. 1960

ABSTRACT: A space kitchen has been designed for feeding one astronaut at a time in a weightless state.

845

Anon. 1961 OT MECHTY K DRISTVITEL'NOSTI (MEDIKO-BIOLOGICHESKIE PROBLEMY KOSMICHESKOGO POLETA (From Thought to Reality (Bio-Medical Problems of Cosmic Flight) Voenno-Med. Zhur. (Moscow) (In Russian) 5:3-9, 1961.
See Also Military Med. J. (USSR), 5:3-12, 1961
See Also U. S. Joint Publ. Research Serv., Washington, D. C., Trans. no. 10052 (1374-N/42), 31 Aug. 1961.

ABSTRACT: Scientific preparations leading to the man-in-orbit satellite flight on 12 Apr. 1961, are discussed in detail. Rocket and satellite flights carrying biological materials were used to work out problems associated with flight dynamics (g-forces, noise, vibration, weightlessness), problems stemming from the physical characteristics of outer space (cosmic radiation), meteors, temperature changes, lack of atmosphere), and problems associated with the internal cabin environment (microclimate, isolation, diurnal rhythm disturbances). Results were satisfactory and information on optimum conditions for space flight. In regard to cosmic radiation, acc eleration growth and germination were shown for onion and Nigella seeds after flight, as well as an increase in the frequency of chromosomal aberations in root cells, bone marrow cells of mice, and growth points of plants. Also the frequency of dominant and recessive lethal factors in Drosophila was increased after a 24-hour satellite

846

Anon. 1961 WEIGHTLESSNESS: MAN IN SPACE. A LITERATURE SURVEY. (North American Aviation, Inc., Downey, Calif.) Rept. No. SID 61-447; 12 Dec. 1961. ASTIA AD 282 469.

ABSTRACT: A review of literature from 1957 to August 1961 on the state of weightlessness. with primary emphasis on the physiological aspects, is given Some engineering documentation is included. The 131 references are listed alphabetically by periodical title and corporate author in one alphabet. Both an aurthor and subject index follow the bibliography. (Author)

847

Anon. 1961 FROM SPUTNIK TO ASTRONAUT
Wojskowy przeglad lotniczy 1961(5):1-8

ABSTRACT: This feature article commemorates Major Y. Gagarin's successful orbital flight of April 12, 1961 and briefly describes all Soviet space vehicles launched during the last 3½ years preceding the manned orbital flight. Gagarin's flight was preceded by Vostok-type space ships launched for a test of the capsule's landing equipment. Gagarin's task during the flight was to observe the earth, the sky, and the lower layers of the atmosphere, as well as his own physical reactions to acceleration, weightlessness, etc. Sensors attached to his body recorded cardiac currents, respiration and pulse rate. The data showed that acceleration and deceleration caused little changes in his pulse rate and respiration. During weightlessness, his pulse and respiration rates returned to nearly normal. It can be assumed that manned space flights to the moon and other planets will come true in the near future. (CARI)

848

Anon. 1961 THE SCHOOL OF WEIGHTLESSNESS
Komsomol'skaya Pravda (Moscow), 11 Aug. 1961, p.3

ABSTRACT: In answer to the questions concerning weightlessness, scientists replied that only Yu. Gagarin and G. Titov know the true meaning of the word weightlessness, since it is difficult to reproduce long periods of weightlessness on earth. Yuriy Gagarin stated that during the period of weightlessness, he felt at ease and experienced no disagreeable sensations. Preliminary data obtained as a result of Titov's flight showed that weightlessness did not hinder normal circulation of the blood. Food intake also proceeded in a satisfactory manner; Titov was successful in handling food both in liquid and solid forms. Weightlessness in no way interfered with his sleep. Both spacemen stated that weightlessness produced no ill effect on their vision, hearing, and sense of touch. During a long flight, some organs, particularly the muscles, may change to conform to the weightless condition. While arriving on another planet or returning to earth, spacemen might discover that they had difficulty in moving around. Two suggestions have been made for creating an artificial gravitational pull within a manned vehicle during long flights. One involves rotating the space vehicle around its axis. The second method consists of placing a magnetic floor in the space vehicles and providing iron shoe soles for its occupants. Training of spacemen to endure weightlessness will always be necessary. (CARI)

849

Anon. 1961 LA RELAZIONE UFFICIALE SUL VOLO SPAZIALE DI TITOV (Official Account of Titov's Space Flight). Oltre il cielo (Rome), 5(90):292-296, Oct. 1961. (In Italian)

ABSTRACT: The spaceship-sputnik "Vostok 2" was successfully launched into space for a 25 hour and 18 minute flight on August 6, 1961. The astronaut was Gherman Stefanovid Titov. This report of the flight includes a description of the communications system, the effects of flight stress on the astronaut and the astronaut's impression of the flight.

850

Anon. 1961 ACADEMY OF SCIENCES USSR, ARTIFICIAL EARTH SATELLITES (SELECTED ARTICLES) AKADEMIYA NAUK SSR, ISKUSSTVENNYYE SPUTNIKI ZEMLI (8):64-71, 90-93 (Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio) Trans. No. FTD-TT-62-694, 18 Oct. 1962; ASTIA AD-288 521)

ABSTRACT: General solution of the problem of the motion of an artificial satellite in the normal field of the earth's attraction.
Detection of radiation anomalies over the South Atlantic at heights of 310-340 Km.

851

Anon. 1961 THE TRIUMPH OF SOVIET SCIENCE AND TECHNOLOGY--THE LAUNCHING AND RETURN TO EARTH OF THE SECOND SPACESHIP. (Technical Documents Liaison Office, Wright-Patterson AFB, Ohio) MCL-1255/1+2, 17 Aug. 1961. ASTIA AD 269 642.
Translation from Priroda, No. 9, Pp. 3, 5

ABSTRACT: For the first time in the history of mankind a spaceship weighing 4600 kg (not counting the last stage of the carrier-rocket) has been launched and safely returned to earth with living beings on board. To conduct scientific investigations aboard the ship there were apparatus directly related to biological research, devices to investigate light and heavy nuclei in primary cosmic radiation, to study solar x-ray and UV radiation, and to record the levels (doses) of cosmic radiation in the animal container. The scientific information was stored and, on command from the ground, was transmitted after each revolution of the ship and before landing.

852

Anon. 1961 DETAILS OF THE LEGENDARY FLIGHT
(Aerospace Technical Intelligence Center, Wright-Patterson AFB, Ohio)
Trans. No. MCL-1035, July 27, 1961, ASTIA AD 261 805
Original Source: Komsomol'skaya Pravda, 91(11031): 1-3, April 16, 1961

853

Anon. 1961 WEIGHTLESSNESS SMALL PROBLEM TO SOVIETS?
Missiles and Rockets, February 6, 1961

ABSTRACT: Soviet biomedics apparently feel that weightlessness is a minor problem, if a problem at all, in space flight. Their published comments on the subject reflect concern only with the psychological adjustment for the astronaut, rather than any difficulties in carrying out missions, consuming foods, or moving about in space vehicles. To help defeat radiation hazards, Russian chemists are working on a protective agent containing sulfur, albumens, vitamins, and hormones, which--when introduced into the body--is expected to increase resistance against radiation.

854

Anon. 1961 FLIGHT OF THE SECOND COSMIC SHIP
Vestnik Akademii Nauk SSSR, 10: 10-17

ABSTRACT: On August 19, 1960, the second Soviet cosmic ship, on board which was a group of experimental animals and other living organisms, went into orbit around the earth. On August 20, they all returned safely to earth. A press conference was held on August 24 by the Presiduim of the USSR Academy of Sciences devoted to the new, outstanding achievement in conguering outer space. A.V. Topchiyev related about how the planned program on the second cosmic ship was carried out and described its passengers. He also cited preliminary results of the flight. Academician N.M. Sisakyan described the biological program of the second cosmic ship. V.V. Parin, active member of the Academy of Medical Sciences, U.S.S.R., described the medico-biological part of the program. Then O.G. Gazenko, senior scientific co-worker of the U.S.S.R. Academy of Medical Sciences showed the first cosmonauts who returned to earth -- Belka and Strelka. The rats and mice were also shown. S.N. Vernov and L.V. Kurnosova told about the investigations of cosmic rays which were carried out during the flight.

855

Anon. 1961 EL HOMBRE EN EL ESPACIO EXTERIOR (MAN IN OUTER SPACE)
Revista de Aeronautica (Spain) 21(245): 275-282, April 1961

ABSTRACT: A resume of the man-in-space projects being conducted by the U.S and U.S.S.R. is presented. (JPL)

856

Anon. 1961 VOSTOK DETAILS
Flight 79(2721): 586, 4 May 1961

ABSTRACT: The Soviet satellite Vostok and Major Gagarin's flight of April 12, 1961, are described. (JPL)

857

Anon. 1961 PARIN ON COSMONAUTS, SPACE DOGS
(FBIS USSR & East Europe, Nr. 81, April 27, 1961)

ABSTRACT: Moscow -- The dogs which have taken part in space flights are still in excellent health and their journey into space has had no harmful aftereffects on the, said Soviet medical scientist Vasil Parin today, appearing on Moscow television program devoted to the conquest of space. Parin stressed that Soviet technology had created vehicles capable of placing living creatures into orbital flight and that both the stages of acceleration and deceleration had caused no harmful aftereffects. Academician Parin said that apparently for some time to come cosmonauts would be selected from among pilots. Outlining the requirements to be met by a cosmonaut, the scientists said that he must possess the same qualities as those possessed by Yuriy Gagarin. Speaking about Yuriy Gagarin's preparation for the flight, Academician Parin said that it had been carried out according to a big program, and all the tests were carried out with "large endurance margins" exceeding in severity those conditions which Gagarin was likely to encounter during the flight. Parin said that Gagarin's space suit incorporated special transmitters with the help of which all the data on the condition of his body during the flight were transmitted to earth. Academician Parin said that in future flights into unexplored cosmic regions the first explorers would apparently again be man's four-legged friends - dogs.

858

Anon. 1961 SOVIETS INDICATE BIG PROBLEMS IN SPACEMAN'S WAY
Columbus Dispatch March 10, 1961

ABSTRACT: Two Russian scientists indicated that despite Soviet recovery of another space ship with a dog inside, major problems remain to be solved before a Soviet man is shot into space. Ivan Maisky, director for the Experimental Biology Institute, and V sil Parin of the Soviet Academy of Medical Sciences agreed that weightlessness is a major problem of amnned space flight. Parin said Russian scientists have been getting "interesting data" on how living organisms are affected by such unusual irritants as vibration, stress, and the extreme noise of rocket engines. (CARI)

859

Anon. 1961 PERIODICAL REPORT ON AEROMEDICINE IN THE USSR: 61-24
(1126th USAF FAG, Arlington Hall Station, Arlington 12, Va.) Rept. 1452577

ABSTRACT: This is a report dealing with (a) Contents of a book on the psychology of the flying profession, (b) Comparative physiological study of tolerance to radial acceleration, (3) The Sixth Congress of the Ukr. Society of Physiologists, and (d) Astronaut training and manned space flights. (CARI)

860

Anon. 1962 BLAGONRAVOV SPEAKS ON COSMONAUTICS DAY
FBIS USSR & East Europe, Nr. 73, April 13, 1962

ABSTRACT: Work on conquering outer space was started in the Soviet Union over 10 yrs. ago. Scientists attempted to investigate the physical phenomena in the atmosphere. Rockets were used as auxiliary transport.
In 1950, the rockets were designed for the upper atmosphere. In 1961, the first rocket designed for cosmic flight was flown into space carrying various animals. Three main problems caused concern: weightlessness, danger of meeting meteorites, and radiation.
Many satellite ships were launched that investigated the space environment that would be encountered by man during his first space flight. (CARI)

861

Anon. 1962 ADAPTATION AND GENETICS
Trans. of Akademiya Meditsinskikh Nauk SSSR. Vestnik, 17(4):27-37, 44-57, and 76-81, 1962.
(Joint Publications Research Service, San Francisco, Calif.)
Sept. 10, 1962 JPRS: 15187

862
Anon. 1962 WEIGHTLESSNESS IS SOVIET PROBLEM
Columbus Dispatch, April 4, 1962

863
Anon. 1962 SOVIETS DISCUSS SPACE WEIGHTLESSNESS EFFECT
Aviation Week and Space Technology, February 26, 1962

ABSTRACT: Although the human nervous system is highly adaptable and has considerable compensating ability to restore normal contact with the outside world, it is not known how much it can compensate for deleterious effects of weightlessness. Soviet scientists contend that the following factors dictate effects on the nervous system in any space venture: low barometric pressure, rocket flight noise and environmental system. Scientists were said to have established that weightlessness induced functional changes of the heart, but cardiac disturbances disappeared after the first two hours of space flight. The absence of gravity excludes the activity of the otolith receptor of the inner ear. This apparently resulted in a distinct feeling of nausea reportedly experienced by Titov. (CARI)

864
Anon. 1962 SOVIET STUDIES ON THE EFFECTS OF WEIGHTLESSNESS AND PHYSICAL EXERTION.
Trans. of Zhurnal Vysshei Nervnoi Deyatel'nostl (USSR) 12(2):202-207 and 332-337, 1962.
(Joint Publications Research Service, Washington, D.C.)
Aug. 10, 1962 JPRS: 14796

CONTENTS:
Changes in the Biopotentials of the Human Brain in Connection with Physical Work, by M. P. Ivanova
The After-Effect of Singly and Repeatedly Acting Centripetal Accelerations on the Higher Nervous Activity of Animals, by A. S. Barer.

865
Anon. 1962 SURVEY OF FACILITIES FOR SPACE ENVIRONMENT SIMULATION
(Aerospace Research and Testing Committee, Washington, D.C.)
ARTC Project No. 6-60; ATC Report No. ARTC-30; April 1962.

ABSTRACT: The main body of the report is separated into 11 sections including acoustic test facilities, vibration test facilities, human factors facilities, and general environmental test facilities. These sections explain the function of specific equipment for space environmental simulation. When practical a summary table has been added to the section giving general characteristics of the equipment.

RESTRAINT, PROTECTION, AND EMERGENCY ESCAPE SYSTEMS

A

1

Abelson, Albert N. 1960 SUMMARY REPORT OF INVESTIGATION TO IMPROVE TROOP RESERVE PARACHUTE
(Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 59-17 ASTIA AD 249 384

ABSTRACT: Experimental and modified standard canopies, a sleeve attached pilot chute, and various types of experimental as well as standard pilot chutes were tested to investigate means of improving the reliability of the troop reserve parachute used with the standard Type T-10 personnel troop parachute assembly. It was concluded that the tested configurations did not exhibit improved performance when compared to the standard troop chest reserve parachute, P/N 48C7155.

2

Achiary, A., L. Servanty, A. Cabanon, & V. André 1956 LA DYNAMIQUE DU SIEGE EJECTABLE (DYNAMICS OF THE EJECTION SEAT) Médecine aeronautique (Paris) 11(1):55-58

ABSTRACT: Characteristics of the accelerative forces imposed by ejection and the dynamic relation between accelerations of the seat and its occupant are discussed. It is shown that the discrepancies between accelerations of the seat and the body parts, as well as the physiological dangers of ejection, are dependent on the elasticity of the body and on seat cushion hardness.

3

Adams, C.C. 1958 HUMAN FACTORS IN SPACE FLYING
In: Space Flight (New York: McGraw-Hill, 1958) Pp. 239-277

ABSTRACT: A review of work being done in Space Medicine with sections on Radiation, Vision, Respiration, Acceleration, Weightlessness, Heat Problems, Space Suits and Meteors.

RESTRAINT, PROTECTION AND EMERGENCY ESCAPE SYSTEMS

Adams, Oscar S., R.B. Levine & W.D. Chiles 1959 RESEARCH TO INVESTIGATE FACTORS AFFECTING MULTIPLE-TASK PSYCHOMOTOR PERFORMANCE (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TR 59-120 ASTIA AD 213 592

ABSTRACT: Fifteen male subjects participated in an experiment designed to study: (a) the 24-hour test-retest reliability and intercorrelation of a battery of seven performance tasks; (b) the effects of performing simultaneously various combinations of physically comparible tasks; (c) the 24-hour test-retest reliability and intercorrelation of a battery of four psychophysiological variables; and (d) the relation of psychophysiological criterion measures to performance criteria and to conditions of task presentation.

The results indicate moderately high reliability and sensitivity for five of the performance task criteria, but a negligible amount of intercorrelation. While no significant correlation was obtained between performance scores and measures of psychophysiological activity, several of the psychophysiological measures showed significant reliability, intercorrelation, and sensitivity to conditions of rest and performance activity.

Adamson, R.L. 1949 RADAR OPERATOR'S SEAT STATIC TEST - MODEL F-94A (Fighter) (Lockheed Aircraft Corp., Burbank, Calif.) June 1949, ATI-69863

ABSTRACT: Static tests were conducted on the radar operator seat for the F-94A fighter. For all tests, the seat was installed in a built-up steel frame with the seat-back horizontal and facing upwards. Hydraulic jacks acting through wood and steel jigs were used to apply loads to the safety harness, seat bottom and the front edge. Load was distributed over the seat bottom by a wood block faced with a one-inch layer of sponge rubber. Distributed load was applied to the seat back by lead pigs and shot bags. The seat withstood without failure 100% scheduled load for all test conditions. Failure in both front corners of the seat bucket occurred at 160% when a load of 4000 lb was uniformly distributed over an area of the seat bottom.

Adams, R. M. & J. R. Dickey 1961 STUDIES OF ESCAPE FROM BALLISTIC SPACE VEHICLES. II. INSTRUMENTATION. (USAF School of Aviation Medicine, Brooks, AFB, Tex.) Rep. 61 29, April 1961.

ABSTRACT: Specific details of a biopack instrumentation system were discussed as well as the design philosophy underlying the approaches used. Bio-

medical information on primates successfully flown through programmed escape profiles was obtained by the instrumentation in conjunction with a National Aeronautics and Space Administration project. The instrumentation consisted of devices for 1) sensing the life cell temperature, humidity, atmospheric pressure, and oxygen partial pressure; 2) detecting and measuring the S's respiratory rate, pulse, eye movements, vectoralectrocardiogram, and psychomotor performance; and 3) photographing the facial area of the animal during flight. (Tufts)

7

Ahrens, D.J. 1950 STATIC TEST PROPOSAL - MISCELLANEOUS
(Cessna Aircraft Company, Wichita, Kansas) Report No. 920-1, August 1950. ASTIA ATI-91823.

ABSTRACT: The object of the front and rear seat tests is to substantiate the Model 305A seats for utility category in accordance with CAR 3.390. Load determination comprises most of this report with an emphasis on seat bottom, seat back, safety belt attachments, and shoulder harness.

8

The Aerotherm Corporation 1960 CONDUCT STUDY, DESIGN, DEVELOP AND FURNISH PROTOTYPES OF ENERGY ABSORPTION SYSTEMS FOR AIRCRAFT SEATS
(Navy Bureau of Aeronautics, Contract NOa(s)57-367-C Progress Reports No. 1-No. 30, Jan 2, 1957 to Feb. 29, 1960), ASTIA AD 269 485

ABSTRACT: Work is in progress on the general problem "regions where it appears that the deliberate incorporation of energy absorbing features in the design of aircraft seats could be beneficial and those regions where it would be futile and possibly actually dangerous".
Preliminary calculations on this phase are approximately 80% complete.

9

Agate, J.N. 1961 SOME EFFECTS OF VIBRATION UPON THE EXTREMITIES OF THE HUMAN
(Paper, Symposium on Vibration, 20 January 1961, Imperial College, London)

ABSTRACT: This paper discusses the evidence that certain vibrations transmitted to the hands can induce a circulatory disturbance known as Raynaud's disease, resulting in an abnormal sensitivity of the fingers to exposure to cold.

10

Ahrens, D.J. 1950 STATIC TEST RESULTS - MISCELLANEOUS - AND REVISION A. (Cessna Aircraft Co., Wichita, Kansas) Report No. 920-2, September, 1950. ASTIA ATI- 91822

ABSTRACT: This is a report of miscellaneous static test results of the Model 305A front seat, rear seat, safety belts, and shoulder harness.

11

Aho, A., & E. Tahti 1957 SIGNIFICANCE OF FUNCTIONAL RADIOGRAPHY OF THE LUMBAR SPINE IN FORWARD AND BACKWARD FLEXION. Annales Chirurgiae et gynaecologiae Fenniae (Helsinki) 46(3):336-350

SUMMARY: Functional radiography of the lumbar spine was found to supplement conventional radiography. The diagnosis from functional radiography was based on exceptionally restricted mobility or exceptional mode of movement of the intervertebral space.
Exceptional mobility was almost always associated with symptoms from the lumbar spine. Exceptional segmental mobility disclosed intervertebral degeneration. Exceptional mode of movement can often be considered an indication of incipient degeneration of the nucleus pulposus. A considerable and exceptional restriction of movement is a radiological symptom of more advanced intervertebral degeneration In the event of radiating pain, functional radiography helped to localize the prolapsed segment in acute cases of recent origin.
(Author)

13

Aviation Crash Injury Research 1956 HV HARNESS AND REEL QUESTIONNAIRE (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc., Phoenix, Arizona) Report AvCIR-6-F-70, Oct. 1956

14

Alexander, G. 1961 FLIGHT PROVES MAN CAN FUNCTION IN SPACE Aviation Week, 70(20):31-32. 15 May 1961.

ABSTRACT: A description is given of the pilot functions performed and the stresses and loads (weightlessness, peak gravity and re-entry loads) to which pilot and capsule were subjected during the 15 minute Mercury-Redstone flight on May 5, 1961.

15

Alexander, M. 1957 HEIGHT-WEIGHT SIZING AND FIT-TEST OF A CUTAWAY G-SUIT, TYPE CSV-3/P WADC Technical Report 57-432, July 1957

16

Alexander, S. E. & J. G. Fraser 1961 FUNDAMENTAL CONCEPTS IN RCAF ARCTIC SURVIVAL TRAINING. In Bergeret, P., ed., Escape and Survival: Clinical and Biological Problems in Aero Space Medicine. (Advisory Group for Aeronautical Research and Development, Paris) AGARDograph No. 52. ASTIA Doc. No. AD-261 881.

(See also Paper, Aerospace Med. Panel, AGARD, NATO meeting, 1960)

.17

Ali, A., & H. Matlock 1957 CUSHIONING FOR AIR DROP, PART VI, PRELIMINARY INVESTIGATION OF THE ABSORPTION OF SHOCK ENERGY BY WOOD IN LATERAL COMPRESSION. (Structural Mechanics Research Lab., Texas University, Austin, Texas) Contract No. DA 19-129-qm-150, ASTIA AD-132 863.

ABSTRACT: In addition to tests to determine the feasibility of using wood in lateral compression, a few exploratory tests were made using wood in combination with steel wire in tension. Devices designed especially for repeated use in testing were utilized, and a limited number of tests were made to give an indication of the quantity of energy absorbed under these conditions. The force-displacement curves obtained from free-fall tests are shown. The cost of absorbing impact energy is based on the cost of devices used to apply the loads. The tests indicate that it is feasible to use wood in lateral compression to absorb shock energy of impact efficiently and economically; the cost for energy absorption for wood is $0.00003/ft-lb as compared to $0.000015/ft-lb for paper honeycomb. The type of surface, wedge-shaped or cylindrical, which is used for compressing the wood has an influence on the energy absorption. The force level at which the energy is absorbed appears to be affected by the amount of lateral compression, though not in direct ratio as friction seems to play a significant part in the absorption of shock energy.

18

Ali, A. 1957 CUSHIONING FOR AIR DROP, PART VIII, DYNAMIC STRESS STRAIN CHARACTERISTICS OF VARIOUS MATERIALS. (Structural Mechanics Research Lab., Texas University, Austin, Texas) Contract No. DA 19-129-qm-150. ASTIA AD-141 943.

ABSTRACT: In the delivery of supplies from aircraft in flight, cushioning materials are needed for absorbing the shock energy on impact with the ground. The capability of a material for absorbing impact energy can best be evaluated from the dynamic stress-strain curve for that material. Under the title contract, a survey has been made of the cushioning materials available, and materials exhibiting a wide range of physical properties were tested. Dynamic stress-strain curves, along with some static stress-strain curves, are presented for these cushioning materials. Some of the data presented were taken from other sources. The evaluation of dynamic stress-strain curves is discussed briefly to indicate the type of material necessary for efficient and economical absorption of impact energy.

19

Ali, A., & L. R. Benson 1957 CUSHIONING FOR AIR DROP, PART IX, BIBLIOGRAPHY OF LITERATURE PERTAINING TO THE ABSORPTION OF IMPACT ENERGY. (Structural Mechanics Research Lab., Texas University, Austin, Texas) Contract Nos. DA 19-129-qm-150 and DA 11-009-qm-19309; ASTIA AD-141 944

ABSTRACT: This report consists of an annotated bibliography of literature dealing with all phases of the problem of the absorption of impact energy in the air drop of supplies and equipment. Included in this survey are pertinent articles in the following phases: (1) theory and design of cushioning, (2) economics of energy-absorbing systems, (3) materials, devices, and systems which may be available, (4) dynamic test facilities and procedures for investigation of energy absorbers, and (5) results obtained from actual dynamic laboratory and field tests.

20

Ames, W. H. , H. M. Sweeney and H. E. Savely 1947
HUMAN TOLERANCE TO ACCELERATION IN PILOT EJECTION
J. Aviation Med. 18(6):548-553 Dec. 1947

ABSTRACT: In view of individual variations, it is apparent that the accelerations applied to the subject should be kept to the minimum required to achieve the desired terminal velocity and that the rate of application of the g forces be kept as low as possible. The present ejection seat

equipment developed by the Army Air Forces and the Ordnance Department provides a terminal velocity of 60 feet per second with a maximum of 14 to 16 g on the subject at a rate of application of 175 to 200 g per second. This system provides a means of emergency escape from high speed aircraft with a maximum g well under what is considered the physiological tolerance to high linear acceleration.

In service use, it is evident that a thorough indoctrination should be given all pilots of aircraft equipped with ejection seats so that they may become conditioned to the sequence of events prior to ejection and appreciate the necessity of assuming the proper body position. This indoctrination should consist of a demonstration of the equipment, movies of actual live ejections, such as the two made in August, 1946, at Wright Field, and an ejection on the 100-foot ejection seat test tower.

21

Amiragov, I. L., V. V. Ruzakov, L. F. Rastegayev, & A. V. Govorov 1962 A DEVICE FOR AUTOMATIC ACTUATION OF A PARACHUTE RESCUE SYSTEM FOR USE DURING EJECTION. Soviet Patent No. 132957, (655682/40), 22 Feb. 1960 (Translation Services Branch, Foreign Technology Div., Wright-Patterson AFB, Ohio) Trans. No. FTD-TT-62-350/1+2+4; ASTIA AD-288 988

ABSTRACT:
Has the following special feature: in order to automatically release the stabilizer chutes and the main chute, and also the harness lines, depending on the altitude and speed at the time of ejection, it contains aneroids and diaphragm boxes attached to the static and dynamic air-pressure lines; and, by means of a potentiometric bridge and an electric motor, using shaped (profiled) cams and contact discs of the chronometer, it sets the contacts of the capacitors of the electromagnetic relays of the power-mechanism retainers in a specific angular position relative to the contact hand of the chronometer, as a function of flight speed and altitude. (CARI)

22

Amos, S.W. 1951 PERSONAL PROTECTIVE EQUIPMENT OF AIRCRAFT ACCIDENTS. (Directorate of Flight Safety Research, Norton AFB, California) Publication M-36, 16-19 October, 1951. ASTIA ATI 197 463.

ABSTRACT: This report is an evaluation of a study on ejection seats made by the author. Information of the suitability of ejection seats was obtained through questionnaires sent to all pilots who have intentionally used the ejection seat as a means of emergency escape from aircraft. It was found that ejection of the seat at too low an altitude is the greatest difficulty encountered and this will much improve when automatic means of release from

23

Andrews, N.L. 1955 THEORETICAL APPROACH TO THE DESIGN OF EJECTION SEAT CUSHION. (Flying Personnel Research Committee, Air Ministry) F.P.R.C. Memo No. 64, September 1955

24

Arizona Highway Department 1961 SMART DRIVERS USE SEAT BELTS. (Arizona Highway Department, August 1961)

ABSTRACT: The booklet contains information on how seat belts work and why they are necessary. Questions are answered concerning the safety of seat belts and specifications are given to help in choosing a seat belt. Tables are included on motor vehicle traffic fatalities and cause of accidents.

25

Arment, D. E. & Ralph C. Lenz 1946 KINETIC MEASUREMENTS ON A PILOT DUMMY EJECTED FROM A P-61 AIRPLANE IN FLIGHT, DETAILED ANALYSIS OF DATA (Air Materiel Command, Wright Field, Dayton, Ohio) Serial No. TSEAC12A/4303-45-1, Add. 1 October 17, 1946 ASTIA ATI 186 676

ABSTRACT: This report presents the data and the analysis thereof, relative to the forces acting on the pilot-dummy during the ejection-seat tests conducted with the P-61B-5 airplane during the period from 27 February 1946 to 1 April 1946. Detailed studies of the kinetic measurement data resulted in the following conclusions: (a) The ejection velocity (57.6 f.p.s.) obtained in the tests closely approximates the velocity (57 f.p.s.) for which the catapult was designed. (b) At airplane velocities greater than 235 mph indicated airspeed, the horizontal acceleration caused by the airstream exceeds 3 g. The horizontal acceleration becomes physiologically negative if the ejected pilot should rotate to a head-forward position. (c) The increased horizontal acceleration at the higher airspeeds makes reduction of the ejection velocity inadvisable because the pilot's trajectory might approach too close to the tail of the airplane. (d) The vertical acceleration, as recorded for the peak values (27 to 31 g for 0.015 second), exceeds the present-known physiological tolerance of a human subject. (e) The peak "vertical" accelerations were caused by the compressibility of the parachute packs between the seat and the dummy, and probably can be eliminated or reduced by corrective modification of the cushioning components.

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Armored Force Medical Research Laboratory 1943 SEAT DESIGN FOR M4 TANKS. (Armored Force Medical Research Laboratory, Fort Knox, Ky.) Project No. 5-12. 5 March 1943.

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Armored Force Medical Research Laboratory 1945 SEATS FOR TRUCK (4 x 4) ¼ TON (JEEP). (Armored Force Medical Research Laboratory, Fort Knox, Kentucky). Project No. 5-12. 17 Feb. 1945.

28

Aron, W.K. 1959 STUDY AND DEVELOPMENT OF PARACHUTES AND SYSTEMS FOR IN-FLIGHT AND LANDING DECELERATION OF AIRCRAFT, PART III. DESIGN OF ASSISTING AND CONTROL DEVICES
(Wright Air Development Center, Air Research and Development Command, United States Air Force, Wright-Patterson Air Force Base, Ohio) Contract No. AF 33(038)-22112, Project No. 6069-61517; WADC Technical Report 57-566, Part III. ASTIA AD 155708

ABSTRACT: Certain devices were designed for the purpose of controlling parachutes deployed as air brakes on aircraft. Development has progressed through the prototype stage, and performance tests were conducted in conjunction with the high speed taxi tests of Ring Slot parachutes in a B-25 airplane. To provide for jettisoning the parachute, a mechanically operated disconnect was built, and to provide for parachute reefing control, a combination disreefer and swivel unit was devised.

Typical flight operations utilizing these units and the accompanying design criteria evolved from their uses are presented in this report along with descriptions of their construction. Illustrations, test results, performance specifications including environmental test recommendations, and engineering drawings are included in the appendices. The enclosed engineering drawings were used in the manufacture of the prototype items and are not intended to be finalized to the extent of standardization.

29

Aviation Crash Injury Research 1960 AO-1BF U. S. ARMY "MOHAWK" MOCKUP EVALUATION: BETHPAGE, LONG ISLAND, NEW YORK, 31 MARCH 1960 (Report of Crash Injury Evaluation AvCIR-12-PV-117, Aug. 1960, for U. S. Army Transportation Research Command) Contract DA-44-177-TC-624, TREC TR 60-45

30

Arrowhead Products 1961 COCKPIT RETENTION AND PARACHUTE SUSPENSION GARMENT (Dept of Navy, Bureau of Naval Weapons, Airborne Equipment Div.) Contract NOw 60-0053, Final Engr. Rept., Oct. 27, 1961. ASTIA AD 269 824 (See Huettl, George)

ABSTRACT: Cockpit retention and parachute suspension flight clothing which can distribute high acceleration forces over large areas of the body was studied to reduce injuries occurring in present day high performance aircraft. It was found that a flexible, inelastic nylon-netting garment could be utilized in distributing acceleration loads over the body torso. By crossing the fibers of a material over each other and biasing them at 45 degrees to the external load, a Chinese finger grip containment action can be developed. This containment action (axial compression load) is applied when acceleration forces are applied to the cockpit seat or the risers. Several restraint garments were constructed for evaluation. Hip and shoulder restraint straps were integrated into the netting pattern for attachment to the risers and cockpit seat. The final garment had a cover and liner for additional comfort and ease of donning and doffing. (Author)

31

Arsen'eva, M. A., V. V. Antipov, V. G. Petrukhin, T. S. L'vova, N. N. Orlova, & S. S. Il'ina 1961 IZMENENIIA V KROVETVORNYKH ORGANAKH MYSHEI POD VLIIANIE POLETA NA KORABLE-SPUTNIKE. (CHANGES IN THE HEMATOPOIETIC ORGANS OF MICE UNDER THE INFLUENCE OF FLIGHT IN A SPACESHIP) Iskusstvennye sputniki zemli (Moskva) 1961(10):82-92, 1961

ABSTRACT: The effect of space flight conditions was studied on the hematopoietic organs of 40 black S-57 strain mice and white mice sent up in the 2nd sputnik. An attempt was made to differentiate between the action of vibration, acceleration, and radiation. All animals were returned to earth in good condition. Chromosome disintegration during mitosis in the bone marrow cells was significantly increased in the experimental animals as compared to controls. The findings differed from the results of x-ray studies in that the frequency of chromosome destruction did not decrease prior to the end of the experiment and mosaicism in chromosomal changes was almost completely absent. Thirty days after the return to earth myelopoiesis increased sharply, manifested in an increased number of myeloblasts, promyelocytes, and myelocytes. Three days after the return the number of megacaryocytes in the spleen decreased. Certain other changes noted in the hematopoietic organs are presumed to be caused by vibration and other adverse factors in flight. (Aerospace Medicine 33(11):1395-1396, Nov. 1962)

33

Askren, W.B. 1959 MAN FUNCTIONS IN SPACE FLIGHT. (Wright Air Development Div., Wright-Patterson AFB, Ohio) June 1959. ASTIA AD 238 480.

Presented to the Panel on Psychology, of the Armed Forces-NRC Committee on Bio-Astronautics, in Washington, D.C. December 2, 1959.

ABSTRACT: The hypothetical activities of a 3-man crew of an earth-to-moon flight were analyzed with respect to some of the following subsystems: Navigation, flight control, energy management, environment control, secondary power management, communication, escape, reconnaissance, offense and defence. The following selection criteria were suggested: (1) sensory abilities, such as general intelligence, computational skills, problem solving ability; (3) motor skills, such as tracking skill, response times; (4) tolerance to physiological stress, such as high g, heat, cold; and (5) adaption to new experiences (psychological stress) such as confinement, new food forms, and crew interaction.

34

Astakhov, M.F, A.V. Karavayev et al. 1956 HANDBOOK OF STRENGTH SPECIFICATION OF AIRCRAFT. PART VI. THE AIRCRAFT LANDING GEAR SHOCK ABSORBER AND ITS CALCULATION (Air Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio) Rept. No. ATIC-202004, ASTIA AD-136 091

ABSTRACT: This publication contains chapters on each of the following subjects: Landing Gear Shock Absorbers; The Oleo-Pneumatic Shock Absorbing System; and Rubber Shock Absorbers.

35

Atlantic Research Corp. 1958 DEVELOPMENT OF FOAMED-IN-PLACE PLASTIC ENERGY ABSORBING MATERIALS. (Atlantic Research Corp., Alexandria, Va.) Final Rept. 31 Dec. 1956 - 31 March 1958; Contract No. DA 19-129-qm-838. ASTIA AD-206 052

ABSTRACT: Investigations were made of materials, methods and equipment, which would be suitable for the production of foamed-in-place, plastic, energy-dissipating structures in the field for later assembly with aerial drop containers. Polyurethane systems were selected for initial studies. The thermal balance was

also studied of highly exothermic foamed-in-place plastic systems as possible energy absorbers and flexible and rigid insulating materials. A process was developed for the production of highly exothermic one-shot resin systems which could be foamed in place under their own heat of reaction to cured, rigid foams with equivalent or better energy dissipating properties than foamed glass at comparable densities; the systems were modified castor oil polyurethanes. The heat of condensation of mixtures of castor oil and other simple polyols with di-isocynantes or isocyanate adducts when properly catalyzed induced the formation of thermal radical from added vinyl and related monomers, with subsequent copolymerization with castor oil to give rigid foams of high strength and good energy-dissipating properties. A simple laboratory drop tester was used to screen out unsuitable experimental and commercial products and to select formulations for further improvement. Thermal properties of resin systems and foams pertaining to processing were studied; foam formulations were adjusted to permit preparation of the product under field conditions. The feasibility of producing foamed-in-place flexible and rigid structures at arctic temperatures (-40 degrees to -65 degrees F) was demonstrated.

. 36

Avery, J.P. 1962 STRENGTH ANALYSIS OF CARRIAGE ATTACHMENT FITTING ON CREW SEATS, HU-1 AIRCRAFT, AND RECOMMENDATIONS FOR IMPROVEMENT. (Aviation Crash Injury Research, Phoenix, Arizona) AvCIR 62-11, Oct. 1962.

SUMMARY: The crew seat of the Hu-1A aircraft has failed frequently in survivable type accidents, with the primary failure occurring in the carriage attachment fitting (Part Number 204-070-742-1). The most recent accident occurred at Fort Carson, Colo., 7 May 1962 (reference TCREC Tech. Rept. 62-87). Analysis discloses that occupant inertia load of the order of 11 G could have caused these failures.

A simple field modification is presented which would reduce stresses in the fitting by a factor of approximately two. No new parts need to be manufactured; two AN bolts and one NAS spacer are the only new parts required.

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37

Babione, R. W. 1956 ACCIDENTAL DEATHS IN MILITARY VEHICLES. IN RELATION TO THE USE OF SEAT BELTS.
U. S. Armed Forces Med. J. 8(10):1500-1505, October 1956.

SUMMARY: Deaths of Navy and Marine Corps personnel in government-owned ground vehicles are analyzed for a three-year period. More than half of these (41 out of 72) occurred in open-top military type vehiles, a higher proportion that would be expected during peacetime. Provision of seat belts in open-top vehicles would probably not have reduced but would more likely have increased these fatalities. In only five deaths did this type of vehicle remain upright when involved in an accident, whereas in 33 it rolled over. By comparison, 10 persons who escaped death in rollover accidents by being thrown out would probably have been killed if they had been kept in by seat belts.

In hard-top vehicles involved in accidents, 15 of 20 deaths would probably have been prevented if the victim had been wearing a seat belt, although in two cases he was too drunk to have used one. In 12 of the deaths, the victim was thrown from the cab, with or without rollover. Front seat passengers in ambulances appear to be especially at risk when not provided with seat belts.

Seven deaths, or one out of 10, occurred in falls from fire and crash trucks when the vehicle was merely making a turn. In two of these, the man slid off a seat. In these two cases, seat belts would certainly have prevented the accidents had they been worn. Quick-release belts for standees should also be considered for this type of vehicle.

If seat blets are used in hard-top vehicles, potential monetary savings on deaths alone amount to $470,000 in three years. In addition, many serious and costly injuries would be prevented.

Weighing the cost of preventive measures against their savings, both in deaths and in the far more frequent nonfatal but costly injuries, requires more detailed reporting of the causes of trauma in serious and fatal vehicular accidents.

38

Bacas, G. A 1960 A4D ESCAPE SYSTEM, EVALUATION OF MODIFIED HEAD-REST INSTALLED BY A4D AIRCRAFT SERVICE CHANGE NO. 157C FOR ACCEPTABLE HEAD POSITIONING. (Naval Air Test Center, Patuxent River, Md.) Proj. TED no. PTR RAAE-23004, Serial No. AT311-276, Rept. No. 1, 5 August 1960. ASTIA AD-267 383.

ABSTRACT: The Service Test Division conducted an evaluation of a modified headrest configuration (A4D ASC 157C) for the RAPEC low level ejection system to determine if the headrest configuration afforded acceptable pilot head positioning during catapult launches. The modified headrest configuration was considered satisfactory for service use; however, incorporation of firmer headrest material is considered desirable for improved service use. (Author)

39

Baier, W. H. 1961 ESCAPE IN SPACE
Frontier, Summer 1961 pp. 28-31

ABSTRACT: This article discusses briefly the precautions taken to insure safety for U. S. astronauts. (JPL)

40

Bakh, I , O. Gorlov, V. Yakovlev & Yc. Yogov 1959 MAN IN SPACE: MEDICAL-BIOLOGICAL PROBLEMS IN SPACE FLIGHTS
(Air Technical Intelligence Center, Wright-Patterson AFB, Ohio) ATIC-1256169
7 October 1959
Original Source: Vses. Obshc. Raspr. Polit. i Nauch. Znanii (USSR)
Ser. 8, Vol. 1, No. 20. 1958.

ABSTRACT: The pamphlet presents the problems of meteoric danger, weightlessness, hypoxia, space suits, acceleration and water and food. There is also information concerning Sputnik 2 and the dog, Layka.

41

Bair, F.H. & L.J. Petti 1953 DETERMINATION OF THE MOST DESIRABLE RIDGE PATTERN FOR PILOTS' PROTECTIVE HELMETS
(Aeronautical Materials Laboratory, Naval Air Material Center, Philadelphia, Pa.)
AML NAM AE 4407 , Part I Dec. 9, 1953 ASTIA AD 30 501

ABSTRACT: Helmet shells having 6 designs were prepared and tested under static and dynamic (impact) loads. The plain shell appeared to be the most resistant to impact loading, but was the least resistant to static loading; sandwich or semi-sandwich construction may improve the properties. A dynamic (impact) test is considered a better method of evaluating helmet shells than a static-load test. Rounded ridges are preferred over sharp ridges. Intersecting ridges tend to deleteriously localize the stresses. The pendulum-impact-high-speed-camera procedure, developed during this investigation, is a satisfactory method of conducting impact tests.

42

Barkla, D. 1961 THE ESTIMATION OF BODY MEASUREMENTS OF BRITISH POPULATION IN RELATION TO SEAT DESIGN
Ergonomics 4(2):123-132, April 1961.

ABSTRACT: The principal published information on human dimensions relevant to seat design is brought together. The populations surveyed comprise British, Swedish, and American individuals. Estimates of the measurements of young British adults are derived from the data and applications made to seat design. (Tufts)

43

Barnaby, R. S. Feb. 1942 REPORT ON PRONE PILOT INSTALLATION IN THE MODEL XSD2U-3 AIRPLANE. (Naval Aircraft Factory, Philadelphia, Pa.) Rept. no. M-H 268, 24 Feb. 1942.

44

Barnes, Richard W. 1946 PILOT EJECTION SEAT ACCESSORIES
(Personal Equipment Laboratory, Army Air Forces) Serial No. TSEAP-7-9-482
ASTIA ATI 179 496

ABSTRACT: Experiments were conducted using various parachutes for the following

purposes: To determine a method to prevent tumbling of the ejection seat; to determine a method for insuring positive separation of occupant and ejection seat at a certain point on the seat trajectory; to determine a method for decreasing the minimum safe bailout altitude in aircraft equipped with an ejection seat; and to determine a method for the interim use of standard parachute with an ejection seat, at all altitudes, and at speeds up to 600 miles per hour. A description of the guide surface parachute to be installed on the ejection seat is given in this report.

45

Barnes, R. W. 1951 UNITED STATES AIRFORCE PARACHUTE HANDBOOK (Air Material Command, Engineering Div. Equipment Lab. Parachute Branch, Wright-Patterson AFb, Ohio) April 27, 1947; Revised, March 1, 1951. ATI 35532.

46

Bartlett, R. G., Jr., V. C. Bohn, & R. H. Helmendach 1954 ABILITY OF RAT TO ADAPT TO STRESS OF LIGHT RESTRAINT. Proc. Soc. Exp. Biol. Med. 86: 395-396

ABSTRACT: Ability of the albino rat to adapt to stress of light restraint was investigated. Rats were able to adapt to the stress of restraint (for one week) in a cylinder of wire mesh so that they did not become hypothermic when exposed to the stress in the cold. The possible roles of emotional adaptation and adrenal cortical activity in producing the increased resistance to these stresses are discussed. (Author)

47

Bartlett, R. G. 1956 STRESS ADAPTATION AND INHIBITION OF RESTRAINT-INDUCED (EMOTIONAL) HYPOTHERMIA. J. Appl. Physiol. 8(6):661-663. May 1956.

ABSTRACT: From the data presented, three general conclusions may be drawn on the rat's ability to adapt to the dual stresses of cold and restraint; (a) the rapidity of this adaptation suggests that a familiarity or emotional component may be involved in the process; (b) there is a fairly rapid loss of the adaptation if it is not 'reinforced' by the application of the stress; (c) adaptation to stress may protect against the body temperature drop in this restraint-induced (emotional) hypotermia. This is suggested by the observation that repeated exposures of the rat to the stress of forced muscular activity as well as adaptation to cold and/or restraint inhibit this hypothermia.

48

Bartlett, R. G. & P. D. Atland 1959 EFFECT OF RESTRAINT ON ALTITUDE TOLERANCE IN THE RAT.
J. Appl. Physiol. 14(3):395-396, May 1959.

ABSTRACT: Young adult male and female Sprague-Dawley rats were exposed to a simulated altitude of 33,500 ft. both with and without restraint. The exposure was begun immediately upon the restraint of the experimental animals. The restrained animals died significantly sooner than did the nonrestrained controls. The possible relation of colonic temperature, oxygen consumption and emotional stress to the decreased altitude tolerance is discussed. It is suggested that the data serve as a warning for caution in the use of restraint for convenience in altitude tolerance experiments.

49

Bartlett, R. G. 1962 DESIGN CONCEPTS FOR DOME TYPE HELMET IMPROVEMENTS (Naval School of Aviation Medicine, Pensacola, Fla.) Project no. MR005.13-3100, Subtask 6, Report no. 4, June 13, 1962

ABSTRACT: The design concepts for a modification of the dome-type (neck-seal) helmet are presented. The modified helmet is designed to: (1) prevent fogging. (2) conserve breathing oxygen stores, (3) provide crash protection, (4) control the added anatomical dead space for CO_2 accumulation, (5) ameliorate or prevent hyperventilation, and (6) humidify the dry inspired oxygen. The use of the device is optional and it may or may not be used on any time schedule during the flight.

50

Bartlett, R.G. 1962 A STUDY OF CO_2 BUILD-UP WITH A NECK SEAL SUBSTITUTED FOR THE FACE SEAL IN THE FULL PRESSURE SUIT HELMET
(Naval School of Aviation Medicine, Pensacola, Fla.) Project no. MR005.13-3100, Subtask 8, Report no. 11, June 8, 1962

ABSTRACT: Breath-by-breath CO_2 levels were compared for two seal configurations: the face seal now used in both the Air Force and Navy pressure suits (advantages, smallness of dead space and of rebreathing, facilitating delivery of dry oxygen in a number of fine streams over the face plate eliminating fogging of the aviator's vision, but requiring personal fitting for reasonable comfort and restriction of head movement) and the neck seal (which would eliminate the undesirable aspects of the face seal provided no dead space or CO_2 problem is created). The pCO_2 measurements revealed zero to 1.5% difference in CO_2 levels with the face seal and the neck seal. Such differences should not disqualify the neck seal for further consideration.

51

Bartlett, R. G., Jr. 1963 DESIGN CONCEPTS FOR DOME TYPE HELMET IMPROVEMENTS. Aerospace Medicine 34(3):213-217, March 1963

ABSTRACT: The dome type (neck seal) helmet offers several advantages over the face seal (Mark IV) helmet in terms of allowing free head movement, providing potentially better head cooling, and permitting the removal of the uncomfortable face seal. The dome type helmet, however, brings its own problems The increased dead space, the lessened crash protection, and the rapid fogging in the cold with the much enlarged visor area are the more acute problems.

The design concepts for a modification of the dome type helmet are presented. The modified helmet is designed to: 1) prevent fogging, 2) conserve breathing oxygen stores, 3) provide crash protection, 4) control the added anatomical dead space for CO_2 accumulation, 5) ameliorate or prevent hyperventilation, and 6) humidigy the dry inspired oxygen. The use of the device is optional and it may or may not be used on any time schedule during the flight. (Author)

52

Barwood, A J. 1953 EMERGENCY ESCAPE AND SURVIVAL In "Discussion on Survival and Rescue", Proceedings Royal Society of Medicine 46(7):523-526

ABSTRACT: This paper is one of a series devoted to the problems of survival in aviation, particularly at altitudes over 40,000 feet. The author discusses the conditions which must be satisfied in order to ensure the maximum chance of survival during and after escape from aircraft. Considerations of survival must influence the design of aircraft, of cloting, of protective devices used by crew members, of escape mechanisms, and of auxiliary equipment, e.g., automatically opening parachutes and survival packs designed for any kind of global surface. Survival in isolated areas or under conditions of extreme cold presents particular problems as far as accessory equipment is concerned. The author elaborates on the type of gear which should be packed for flights over each of these specific areas. Training of aircrew personnel in the use of survival equipment under each of the various conditions is considered an important factor in survival.

53

Barwood, A.J. 1962 THE MAINTENANCE OF CORRECT EJECTION POSTURE
Paper: 33rd Annual Meeting of the Aerospace Medical Association, Chalfonte-Haddon Hall, Atlantic City, N.J., April 9-12, 1962

ABSTRACT: The high incidence of mild back injury during otherwise successful ejections, and the increasing incidence of such back injury with the improvement of ejection capability, prompted investigation into the probable cause of such injury. The geometry of harness systems was studied and the techniques for adjusting such harnesses were investigated. The typical back injury in the region of T-10--L-2 indicated that posture appeared to have a direct relation to such injury. Means of maintaining an acceptable posture were therefore investigated and ultimately modifications for all types of harnesses were proposed. Initially these were tried experimentally and have produced marked improvement in whole body restraint, and have, at the same time, made the harness system more comfortable. The moulding of the seat top and back to the mean anatomical profile of aircrew has also been attempted, resulting in the maintenance of an improved ejection posture and very considerable improvement in comfort and acceptability -- a factor which might well be applied to conventional seat

54

Bary, J.L. 1957 INTERNAL BALLISTIC DESIGN AND TRAJECTORY ANALYSIS OF A ROCKET-ASSISTED PILOT EJECTION SEAT. (Naval Ordnance Test Station, China Lake, Calif.) NAVORD rept. no. 5433. ASTIA AD-150 906.

ABSTRACT: The problem of safe escape of a pilot from a disabled plane is discussed in general, and a rocket-assisted ejection seat is considered as a solution. Two tentative internal ballistic designs are presented. Equations are developed for the motion of an ejection seat after it leaves the plane. Graphs are included showing thrust-time curves, seat trajectories, forces on the pilot, aerodynamic drag, and physiological acceleration limits.

55

Baumunk, D.B. and H.L. Walpole 1945 AN INVESTIGATION OF SEAT DESIGN FOR COMBAT AIRCRAFT. (Douglas Aircraft Co., Inc., Santa Monica, Calif.) Rept. No. ES 6950. Nov. 1945

56

Bayley, C. H. & M. Mitton 1958 EXAMINATION OF NYLON SEAT HARNESS WEBBING. (National Academy of Sciences -- National Research Council, Washington, D. C.) NRC Rept. No. C.81-58S

57

Bebout, R. W. 1961 DESIGN, DEVELOPMENT, AND FABRICATION OF SIX (6) PROTOTYPE MODEL MISSION COMPLETION FULL PRESSURE SUIT ASSEMBLIES. (B. F. Goodrich Aviation Products, Akron, Ohio) Monthly Engineering Rept. No. 20, 1 Jan. - 31 Jan. 1961; Contract NOas 59-6199C, 1 Feb. 1961. ASTIA AD-252 658L.

ABSTRACT: The sixth and final suit to be delivered on this contract will be used for Project "Strato-Lab High #5". This suit, designated XN-14, will be delivered to A.C.E.L. the first week of February and the mating helmet, XNH-14, one week later. (AUTHOR)

58

Beck, A.I., and G. Hildebrand 1958 NEW OPEN EJECTION SEATS. SAE Journal, 66(10):67-69.

ABSTRACT: A veritable crash program has been conducted by the aircraft industry and the military to fill the immediate need for extending the usefulness of the open ejection seat escape system. A group of Air Force contractors joined together to form the Industry Crew Escape Systems Committee, known as ICESC, in an effort to accelerate this endeavor. Accomplishments in fulfilling the essential design requirements have been made in the following fields: ejection acceleration and separation; dynamic stability; deceleration and windblast; high altitude; high temperature; low altitude; and landing and post landing conditions.

59

Beck, A.I. 1958 ESCAPE SYSTEMS: A METHODOLOGY TO MEET THE NEEDS. (Paper, SAE Meeting 29 Sept - 4 Oct. 1958.) S.A.E. Preprint No. 91C.

ABSTRACT: Relative advantages and disadvantages of open ejection seats and escape capsules are discussed. Optimum design criteria for the open ejection seat type are presented. Essential requirements of an escape capsule are given.

60

Beck, A.I., & B. Cooper 1959 PROBLEMS INVOLVED IN PROVIDING PROTECTION FOR AIRCREWMAN DURING ESCAPE. (Paper, Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: The problem areas concerned in providing adequate protection for aircrewmen prior to and during escape sequences from performance aircraft are complicated by the physiologic considerations and the physical nature of the escape itself. The human limitations to imposed forces, both initial and sustained, and the method used to eliminate and/or reduce them will be presented. Pertinent data resulting from sled test runs and crew escape studies will be discussed using actual filmed sequences of research effort. The presentation will consider the present state-of-the-art of the crew escape systems and will present the problems yet to be solved to produce reliable escape potential for proposed new weapons systems. Factors such as positioning, restraints, time sequences, personal equipment, altitude and speed and related problems will be reviewed and possible solutions offered to meet the demands arising from the ever expanding flight envelopes of the most modern weapons systems. (J. Aviation Med. 30(3):174, March 1959

61

Beckett, L.C. 1959 PASSENGER SEAT DESIGN AS APPLIED TO THE CONVAIR 880. (Paper, The American Society of Mechanical Engineers, Aviation Conference, Los Angeles, Calif., 9-12 Mar. 1959)

62

Beckman, E.L., O.L. Slaughter & E.H. Wood 1955 MEASUREMENTS TO EVALUATE THE EFFECTIVENESS OF THE FULL PRESSURE HALF SUIT IN APPLYING EXTERNAL PRESSURE TO THE BODY
(U.S. Naval Air Development Center, Aviation Acceleration Lab., Johnsville, Pa.) NADC-MA-5502 21 March 1955 ASTIA AD 62 492

ABSTRACT: A series of experiments was performed on 5 human subjects in order to evaluate the effects of applying, by means of an anti-blackout suit, known increments of external pressure to the body below the ziphisternum. In each subject, during a short inflation period at 1 G, the pressure measured within the G-suit was compared to (1) the pressure measured between the suit and the body surface, (2) the intrarectal pressure and, (3) the intra-esophageal pressure. It was found that the pressure increment at the body surface, was approximately 90 per cent of the suit pressure increment; the pressure increase within the rectum was 40-65 per cent of the suit pressure increase; and the rise in intra-esophageal pressure was approximately 3 per cent of the rise in suit pressure. These pressure changes within the body are interpreted as aiding the venous return to the heart.

63

Beckman, E., D.C. McNutt, & J.S.P. Rawlins 1958 USE OF THE STANDARD EJECTION SEAT SYSTEM AS A MEANS OF ESCAPE FROM SUBMERGED AIRCRAFT. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 1049, May 1958. ASTIA AD 201 166

ABSTRACT: A programme of research into the problems of escape from ditched aircraft has been undertaken at this Institute. The programme has included an assessment of the feasibility and advisability of using the standard Martin_Baker ejection seat system as a means of escape from submerged aircraft.

Although the problems relating to underwater ejection have not been completely evaluated, we think that sufficient pertinent information has been accumulated to justify a preliminary report so that the results of the trials to date can be made available to aircrew.

64

Beckman, E. L., J. Rawlins, and D. McNutt 1958 AN INVESTIGATION INTO THE FEASIBILITY OF USING THE STANDARD EJECTION SEAT SYSTEM FOR UNDERWATER ESCAPE FROM DITCHED AIRCRAFT. (Paper, Meeting of Aero Medical Assoc., Statler Hotel, Washington, March 24-26, 1958)

ABSTRACT: An investigation into the feasibility of using the ejection seat system as a means of escape from ditched aircraft has been carried out at water depths down to 34 feet. An evaluation was made of the blast pressure, accelerations, drag and decompression loads which would act upon the pilot in using the ejection seat under water. The physiologic acceptability of these loads when acting singly and combined were then evaluated clinically be experienced subjects. The function of the automatic release mechanisms were also observed. Simulated escapes from submerged aircraft utilizing standard pilot survival equipment and ejection seat equipment were then carried out. J. Aviation Med., 29(3):229, March 1958.

65

Beckman, E.L., D.C. McNutt, & J.S.P. Rawlins 1959 AN INVESTIGATION INTO THE FEASIBILITY OF USING THE MARTIN BAKER EJECTION SEAT SYSTEMS FOR UNDERWATER ESCAPE FROM DITCHED AIRCRAFT. (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. 1076, Aug. 1959.
See also Aerospace Medicine 31(9):715-732

6

Beckman, E. L., D. C. McNutt and J. S. P. Rawlins 1959 ESCAPE FROM DITCHED AIRCRAFT. III. AN INVESTIGATION INTO THE FEASIBILITY OF USING THE STANDARD MARTIN-BAKER EJECTION SEAT SYSTEMS FOR UNDER WATER ESCAPE FROM DITCHED AIRCRAFT
(Flying Personnel Research Committee (Gt. Brit.).
Rept. no. FPRC 1093 July 1959 ASTIA AD 243 787

ABSTRACT: Investigation of the problems of escape from ditched aircraft has been in progress at the RAF Institute of Aviation Medicine, Farnborough, for several years. It was early established that the standard Martin-Baker Ejection Seat System might be used for escape from a submerged aircraft with reasonable safety. Because of the importance of this information to naval aviators, a preliminary report was issued presenting the possible advantages and hazards of using the ejection seat system for escape from a ditched aircraft. Further investigations and evaluation of the original data have permitted a more accurate assessment of the problem. The results of these studies together with the condlusions which are indicated on the basis of this further knowledge are presented. The conclusions are in general agreement with previous ones, i.e. that the use of the ejection seat system is to be recommended as a means of escape from a submerged aircraft. Ejection through the canopy is recommended for aircraft with frangible canopies. The inherent dangers of injury when using the ejection seat under water are accepted as a reasonable risk for a life-saving procedure. Recommendations are made for modifying the present ejection seat systems so as to improve their performance under water and to decrease the danger to the aircrew in the use of the equipment. (Author)

67

Beckman, E. L. 1959 ESCAPE FROM DITCHED AIRCRAFT. IV. EVALUATION OF THE FACTORS WHICH AFFECT SURVIVAL IN A DITCHING ACCIDENT IN CURRENT OPERATIONAL AIRCRAFT WITH RECOMMENDATIONS FOR INCREASING THE RATE OF SURVIVAL
(Flying Personnel Research Committee, Great Brit.)
Rept. no. FPRC 1094 March 1959 ASTIA AD 243 788

ABSTRACT: Despite the high order of efficiency which has been evolved in naval carrier operations, a fraction of one per cent of the launches and landings still end in a ditching accident. In the past, approximately half the aircrew involved in these accidents lost their lives. The Royal Air Force Institute of Aviation Medicine has carried out an extensive series of investigations into the factors which affect survival from a ditching accident. The methods by which these factors limit survival are reviewed and their significance is discussed. The probability of aircrew making a safe escape after a ditching accident by using manual escape procedures is assessed: these procedures are shown to be inadequate for escaping from modern jet aircraft, and the use of the ejection seat to assist escape from a sinking aircraft is evaluatedand recommended. A research programme is proposed for

accumulating data on ditching accidents; this includes the measurement of accelerations to which the aircrew are subjected during ditching and the measurement of the sinking characteristics of aircraft when subjected to realistic ditching conditions. The results obtained should permit an accurate evaluation of the effectiveness of the present methods of escape from ditched aircraft. An engineering development programme is proposed for providing a buoyancy system for the entire airframe in some cases, for the ejection seat in others, and for modifying the ejection seat firing system so as to ensure that it functions under water in additon to providing a slower ejection velocity, when used for escape from a ditched aircraft. (Author)

68

Beckman, E. 1960 AN INVESTIGATION INTO THE FEASIBILITY OF USING THE STANDARD MARTIN-BAKER EJECTION SEAT SYSTEMS FOR UNDERWATER ESCAPE FROM DITCHED AIRCRAFT. Aerospace Medicine, 31 (9): 715-732.

ABSTRACT: The increase in the density of jet aircraft and the introduction of the pressurized cabins in military aircraft have increased the mortality rate from ditching accidents at sea and have therefore increased the significance of ditching to Naval aviators.
The advantage to be gained by using the ejection seat system for escaping from a ditched aircraft was established by a Royal Naval pilot who escaped from his submerged, ditched aircraft by use of the ejection seat. Investigations were therefore undertaken to evaluate the use of the ejection seat as a method of escape from submerged aircraft. It has been determined that the acceleration and drag loads, the blast pressure, and the rapid pressure changes due to the trajectory of the seat to which a pilot would be subjected in using the Martin-Baker Mark 1, 2, 3, 4 or A.5 ejection seat-gun systems are within the human tolerance limits for an emergency escape procedure. Ejection through the canopy is also recommended for escape from submerged, ditched aircraft with frangible canopies. The inherent dangers of injury from striking the canopy when ejecting through the canopy during escape from a ditched aircraft are considered to be within the acceptable limits for a life-saving procedure.

69

Beckman, E.L. 1960 CHANCE VOUGHT AIRCRAFT COMPANY, INC. F8U PILOT CAPSULE: FEASIBILITY STUDY OF
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-L6036 Oct. 18, 1960

ABSTRACT: The evaluation of the feasibility of utilizing an explosive shaped charge for separating the cockpit section of an F8U aircraft from the remaining fuselage section was carried out by the Chance Vought Aircraft Co. and the Jet

Research Center between 25 June 1958 through 11 January 1959. This report relates to the medical aspects of a test conducted for the Naval Weapons Laboratory to determine the effectiveness of the linear shaped charge in separating the cockpit section from the remainder of the fuselage when the fuselage was immersed in water. It is concluded that the over-pressures measured within the cockpit and on the water above the canopy during severance of an F8U fuselage by use of linear shaped charges were within the limits of human tolerance under conditions of this experiment. The magnitude, rate of application of acceleration, and displacement of the ejection seat guide rail were of such magnitude that if they were transmitted through a seat to a pilot, the load would be expected to cause severe damage to the pilot's back with incapacitation and permanent injury. The damage to the cockpit canopy and to the capsule structure as a result of the overpressure of the explosion and distortion of the airframe were such as to render the cockpit uninhabitable to a pilot who was not supplied with accessory breathing

70

Beer, M., R. M. Jayson, V. E. Carter & F. H. Kresse 1961 SURVEY OF ESCAPE TRAINING IN THE AIR FORCE
(USAF Behavioral Science Lab. & USAF Aerospace Medical Lab., Wright-Patterson AFB, Ohio) (Proj. 7222, Task 71748) WADD TR 60 792, March 1961

ABSTRACT: To study the effectiveness of the present U. S. Air Force ejection training program, the following sources were canvassed for relevant information: literature on ejection training, training films, aircrew personnel, training instructors, and accident statistics. Questionnaire data were obtained from all personnel who had ejected successfully during a stated period and standardized direct interviews, based on the questionnaire, were administered to all personnel in a Fighter Interceptor Squadron. On the basis of an analysis of the information, specific deficiencies in training procedures, training media, and content of the program were indentified. Recommendations were included. (Tufts)

71

Benuitt, A. 1959 DEVELOPMENT OF A PROPELLANT ACTUATED DEVICE CATAPULT, AIRCRAFT PERSONNEL, T18. (Frankford Arsenal, Research and Development Group, Philadelphia, Pa.) Memorandum Report No. M59-38-1, WADC TR 59-305. Jan. 1959. ASTIA AD 233 485.

ABSTRACT: This report details the design, development, and fabrication of the T18 personnel catapult. The T18 catapult differs from the conventional catapult in that it is the first to use the high-low ballistic principle

in conjunction with a temperature-sensitive nozzled cartridge. In this system the propellant burns at a high pressure in a small chamber from which the gases are metered at optimum pressure to the catapult tubes. Used in conjunction with the temperature-sensitive nozzle on the cartridge, it is capable of producing optimum performance characteristics throughout the temperature range of -65° to 160° F. The T18 catapult project was terminated after partial final evaluation test firings.

It was concluded that the separation velocity, acceleration, and ejection height exceeded corresponding performance characteristics of the M3 catapult at -65°F; at 70°F, performance of the T18 is comparable to that of the M3; however, at 160°F, the rate of change of acceleration is too high. It is felt that further development could bring the rate of change of acceleration within the allowable limits.

72

Benneche, R.A. 1948 WIND TUNNEL INVESTIGATION OF THE STABILITY CHARACTERISTICS OF A 1/12 SCALE MODEL OF THE PILOT EJECTION CAPSULE OF THE MODEL XP-92 AIRPLANE IN THE CVAC 4 FT WIND TUNNEL (Consolidated Vultee Aircraft Corporation, San Diego Division, San Diego, Calif.) CVAC Test #27, 3 May 1948. ASTIA ATI 54 176.

ABSTRACT: The 13.124 inch capsule consisting of the entire portion of the fuselage ahead of the break station is statically unstable at angles of zero pitch and yaw. The capsule can be made marginally stable by shortening the inner body length to 6.54 inches. The stability of the capsule with aft stations of inner body and outer shell corresponding will be improved by removing a portion of the forward part of the outer shell. The stability of the capsule in pitch will be improved by incorporating a portion of the airplane wing into the capsule design. The stability of the capsule in yaw will be improved by opening the nose wheel doors. The optimum combination of the effects of 3,4, and 5, will result in a capsule which is stable in pitch but unstable in yaw. To obtain stability in yaw it will probably be necessary to redesign the nose wheel doors, preferably combining them to make a single large door; or to use a stabilizing device such as a small vertical fin or a trailing parachute. It is planned to investigate the effect of capsule stabilization by means of a parachute.

73

Benson, A.J. & B.F. Tindall 1961 ACCEPTABILITY OF SPIN DURING STABILIZED FALL FOLLOWING EJECTION IN A FULLAND 4-G SEAT
(RAF, Institute of Aviation Medicine, Farnborough) FPRC Memo No. 169, Nov. 1961

ABSTRACT: A pattern of rotation (simulating that which subjects experience in the Fulland 4-g ejection system from about 38,000 feet) is investigated as it related to nausea and vomiting. Twenty-eight subjects (11 aircrewmen, 1 experienced parachutist, and 16 laboratory staff members) were subjected to the simulated pattern in the laboratory on a turntable. All subjects kept their heads still during the experiment. None of the subjects vomited, four had symptoms of nausea -- only two of these severe. Aircrewmen using this ejection seat system should be instructed to move their heads as little as possible during the angular motion. (Aerospace Medicine 33(11): 1404, Nov. 1962)

74

Benson, V.G. 1961 AEROSPACE MEDICAL ASPECTS OF U.S. NAVY MANNED BALLOON FLIGHT OF 4 MAY 1961 STRATO-LAB HIGH NO. 5"
(U.S. Naval Air Development Center, Aviation Medical Acceleration Lab., Johnsville, Pa.) NADC-MA 6208, 20 Aug. 1962. ASTIA AD 285575.

ABSTRACT: This paper presents medical considerations and results pertinent to the Strato-Lab High No. 5 balloon flight during which two naval officers reached a record altitude of 113,733 feet in an open gondola while wearing the Navy-Mercury full pressure suits. The flight provided means for testing (1) the complete capabilities of the full pressure suit for a prolonged period of time in an actual space equivalent environment and (2) biotelemetry methods for measuring the physiological reactions of the subjects. The operation and functioning of the full pressure suit and the performance of the pilots during the flight is discussed. The temperature control capability provided by the venetian blinds system in the gondola is examined and the physical status of the pilots, as indicated by bio-instrumentation data, is summarized.

75

Benton, R. 1943 PILOTS' HEAD SUPPORT.
Memo Rept. No. ENG-49-695-38 (USAF, AMC, Wright-Patterson AFB, Ohio) 4 Nov. 1943 ASTIA AD 39 862.

ABSTRACT: The purpose of this publication is to report examination of a pilot's head support sent to the Aero Medical Laboratory by Avion, Incorporated. The following undesirable features of the head support which

was sent may be pointed out: The metal ring inserted in the ear phone socket would: (1) Prevent secure seating of the earphones in their proper places. (2) Completely destroy the acoustical qualities of the earphones assembly by replacing a sound absorbing material with a sound conducting material. (3) Be the least desirable location for a stress-bearing structure from the standpoint of intercommunication. (4) Perhaps pull out of a seating as insecure as relatively soft rubber. As a result of the tests, it was concluded that the head support, as constructed, is not satisfactory for its purpose.

76

Benzinger, T. 1946 PHYSIOLOGISCHE GRUNDLAGEN FUR BAU UND EINSATZ VON STRATOSPHARENFLUGZEUGEN. (Physiological Basis for the Construction and Use of Stratosphere Airplanes. (Hdq. Air Materiel Command, Wright Field Dayton, Ohio) Translation Report No. F-TS-467-RE, Oct. 1946. ASTIA ATI 25545

77

Berg, C. R., et al. 1958 SEATS
(Hardman Tool & Engineering Co., Los Angeles, Calif.) July 21, 1958

78

The Berger Bros. Co. 1946 THE STORY OF THE G-SUIT
(New Haven: The Berger Brothers Company, 1946)

ABSTRACT: A pamphlet including a reprint of an article by D.N.W. Grant published in Flying, Sept. 1945, with additional text and illustrations by the Berger Brothers Co. Discusses effects of acceleration, particularly blackout. Traces the development of anti-blackout apparel from World War I through the end of World War II, emphasizing U.S.,Canadian and British developments.

79

Bergeret, P., ed. 1961 ESCAPE AND SURVIVAL: CLINICAL AND BIOLOGICAL PROBLEMS IN AERO SPACE MEDICINE
(New York, London, Paris: Pergamon Press, 1961) AGARDograph No. 52
ASTIA AD 261 881

ABSTRACT: This collection of monographs is published for and on behalf of AGARD NATO (Advisory Group for Aeronautical Research and Development, North Atlantic Treaty Organization). Contributed by experts in the field, the papers discuss various aspects in the study of clinical and biological problems in aero space medicine on the subject of escape and survival.

80

Beresford, T. 1959 RECOVERY FROM SPACE.
Prod. Eng., 30(12):17-19 , 23 Mar. 1959

ABSTRACT: Discusses problems of recovering manned satellites and their occupants from space and some of the tests and devices being designed to aid in their recovery. Discusses the heat problem, the altitude at which recovery apparatus should be employed, the control of vehicle orientation upon landing to facilitate the work of rescue teams, and the reduction of landing impact. The heat of re-entry may be studied with high-altitude windtunnel tests; an automatic triple-control recovery system such as that designed by Northrop Aircraft Corp. seems most feasible; the vehicle can be positioned with ground-actuated retrorockets; final impacts can be softened by use of airbags or honeycomb decelerators also designed by Northrop. Recovery might also be effected by a variation of Northrop's Skysail parachute.

81

Bernardini, A.T. 1959 THE NEED FOR RADICAL DEVELOPMENT OF RESTRAINING DEVICES FOR MANNED FLIGHT. (Paper, Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: Today's "weapon system" has moved rapidly from the "aeroplane," through the "aircraft" phase, and is heading for the "manned missile" development. Each connotation depicts the evolution of manned flight. We have arrived at a stage which demands a reappraisal of restraint concepts so that resultant products of new thinking may rise, analogous to beneficial mutants in nature, in order to provide proper restraint for present and future manned flight. (J. Aviation Med. 30(3):175-176, March 1959)

82

Berus, W. J. 1961 DEVELOPMENT OF PERSONNEL PROTECTIVE SYSTEMS FOR SPACE FLIGHT AND EXPLORATION MISSIONS (B. F. Goodrich Aviation Products, Akron, Ohio) Monthly Engineering Report No. 3, 18 July 1961 - 17 August 1961; Contract NOw 61-0554-c. ASTIA AD-265 163L

ABSTRACT: The list of general movements or motions that may be required of the space craft crewman has not been substantially enlarged. However, work is continuing to make this list as complete as possible. Potential environmental hazards inside the vehicle were investigated. The magnitude of these conditions is difficult to determine. The materials investigation phase of this program has been outlined. Three (3) areas of endeavor constitute this phase: a)Inner layer, b)Shielding layer, and c)Outer layer. (AUTHOR)

83

Berus, W.J. 1962 DEVELOPMENT OF PERSONNEL PROTECTIVE SYSTEMS FOR SPACE FLIGHT AND EXPLORATION MISSIONS
(B.F. Goodrich Aerospace and Defense Products, Akron, Ohio) Contract NOw 61-0554-c Covering Period April 18, 1962, through May 17, 1962. Twelfth Monthly Engineering Report, ASTIA AD 283 613

ABSTRACT: MT-1 yarn is currently being coated with Teflon-Mgo in an attempt to improve its reflectance properties. Glass-rayon blend yarn is being wove. in an attempt to obtain a high-strength low-creep fabric for pressure suit application.

Emissivity studies are continuing in an effort to obtain a complete thermal analysis of the present full pressure suit as well as potential space suit constructions.

Fabrication of the XGD-37 full pressure suit is 80% complete. This suit will be delivered to ACEL during the week of May 21, 1962.

84

Beson, E.E. 1958 DESIGN CONSIDERATIONS OF A BALLOON-BORNE PRESSURIZED CAPSULE FOR HIGH ALTITUDE BAILOUT STUDY. J. Aviation Med. 29(7):516-525, July 1958.

ABSTRACT: The purpose of Project High-Dive was to determine how a man can survive a parachute jump from 90,000 feet at fall velocities as high as 400 miles per hour, how stable his descent would be and if he could survive the low temperatures and opening shock of the parachute.

85

Beupre, F.J. 1947 PILOT EJECTION SEAT ACCESSORIES, UPWARD EJECTION TESTS OF 3 NOVEMBER 1947. (Army Air Forces Materiel Command) Memorandum Report No. TSEPE-672-22B, ASTIA ATI-171669.

ABSTRACT: The purpose of these tests was to determine the operational characteristics of automatic safety belt and release assemblies, and seat and dummy salvage parachutes, when used on upward ejection tests from a P-82B fighter type aircraft.

As a result of the tests, it was found that the Cook Electric Aneroid-Timer Actuator, in its present form, is not satisfactory from an engineering viewpoint. The BA-15, 1-1/2 volt dry cell battery, when used singly, does not have sufficient output to fire the present explosive bellows consistently. The standard B-10 parachute, 24-ft. diameter, is not satisfactory when used as a dummy salvage parachute if opened at speeds above 200 miles per hour. However, the dummy which was used in these tests was not of a construction which would allow efficient operation of the safety belt and shoulder harness assembly. An ejection seat salvage parachute does not operate efficiently

86

Bezreh, A.A. 1961 ARMY EXPERIENCE WITH CRASH INJURIES AND PROTECTIVE EQUIPMENT. (Paper, Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Material Center, Philadelphia, Pa., June 14-15, 1961)

ABSTRACT: Reports data representing some features of Army experience, as a user of light fixed wing aircraft and of helicopters, with respect to crash injuries and protective equipment. Because of the performance characteristics of Army aircraft such as relatively low speed, most accidents, approximately 97%, are theoretically survivable. However, far less accidents are actually survived. The development and incorporation of crashworthiness characteristics and improved personal protective equipment, therefore, is of crucial importance if the discrepancy between survivable and survived accidents is to be eliminate

Some statistical findings are given which illustrate the effectiveness of items of personal protective equipment. Injury patterns are given with respect to injury severity, type, and location; and a comparison between fixed wing and rotary wing injury patterns reveals no striking differences, except that injuries incurred in helicopter accidents appear to have been somewhat more when used in the position of a seat type parachute.

The dramatic effect of post-crash fire upon mortality is illustrated statistically. Although only 5.7% of all major accidents, both fixed and rotary wing, were complicated by post-crash fire. this relatively small percent of accidents accounted for 49.6% of all fatalities, pointing out the serious need for crash-resistant fuel systems.

87

Bierman, H.R. 1945 STATIC LOADING TESTS OF LAP SAFETY BELTS AND SHOULDER HARNESSES (NAF 1201-1) (Naval Medical Research Institute, Bethesda, Md.) Research Project X-630, Rept. No. 2, 27 Oct. 1945.

ABSTRACT: Three lap safety belts and shoulder harness assemblies made by a different company than the con concerned in Report No. 1 of this project were stretched longitudinally by static loading to the point of failure. Failure of the lap safety belts occurred when static loads of from 2430 to 3350 pounds were applied. In two belts the metal connectors failed, while in the third the webbing tore at the point of attachment to the female buckle fitting. The failure of the lap safety belts under static loads occurred about the center connecting buckle but at a different point than in previous tests. Six shoulder harness straps were tested by stretching longitudinally under static loading to the point of failure. The webbing of five harness straps failed at loads of 820 to 1180 pounds. Tne sixth strap slipped at the adjustment buckle and was not tested to the point of destruction. No metal part failure occurred during these tests.

88

Bierman, H.R. & V. Larsen 1946 DISTRIBUTION OF IMPACT FORCES ON THE HUMAN THROUGH RESTRAINING DEVICES
(Naval Medical Research Inst., Bethesda, Md.) Proj. X-630, Rept. No. 4 March 21, 1946

ABSTRACT: The distribution of impact pressures transmitted to the human body through the regulation shoulder straps and seat belt of aircraft has been investigated. The seat belt exerts a maximal impact pressure to the body at the umbilicus through the center of the belt. Maximal impact pressures are exerted by the shoulder straps to the body at the clavicular areas. An improved design of the present restraining devices in aircraft allowing a more equal distribution of the impact pressures on the body may permit increased tolerance to such pressures.

89

Bierman, H.R., et al. 1946 THE PRINCIPLES OF PROTECTION OF THE HUMAN BODY AS APPLIED IN A RESTRAINING HARNESS FOR AIRCRAFT PILOTS
(Naval Medical Research Institute, Bethesda, Md.) Proj. X-630; Rept. No. 6, 10 May 1946
NOTE: CA P&S 4.24na

ABSTRACT: A restraining harness for aircraft pilots has been developed which has successfully protected volunteers against 2500 foot-pounds delivered on

the impact decelerator by dropping a 500 pound weight five feet. This impact force expended in 0.15 seconds on a dummy enclosed in a semi-rigid harness is featured by 10,000 pound peaks as measured by strain gages.

The factors which contribute to the effectiveness of this harness are: (a) Distribution of the impact load over a large body area. (b) Distribution of the impact load to regions of the body best able to withstand high impact forces. (c) Gradual rate of application of force due to high initial elasticity of the material. (d) Damping of small irregularities during the period of impact. (e) The property of the material to elongate inelastically when the applied force reaches a predetermined tolerable limit, permitting the absorption of large amounts of energy.

91

Bierman, H.R. 1947 TEST AND EVALUATION OF EXPERIMENTAL HARNESS UNDER CONTROLLED CRASH CONDITIONS. (Naval Medical Research Institute, Bethesda, Md.) Proj. X-630, Rept. No. 11, 10 Apr. 1947.

92

Billingham, J. and P.J.R. Phizackerley 1956 A COMPARISON BETWEEN THE MK 2 AND MK 3 AIR VENTILATED SUITS. (RAF Inst. Av. Med., Farnborough). FPRC Memo 79. Dec. 1956.

93

Billingham, J. and P.J.R. Phizackerley 1957 THE PHYSIOLOGICAL ASSESSMENT OF TWO AIR VENTILATED SUIT SYSTEMS FOR CANBERRA AIRCRAFT. (RAF Inst. Av. Med., Farnborough). FPRC Memo 81. Mar. 1957.

94

Billingham, J. and P.J.R. Phizackerley 1957 RAF AIR VENTILATED SUIT MK 2. (RAF Inst. Av. Med., Farnborough) FPRC Memo 90. Dec. 1957.

95

Bierman, E.O. 1959 TRAUMA FOLLOWING EJECTION FROM JET AIRCRAFT: A CASE REPORT Am. J. Ophthalmol., 48 (3, Part 1): 399, Sept. 1959

ABSTRACT: A 34-year-old man, ejected from a jet aircraft at approximately 18,000 ft. at a speed of over 600 miles per hour (0.9 the speed of sound), sustained a multiplicity of broken bones, subconjuntival hemorrhages, marked extravasation of the eyelids, and marked swelling of the face and lips. Examinations within a few hours after the accident and two months later revealed no damage to the eye itself.

96

Billingham, J. and T.L. Hughes 1960 PROTECTION OF AIRCREW AGAINST THE HIGH CABIN TEMPERATURES WHICH MAY OCCUR IN PROLONGED SUPERSONIC FLIGHT AFTER FAILURE OF THE CABIN COOLING SYSTEM (RAF Inst. Av. Med., Farnborough). FPRC Rept. 1109, Feb. 1960.

97

Bjorksten Research Laboratories, Inc., 1959 DEVELOPMENT OF IMPROVED FLIGHT HELMET LINER. (Wright-Air Development Center, Wright-Patterson AFB, Ohio) WADC TR 59-435, Oct. 1959.

ABSTRACT: Various low-density plastic foam systems were evaluated for suitability for a padding helmet liner providing maximum comfort with greatest protection against shock and impact. Means of fabricating uniform and reproducible liners by injection of fluid foam into molds were studied. A liner was developed which appears to meet specification requirements for comfort, protection, ease of application, and durability. It consists of a complete inner layer of a maximum comfort, open-celled, hydrophilic, polyurethane foam, integrally bonded to an outer layer of high-energy, absorbent, polyurethane foam which is thickest over the parietal, upper occipital, and temporal areas and also provides chin area protection. Density of the composite material is approximately 4 pounds per cubic foot. Polyurethane foam systems are shown to be capable of providing the desired combination of properties for the application, utilizing techniques adaptable to production processing.

98

Black, H.W. 1944 CHARACTERISTICS OF A PRONE POSITION CONTROL INSTALLATION IN A TG-6 GLIDER. (USAAF, Air Materiel Command, Wright-Patterson AFB, Ohio) Memo Rept. No. ENG-51-4561-1-9, 3 Aug. 1944.

99

Bloetscher, F. & G. W. Quaint 1954 GENERAL ANALYSIS OF THE PROBLEM OF ESCAPE FROM AIRCRAFT
(Goodyear Aircraft Corp., Akron, Ohio) Rept. no. GER 5974
(US Navy Dept., Bur. of Aeronautics) (Contr. NOas 53-1014-C) 15 Mar. 1954

100

Bloetscher, F. 1956 DESIGN AND DEVELOPMENT OF A GENERAL PURPOSE EJECTABLE SEAT-CAPSULE FOR SUPERSONIC AIRCRAFT. PHASE II - FINAL REPORT
(Goodyear Aircraft Corporation, Akron, Ohio) GER 7669, R-1173,
BuAer Contract No. Noas 53-820-c, 23 May 1956. ASTIA AD 131966

SUMMARY: An ejectable seat-capsule was designed by the Goodyear Aircraft Corporation in accordance with the Department of the Navy, Bureau of Aeronautics, Contract No. NOas 53-820-c. This contract was established by the Bureau of Aeronautics as part of their program to develop safe means of escape from aircraft traveling at supersonic speeds.

The program for this design phase included the detail design of a capsule which provides a safe means of escape from an aircraft traveling at M = 1 at sea level and M = 1.5 at 30,000 feet, ejection tests of full-scale dynamic models, flotation tests, various structural tests, and a complete stress-weight analysis. The construction of the full-scale dynamic test models necessitated the fabrication of many prototype components and the design and fabrication of a high-speed test sled for use on the Supersonic Naval Ordnance Research Track (SNORT) at the US Naval Ordnance Test Station (NOTS), China Lake, California.

101

Blohn, W.J. 1959 EVALUATION OF CREW SEAT FOR COMFORT.
(Airship Test & Development Dept., U.S. Naval Air Station, Lakehurst, N.J.) Navy, Bureau of Aeronautics Proj. Directive TED LAK AC 7075.1, Final Report, NAS Lakehurst 13-59, 30 July 1959. ASTIA AD 229 005.

ABSTRACT: A new crew seat for a comparative comfort evaluation was given. The seat was placed at the radar scope operator's position aboard a squadron ZPG-2W airship and the evaluation was made against an existing crew seat in the airship. The new seat under evaluation was installed in the airship and data collection periods were made during flights of the airship while participating in the assigned squadron missions for a period of four months. Processed data indicate the contoured seat to be more comfortable than the standard seat. It is recommended that in any future seat study a variety of seats be selected for evaluation and compared under controlled laboratory conditions.

102

Bloschies, H.H. 1960 LOW SPEED WIND TUNNEL TEST EJECTIONS OF .042 SIZE F8U-1 DYNAMIC MODELS OF THE NAVY INTEGRATED FLIGHT CAPSULE (Chance Vought Aircraft Inc., Dallas, Texas) Rept. No. EOR-12652 ASTIA AD 263 496

ABSTRACT: A series of dynamic model test ejections, of an established configuration, were performed January 11 to January 15, 1960 at the Low Speed Wind Tunnel of Chance Vought Aircraft. The objective of the tests was to pictorially demonstrate the capsule stability of a .042 size capsule at several speeds, angles of attack, and angles of yaw. The ejection tests were made with a .042 Dynamically Scaled F8U-1 nose section. Photographic records of the dynamic test trajectories obtained during this test are shown on pages 11 to 39 of this report. Static test ejections of a model of the same weight as the dynamic capsule model were also accomplished.

103

Blum, E. 1944 SEAT STATIC TESTS XR-9 HELICOPTER. (G & A Aircraft, Inc., Pitcairn Field, Willow Grove, Pa.) ASTIA ATI 45447, November 1944

ABSTRACT: Tests were conducted on the pilot and passenger seats of the XR-9 helicopter to determine its strength. Static tests were made to design loads for each loading condition. Deflection of seat pans were obtained during vertical seat loadings and deflections of supporting structure were obtained during belt loadings. Upon conclusion of the tests, loads were applied to seat bottoms until failure occurred as indicated. It was concluded that the seat successfully complied with the strength with reference to vertical loads, in that failure occurred at loadings considerably above the design criteria.

104

Boaz, W. 1958 DEVELOPMENT OF CARTRIDGE ACTUATED DEVICE, EJECTOR, T7. (Pitman-Dunn Labs. Group, Frankford Arsenal, Philadelphia) Project No. TS1-15, Memo Rept. No. 692. ASTIA AD 204 520

ABSTRACT: The T7 drag parachute ejector is a cartridge actuated device designed to eject a drag parachute for main parachute deployment from the F103 aircraft emergency escape capsule. The T15 delay element was used to delay operation of the ejector for approximately two seconds after the ejec-

tion of the escape capsule from the F103 aircraft. This delay enables the capsule to clear the aircraft and decelerate sufficiently to deploy the drag parachute safely. The ejector is externally mounted to the escape capsule behind the pilot compartment, and its yoke, connected to the drag parachute, is in the aft direction. The drag parachute is then used to extract the main parachute from its case when the capsule falls to a safe altitude. The normal and alternate method of parachute deployment for the F103 aircraft emergency escape capsule is described. This report documents the design and development of the T7 drag chute ejector and includes a summary of the T15 delay element development. (Author)

105

Boaz, C.W. 1961 A BASIC INVESTIGATION OF CONTROLLABLE THRUST DEVICES FOR ESCAPE FROM SPACE VEHICLES. PHASE I, PART I, VOLUME I - SUMMARY REPORT. (Wright Air Development Division, Air Research and Development Command, Wright-Patterson AFB, Ohio) WADD Technical Report 60-348, FA Report R-1547, Jan. 1961. ASTIA AD 256 851.

ABSTRACT: The control of thrust from propellant actuated devices (PAD's) used for escape from space vehicles was investigated. Repetitive start-stop operations and control of thrust rate and direction were considered for gaseous, liquid, solid, and mechanical systems, with respect to the problems of operating in the environmental zone bounded by altitudes of 75,000 and 300,000 feet.

The problems of repetitive start-stop operations probably are not of importance at the altitudes considered, since there the flight time of vehicles is relatively short and complicated maneuvers would not be required. This, however, would not be true at higher altitudes. Present solid propellant-operated devices are believed to be satisfactory for operation from 75,000 to 300,000 feet, but some changes in performance characteristics may be required. Of the various methods studied for controlling thrust rate, hydraulic or pneumatic systems are the least difficult; control in liquid propellant systems is rather flexible; solid propellant systems, which give a uniform, reliable, fixed-type performance, offer good possibilities for control through design of the solid propellant charges. Of the methods for controlling thrust direction examined, it was found that selection of a particular method will depend on a number of factors; the problem is believed to be more important at the higher altitudes, for the reasons stated above.

So far as the operation of escape mechanisms is concerned, the problems introduced by environmental conditions between 75,000 and 300,000 feet were found to differ only slightly from the problems common at lower altitudes. Vacuum effects, ozone concentration, and temperature were the chief factors considered. The need for an examination of the problem of thrust control at altitudes of 200 miles or more was evident from the results of this program.

106

Boaz, C.W. 1961 A BASIC INVESTIGATION OF CONTROLLABLE THRUST DEVICES FOR ESCAPE FROM SPACE VEHICLES, PHASE I, PART I, VOLUME II - SUPPORTING DATA. (Frankford Arsenal, Philadelphia, Pa.) Rept. No. R-1548; (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 60-349, Feb. 1961. ASTIA AD 258546

ABSTRACT: A basic investigation for controlling thrust from propellant actuated devices used for escape from space vehicles was completed. Various devices used to measure and control temperature, pressure, fluid flow, and liquid level were examined for the start-stop and rate control areas, the principles of operation outlined, and a performance evaluation made in a space environment zone from 75,000 to 300,000 feet. The closed-chamber, load discharge, vented-vessel, and mechanical energy systems for controlling thrust direction were received and evaluated for the proposed space environment. Constant-volume closed chamber, constant-volume vented chamber, and variable-volume closed chamber systems (Gas-operated devices) were analyzed generally to provide simple ballistic models which can be used in establishing basic design criteria for propellant operated devices. Charge design studies were made with emphasis on developing analytical means for solving the charge design problem. An analytical method for designing charges was developed for several ballistic systems and dimensionless ratios simplified the final design. A detailed analytical model of the seat-ejection catapult was developed and a specific computation made for the M3 catapult. Stress is laid upon heat-transfer in the discussion of the catapult. The solution procedure suggests the need for programming the procedure for digital computer operation.

107

Boaz, C.W. 1961 A BASIC INVESTIGATION OF CONTROLLABLE THRUST DEVICES FOR ESCAPE FROM SPACE VEHICLES. PHASE I, PART II. PROPELLANT AND IGNITION SYSTEM (Frankford Arsenal, Philadelphia, Pa.) Rept. No. R-1609 Proj. 1362, Oct. 1961. ASTIA AD 277 700

ABSTRACT: Controllable thrust devices for escape from space vehicles are being investigated. Emphasis was on the use of suitable liquid propellants and ignition methods in propellant actuated devices (PAD) to achieve start-stop, rate, and directional control. Bipropellant, monopropellant, and hybrid systems were evaluated for use in PAD. The pressurization and liquid transfer methods for these systems were kept very simple to insure greater reliability to the device. Thrust versus volume flow rate of propellant combination, based on a number of impulse densities, was charted to determine approximate PAD sizes using liquid propellants. A number of ignition methods were studied in the light of anticipated effects of a space environment. In addition, loading, assembly, and design techniques were discussed to point out safety precautions in addition to those required with solid propellants. Well-known and unclassified propellant properties and combinations were tabulated. (Author)

108

Boeing Airplane Co. 1958 ECP 420 DOWNWARD EJECTION SEAT FLIGHT TEST EVALU. 11 NOV. 1958. (Boeing Airplane Co., Wichita, Kansas) Doc. No. D2-3357, Sec. 4.45.01

109

MOTION PICTURE

Boeing Airplane Co. 1958 IN-FLIGHT EJECTION OF DOWNWARD EJECTION SEATS (ECP 420) TEST 3-8, 18 AUGUST 1958. (Boeing Airplane Co., Wichita, Kansas) Wichita Flight Test Film, Wichita No. BWM 147

110

MOTION PICTURE

Boeing Airplane Co. 1958 IN-FLIGHT EJECTION OF DOWNWARD EJECTION SEATS (ECP 420) TESTS 9-2 AND 9-8, 28 AND 29 APRIL 1958, 1 MAY 1958. (Boeing Airplane Co., Wichita, Kansas) Seattle Flight Test Film, Seattle No. J3.8.0.6, Wichita No. BWM 148

111

Boeing Company 1962 AERIAL AIRCRAFT RECOVERY AND EVACUATION SYSTEM (U.S. Army Transportation Research Command, Fort Eustis, Va.) Vol. I, R-260A, Project 9R38-01-017-39, Contract DA44-177-TC-662, March 1962. ASTIA AD 275 027

ABSTRACT: Results are presented of a program of historical record surveys, analytic studies, and preliminary design pertaining to development of an aerial aircraft recovery and evacuation system for the United States Army. The stability and control problems of transporting a damaged aircraft suspended beneath a helicopter have been determined by these analytic studies. Moreover, the effectiveness of various types of equipment in dealing with these problems has been rigorously studied in terms of their mathematical analogies on the electronic computer. It is shown analytically that pitch and roll stability of an inherently unstable external load can be provided by a multiple cable suspension system deployed from the apex of the prime mover helicopter cargo sling. A method for restraining yaw rotation of the load in hover or transition flight, as well as for counteracting load-yawing in forward flight, has been devised and analytically substantiated. It is concluded that further development of this aircraft recovery system should

be pursued by detail design and fabrication of test components, followed by qualification testing in accordance with the proposed flight test program outlined in this report.

Volume II is available upon request from U.S. Army Transportation Research Command, Fort Eustis, Va. (Author)

112

Bogart, B.K. 1958 GUIDE TO AIRCREW PERSONAL AND AIRCRAFT INSTALLED EQUIPMENT. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TN 58-259. ASTIA AD 155 895

ABSTRACT: Note: This report supersedes Technical Note 57-331, dated October 1957.

113

Bond, G.F. 1961 ESCAPES FROM SINKING JET AIRCRAFT COCKPITS (Panel Discussion -- Symposium on Impact Acceleration Stress, Brooks AFB, Texas Nov. 27-29, 1961)

ABSTRACT: This report presents the findings derived from a large series of underwater escapes, performed both at New London and Key West. The purpose of these tests was to determine, as a part of a NavDevCen Project, whether it would be possible for a pilot to make an unassisted escape from various jet cockpit assemblies, in simulated nose-sink and tail-sink attitudes, with canopy on and off, and increasing sink-rates up to maximum of seven knots. The necessary simulated conditions were achieved by securing the cockpit assembly to be tested on the afterdeck of a submarine, which then submerged, with the test subject in the cockpit, and reached the designated underwater speeds, at which time the test subject attempted to make an egress. In all, about forty egresses were completed without serious casualty. As a result of this escape series, it would appear that the pilot, if trained in buoyant ascent, and not severely disabled, should be able to escape from these types of jet aircraft at maximum sink-rates.

114

Bondurant,Stuart 1958 OPTIMAL ELASTIC CHARACTERISTICS OF EJECTION SEAT CUSHIONS FOR SAFETY AND COMFORT.
(Aero Medical Lab., Wright Air Development Center,Wright-Patterson AFB, Ohio) Rept. on Aircrew Fatigue on Extended Missions.
WADC Tech Note No. 58-260. ASTIA AD 203 384

ABSTRACT: Ejection seat cushions of low compression resistance and/or great thickness may significantly magnify the force acting on the occupant of the seat, thus increasing the likelihood of vertebral injury. Cushions of the compression resistance used in this study which exceed 3.5 in. in thickness were found to amplify the g force acting on the seat occupant while the use of a 1 to 3-in. cushion decreased this force. RAF studies in this field have led to replacement in RAF aircraft of all foam rubber ejection seat cushions with plastic cushions. Studies at the Aero Medical Laboratory have shown the danger of the A-5 cushion because of low compression resistance and considerable thickness and the improvement in safety and comfort afforded by the MC-1 and MC-2 cushions of medium density foam rubber. Moreover, these studies are in agreement with those of the RAF in suggesting that further improvement could be effected by use of a suitable plastic cushion. The Aero Medical Laboratory studies show that a standardization procedure for evaluating seat cushions should be established. In addition, it was determined that safety testing of all seat cushion designs should be conducted through a series of test ejections with human subjects until further studies provide a suitable mechanical test. (Author)

115

Borgeson, G. 1959 CRASH HELMET PROGRESS.
Hot Rod Magazine, Pp. 38-42

ABSTRACT: This publication reviews the history of the crash helmet in the United States. It describes recent experiments on protective headgear for both pilots and racing drivers. It explains the powerful forces that a helmet must absorb. The elements that constitute a good crash helmet are also reviewed. (CARI)

116

Borisov, V. 1958 HERMETICALLY SEALED CABIN OF A SPACE SHIP
Trans. from Sovetskaya Aviatsiya (USSR) No. 141(3005)p.3, 1958.
(Office of Technical Services, Washington, D.C.)
1960 60-23526

ABSTRACT: Current information and hypotheses on the requirements of hermetically sealed cabins are surveyed in nontechnical language.

117

Boritz, R. & S. Narisi 1961 ANALOG COMPUTER STUDY OF THE INTERIOR BALLISTICS OF PROPELLANT ACTUATED PERSONNEL CATAPULTS.
(Pitman-Dunn Labs. Group, Frankford Arsenal, Philadelphia, Pa.)
FA Report No. M61-17-1, ASD TR 61-455. ASTIA AD 270 815

ABSTRACT: The interior ballistics performance of personnel ejection catapults depends strongly on energy distribution. It was proposed that the major portion of the energy lost is lost by heat transfer to the metal parts of the device, and that the transfer occurs mainly by conduction. A study was conducted to determine whether or not such an assumption is valid. A mathematical expression for heat loss by conduction was used in the standard energy equation used in interior ballistics. An analog computer was programmed to solve the interior ballistics equations for personnel ejection catapults. The theoretical performance data thus obtained for a typical 3 tube catapult were compared with the actual performance data. The proposed heat transfer model was partially confirmed. An improved model is proposed. A technique which allows a proper blending of experimental and theoretical procedures is outlined. (Author)

118

Bosee, R. A. and P. W. Gard 1951 AVIATION MEDICINE IN THE EVALUATION OF NEW NAVAL AIRCRAFT.
J. Aviation Med. 22(5):518-523.

ABSTRACT: The collective goal, in aviation medicine, is to maintain the balance on the "normal" side, using as the standard the ability of the individual to perform first, all those bodily functions which are basic to life; second, the series of synchronized acitivities that constitite his special job. The efficacy of man's performance in both those categories is the product of (a) his own physical condition, and (b) the nature of his environment.

The peculiar nature of the environment which the aviator encounters in modern military flying, that is, the combination of acceleration, reduced atmospheric pressure, diminished oxygen supply et ceters, itself requires that aviation medical personnel have a special type of training and experience.

It is evident that, both in original intent and in present practice, aviation medicine is a functioning integral part of new aircraft development and evaluation. There are many important factors that affect flight personnel in the evaluation of new aircraft, designed for high performance and high altitude, such as oxygen equipment, cabin temperature and pressurization, and protective clothing.

119

Bosee, R.A., 1957 ACCESSORY EQUIPMENT AND TESTING PROBLEMS. PROBLEMS OF ESCAPE FROM HIGH PERFORMANCE AIRCRAFT: A SYMPOSIUM.
J. Aviation Med. 28(1):82-90

ABSTRACT: The parachutes and ejection seats are the most common devices for escape from aircraft. One outstanding advantage of the rapid seat and pilot separation sequence in the ejection seat is the provision of maximum available altitude for velocity reduction that is most desirable prior to parachute deployment. A major disadvantage attributable to the accelerated separation of seat and occupant is the complete exposure of the parachute pack and other accessory equipment to the adverse effects of the impact of high wind velocity

The escape capsule is a new source of escape and is not yet a popular source of escape. The prime purpose of the long-heralded escape capsule is to provide positive physical shielding from windblast and other adverse environmental conditions during escape from aircraft. If escape by capsule could be confined to high altitudes only, the problems associated with its development would be materially reduced. However, the system should also be suitable for physiologic problems.

120

Bosee, R.A. & C.F. Payne, Jr. 1961 THEORY ON THE MECHANISM OF VERTEBRAL INJURIES SUSTAINED ON EJECTIONS FROM AIRCRAFT
(Paper, Aerospace Medical Panel of the Advisory Group for Aeronautical Research and Development, N.A.T.O., April 10-14, 1961) ASTIA AD 256 378

ABSTRACT: if the body must be supported by the spinal column during ejection, it is important to maintain: (1) The normal vertebral alignment; (2) The normal spinal axis; (3) Parallel ejection and vertebral axes. This will result in good body posture and therefore good force distribution on the weight-bearing portions of the vertebrae.

121

Bosee, R. A. and C. T. Koochembere 1961 NAVAL AIRCRAFT ESCAPE SYSTEMS— PAST, PRESENT AND FUTURE.
Aerospace Medicine 32(3):223, March 1961

ABSTRACT: Escape systems as defined in this paper encompass the ejection seat concept as applied to naval operational and training type jet aircraft. It is also applicable to those escape systems that have been considered for vertical takeoff and landing (VTOL) types. The evolution of seat and seat catapult design as well as performance capabilities are described as they relate to post World War II naval aircraft. The need for increased ejection trajectory height to assure ground level escape is documented. Test and development relative to some early escape capsule designs as well as a description of some energy attenuation systems are presented. The transition from sixty feet per second to eighty feet per second ejections in conventional seat catapult is explained. The effect of acceleration as applied to seat occupant and equipment is described. The design and function of rocket-type ejection seat systems for more advanced type manned military aircraft and tests to assure performance, reliability and personnel compatibility are also set forth. Finally, an experimental integrated flight capsule concept is described in which a shaped charge is used to cut the capsule away from the remainder of the aircraft.

122

Bostrom, K. 1952 MILITARY TRANSPORT SEATING.
(Bostrom Research Laboratories Publications, Milwaukee, Wisc.) No. 105.

ABSTRACT: The complex limiting factors of human physiology, neuro-physiology and psychology have been either casually appreciated, or not at all in the design of military and commercial vehicles. In 1945, a report was issued stating that 90% of low back injuries seen from one service were from the services' truck transport organizations. At that time, the Bostrom Manufacturing Co. had already developed a suspension seating system to absorb shock and vibration to a degree that was not possible by any type of padding meterial or cushion spring system.

In Bostrom Manufacturing Co., a set of intra-company objectives brought about a keen interest in the man-machine relationship as applicable to commercial trucks and farm tractors. Being manufacturers of seating for trucks, crawler tractor and farm tractors, emphasis on the man-machine relationship was carried over into design and development work on various products.

There is a trend in the machinery building and machinery operating fields.

The trend is based on a knowledge of how of people see, feel, move and fatigue when they use mechanical devices. The aim is to design machines to fit human controllers.

Millions of men have been operating these vehicles and it is understandable that they accept these vehicles as standard. Another wrong assumption was that if millions of commercial drivers apparently had not suffered from vibration and shock, there should be no complaint because slightly worse conditions prevailed on similar military vehicles painted olive drab. Complaints as by-products of rough riding have carried little weight because the medical by-products of overstrain from lifting, stooping and jumping are the same as rough riding and they are synergistic. Accomodation through vehicle design should be within human limitations if maximum machine and individual combat efficiency is to be realized.

123

Bottem, J. M., B. S. Mill, et al. 1962 DYNA-SOAR EJECTION SEAT AND SURVIVAL SYSTEM. (The Boeing Co., Seattle, Wash.) Ident. No. 81205, Rept. No. 10-81000, ASTIA AD-282 004

124

Bowman, J.S., Jr. 1961 DYNAMIC MODEL TESTS AT LOW SUBSONIC SPEEDS OF PROJECT MERCURY CAPSULE CONFIGURATIONS WITH AND WITHOUT DROGUE PARACHUTES. (National Aeronautics and Space Administration, Washington, D.C.) NASA TM X-459.

125

Bowring, John I.R. April 1960 CREW STATIONS OF THE FUTURE 1960 Proceedings of the Institute of Environmental Sciences, 261-281

ABSTRACT: An attempt has been made to outline a few of the problem areas in the crew station field, and to give an idea of the efforts being made "in house" to solve these problems and produce feasible answers. The problems include those of isolation, physiological stresses which stem from the deceleration forces, and emergencies necessitating either the abandonment of the mission or of the flight vehicle. A description of the flight suit, crew seats, recreation facilities, and feeding devices is also included.

126

Boyce, W.C. 1961 A DEVELOPMENTAL 60 "G" PERSONNEL RESTRAINT SYSTEM. (Paper, Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Material Center, Philadelphia, Penn. June 14-15, 1961)

ABSTRACT: This paper described a 60 "g" personnel restraint system currently under development for the Air Force for high g impact tests with live test subjects. The primary objective of these tests is to demonstrate that human tolerance to abrupt deceleration can be increased to 60 g's in all transverse directions. These tests will provide data, heretofore lacking, which may permit more efficient design of advanced, manned space vehicles of the future. These data may enable future space vehicles to land at higher rates of impact than are currently deemed possible, with resultant savings in overall weight and volume.

Design criteria for this restraint system have been derived from examination of representative advanced manned systems in order to determine in which regimes the significant accelerations may occur, the probable magnitude and duration, and the degree of predictability. This restraint system was evolved after analysis of the inertial loadings on the human body, conducted to determine unit pressures on the surface of the body exerted by a hypothetical restraint system. A summary of these studies is shown.

Physiological studies to determine areas and degrees of vulnerability also contributed to the requirements of this system. Unique design requirements that have arisen from the anatomical and engineering studies are described. The effects of fit, body sizing, and comfort upon the degree of protection obtained are examined. Problems of body positioning and geometry and their effect on vehicle cockpit geometry are discussed.

Arising from the analytical and design studies is an integrated support-restraint concept employing a segmented, rigid body shell. This system will soon be tested with human subjects in an effort to extend man's tolerance to abrupt deceleration well beyond the currently established limits. The system is described in detail, and the reasons for the choice of a rigid, molded torso shell are discussed, as well as some of the problems inherent therein.

127

Boyce, W.C. & H.E. Freeman 1961 CONSIDERATIONS AFFECTING THE DESIGN OF A 60 G PERSONNEL RESTRAINT SYSTEM
Paper, ARS Space Flight Report to the Nation, New York, Oct. 9-15, 1961
American Rocket Society Preprint No. 2105-61
ARS Journal 32(6): 939-942, June 1962

ABSTRACT: The design requirements for a personnel restraint system to protect a crewman against omnidirectional abrupt deceleration forces are examined and a

system to meet these requirements is described. Personnel restraint is examined and a system to meet these requirements is described. Personnel restraint is examined from the standpoint of body segment weight and unit surface pressures. Seating geometry and its effect on cockpit envelope is discussed. Several restraint concepts examined during this program are shown, while the system selected for development and live, manned tesaing is described in detail. A newly developed, self-contouring comfort padding with improved rebound characteristics is described. Since test results are not yet available, predictions of system performance are made. (Author)

128

Bradley, R. 1945 JETTISON SEAT-MODEL XP-80A (Lockheed Aircraft Corp., Burbank Calif.) Report 5399, June 1945. ASTIA ATI 47039.

ABSTRACT: Design considerations are presented for a jettisonable pilot seat and a method is discussed for ejecting the pilot from the F-80A jet fighter. The proposed design incorporates an actuating cylinder attached to the floor slightly aft of the seat. This cylinder incorporates two sets of tracks; one set to guide the cylinder during its extension, and the other set to guide the cylinder after the power stroke. The use of an engine starter type cartridge is contemplated and a pressure of 3000 psi and a burning rate sufficient to operate the mechanism has been assumed. Several other methods were also considered. It is recommended that the oxygen system of the aircraft be revised to include a bail-out bottle and attendant equipment, also that the G-suit valve be attached to the seat with break-away connections, and that some means of protection for the pilot's face and other exposed parts of the body be developed.

129

Braunstein, P. W., J. O. Moore, & P. A. Wade 1957 PRELIMINARY FINDINGS OF THE EFFECT OF AUTOMOTIVE SAFETY DESIGN ON INJURY PATTERNS Surgery, Gynecology & Obstetrics 105(3):257-263, Sept. 1957

SUMMARY: Several thousand cases of injury-producing automobile accidents have been studied. The incidence of multiple injuries as well as multiple body areas injured is striking. Specific objects that cause injuries following crash impact are discussed and their relative importance is listed. Recent safety design engineering in its relative infancy apparently has decreased frequency and severity of injury as determined by the preliminary comparison with representative control

data.
Seat belts, as studied in 162 cases of automobile accidents, seem to lessen dramatically the severity and frequency of injuries. It is believed that these forward steps in safety design have been concrete in their accomplishments. This type of engineering solution is based on medical findings and when linked with public acceptance of the inherent value of such protection may well lessen the toll on the lives and well-being of more than 150,000,000 people who use the automobile as the common denominator of transportation. (AUTHOR)

.130

Bray, J.L. 1957 INTERNAL BALLISTIC DESIGN AND TRAJECTORY ANALYSIS OF A ROCKET-ASSISTED PILOT EJECTION SEAT. (U.S. Naval Ordnance Test Station, China Lake, Calif.) NOTS 1701, NAVORD Report 5433, 17 Oct. 1957. ASTIA AD 150906.

ABSTRACT: The problem of safe escape of a pilot from a disabled plane is discussed in general, and a rocket-assisted ejection seat is considered as a solution. Two tentative internal ballistic designs are presented. Equations are developed for the motion of an ejection seat after it leaves the plane. Graphs are included showing thrust-time curves, seat trajectories, forces on the pilot, aerodynamic drag, and physiological acceleration limits.

131

Brazier, J.C. and J.L. Fuller PILOT ESCAPE STUDY - MODELS D-558 & D558-2 PART IV. OPERATIONAL LIMITS FOR USE OF THE JETTISONABLE NOSE SECTION. (Douglas Aircraft Co., Inc., El Segundo, Calif.) Contract no. NOa(s) 6850, Report 15379

ABSTRACT: During the early design stages of the D-558 and D-558-2 Airplanes a jettisonable nose was chosen as a high speed emergency escape means instead of a jettisonable seat. Tests conducted by the NACA indicated that a jettisonable nose of this type was subject to autorotation and that accelerations encountered might be beyond human endurance limits even at relatively low speeds.

It can be said that the noses of the D-558 and D-558-2 do not autorotate after several initial tumbling revolutions caused by the disengaging action. This high initial acceleration is usually of the order of a fraction of a second duration, damping to a mild oscillating motion in five to ten seconds.

An analysis of physiological limitations based upon experiments indicate that a pilot with shoulder and seat belts properly secured can probably withstand the maximum accelerations experienced at release speeds approaching the design speed of the airplane without fatality, although some local injuries may result.

132

Brehaut, W.H. 1962 DESIGN AND TESTING OF PASSENGER SEATS FOR CRASH SURVIVAL (Paper, SAE Aeronautic Meeting, New York, New York, April 3-6, 1962)

133

Brennan, J. N. 1956 DEVELOPMENT OF A METHOD FOR RATIONAL DESIGN OF AIR-DROP PACKAGING (Pennsylvania State University, University Park) Progress Rept. No. 8, 1 Sept. - 31 Oct. 1956; Project No. 7-87-03-004B; Contract No. DA 19-129-qm-386; ASTIA AD-235 525

ABSTRACT: Mathematical analysis of shock spectra for various pulses has been made. An apparatus for testing columns has been designed and construction is underway. Preliminary tests on transmission of pulses through joints have been made. A report on dynamic behavior of plastics has been prepared. The first phases of study of repeated impacts of 61S-T6 aluminum alloy has been completed and the second phase started. Available stress wave pulses from a drop weight machine have been measured. A large size ballistic pendulum has been designed for testing simple structures. Comprehensive tests of our Calidyne shaker have revealed that the motion is markedly nonlinear at some frequencies. Calibrations by steady state and impulse methods have been completed for the Riehle Impact Machine instrumentation. Calibration of all our accelerometers using small amplitude sinusoidal vibration technique has been completed. Work on analog methods has continued. A series of tests has been carried out to determine the shock resistance of an electrical meter. Preliminary work has been started on study of creep recovery after impact. Construction of a 60 foot drop facility for light weight articles has been started.

134

Brent, H.P., T.M. Carey, T.J. Powell et al 1960 SYNERGISM BETWEEN EFFECTS OF HYPERVENTILATION, HYPOGLYCEMIA AND POSITIVE ACCELERATION
Aerospace Medicine 31(2): 101-115
(Paper, 28th Annual Meeting, Aero Medical Assoc., Denver, Colo, 6-8 May 1957)
(Paper, 21st Annual Meeting Canadian Physiological Society, Ottawa, Oct. 1957)

ABSTRACT: Eighteen medically fit aircrew officers were exposed to combinations of voluntary hyperventilation, 3.4 G for five seconds on the centrifuge, and changes in glycemia one hour and three hours after glucose feeding. A large proportion of the subjects was incapicated by the effect of two or more of these combined stimlui, although these same stimuli, when acting separately, had failed to induce comparable disturbances in cardiac or cerebral function. The experimental findings are listed in the article.

135

Brewster, O. C. 1955 PRELIMINARY INVESTIGATION ON THE USE OF ENERGY ABSORPTION IN AIRCRAFT SEATS. (Aerotherm Corp., Bantam, Conn.) March 1955

136

Brewster, O. W. 1954 PROPOSED PROGRAM FOR THE DYNAMIC TESTING OF AIRCRAFT SEATS. (Aerotherm Corp., Bantam, Conn.) 1 Sept. 1954

137

Briggs, F.E.R. 1941 FRANKS'ANTI BLACKING-OUT SUIT.
(Flying Personnel Research Committee, Air Ministry) F.P.R.C. Rept. 301a
May 1941

ABSTRACT: Two subjects wearing FFS were completely protected up to 7 "g" in the P 40 and Harvard III for 12 seconds. Fatigue and nausea were relieved. Some respiratory embarassment was noted during inverted flight, but no other discomfort. An individually fitted suit is necessary.

138

Brissenden, R. F., D. C. Cheatham, & R. A. Champine 1961 TOLERABLE LIMITS OF OSCILLATORY ACCELERATIONS DUE TO ROLLING MOTIONS EXPERIENCED BY ONE PILOT DURING AUTOMATIC-INTERCEPTOR FLIGHT TESTS (National Aeronautics & Space Administration, Washington, D. C.) NASA TN D-810; April 1961 (Supersedes NACA RM L56K20)

ABSTRACT: This paper presents limited data on the level of lateral oscillatory acceleration due to rolling motions found to be tolerable by a pilot during flight tests. The tests were made during the final attack phase of an automatically controlled interceptor. (Author)

139

British Standards Institution 1960 SPECIFICATION FOR PROTECTIVE HELMETS FOR RACING CAR DRIVERS: BRITISH STANDARD. (British Standards Institution, London W. 1, England) British Standard 2495.

140

British Standards Institution 1960 SPECIFICATION FOR SEAT BELT ASSEMBLIES FOR MOTOR VEHICLES. (British Standards Institution) British Standard 3254: 1960 (UDC 614.85:629.113.042:656.13.08)

141

Brooks, P. M. 1951 THE INFLUENCE OF EXTRA-ABDOMINAL PNEUMATIC PRESSURE OF ANTI-BLACKOUT GEAR ON THE EFFECTS OF TILT TABLE POSITION ON RESPIRATION IN HUMAN SUBJECTS.
(Office of Naval Research, Washington, D. C.)
March 1951 Contract N6ori77

SUMMARY: The same subjects used in the previous study were used in this one. The suit pressures used were those of 50, 100, and 150 mm. of Hg. The tilt table positions were those outlined previously.

As the suit pressures were increased, the tidal volume was decreased, but the respiratory rate and respiratory minute volume was increased. Oxygen was decreased as the suit pressures were increased.

142

Brown, C. W., E. E. Ghiselli, R. F. Jarrett, E. W. Minium and R. M. U'Ren 1950 COMPARISON OF AIRCRAFT CONTROLS FOR PRONE AND SEATED POSITION IN THREE DIMENSIONAL PURSUIT TASK. (Air Material Command, Wright-Patterson AFB, Ohio) AF TR 5956. March 1950.

143

Brown, Emma E. & Ruth T. Walton 1961 ABSTRACTS OF HumRRO RESEARCH PUBLICATIONS--FY 1961
(Human Factors Research Branch, TAG Research and Development Command, U.S. Army) Technical Research Note 116, Army Project No. 2L95-60-001, August 1961. ASTIA AD 265 468

ABSTRACT: Research Note 116 identifies both by publication serial number and by Research and Development Research Task all research publications prepared and released by the Human Factors Research Branch of The Adjutant General's R and D Command in FY 1961. The listing includes 2 Technical Research Reports, 8 Technical Research Notes, 3 Research Studies, and 16 Research Memorandums.

Abstracts have been prepared for the majority of FY 1961 publications. Where a publication has been abstracted, the principal research findings have been described as much as possible in non-technical language. Technical language has generally been used as the most expeditious method of communicating details of research and analysis.

144

Brown, G. W. et al. April 1948 COMPARATIVE EFFECTIVENESS OF SPEED OF DETECTION OF VISUAL STIMULI IN THE PRONE AND SEATED POSITIONS. (USAF, AMC, Engng. Div., Wright-Patterson AFB, Ohio) Memo Rept. MCREXD 694-41. 3 May 1948.

145

Brown, J. H. U., ed. 1963 PHYSIOLOGY OF MAN IN SPACE
(New York, London: Academic Press, 1963)

CONTENTS:

Bourne, G. H., Neuromuscular Aspects of Space Travel,
Lindberg, E. F., & E. H. Wood, Acceleration,
Hall, C. E., Stress,
Balke, B., Human Tolerances,
Chambers, R. M. & R. Fried, Psychological Aspects of Space Flight,
Green, C. D., Biomedical Capsules,
Hawkins, W. R., Space Flight Dynamics --- Weightlessness,
Welch, B. E., Ecological Systems

146

Brown, J.L., W.H.B. Ellis et al 1957 THE EFFECT OF SIMULATED CATAPULT LAUNCHING ON PILOT PERFORMANCE
(Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5719, 31 Dec. 1957
ASTIA AD 156 851

ABSTRACT: To determine the effect of exposure to transverse accelerations (similar to those encountered in catapulting) on motor performance, four subjects were exposed to acceleration patterns ranging from four to twelve G. Subjects were trained in a task that required stabilization, by manipulation of a control stick, of disturbances of a standard pitch and roll indicator. Scores for performance were obtained during a control period prior to and immediately following acceleration exposure. Heart rate was recorded during the experimental period and subjective comments obtained. The data were analyzed in terms of performance decrements, effect on heart rate, and subjective effects due to acceleration patterns.

147

Brown, J.L. 1957 HUMAN PERFORMANCE LIMITATIONS IN AIRCRAFT CATAPULTING AND ARRESTING
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR31, Sept. 26, 1957

ABSTRACT: An experiment was carried out to determine whether or not pilots can tolerate higher levels of acceleration during catapulting than those now employed and, if they can, whether or not they are capable of adequately controlling their aircraft immediately following such exposure to acceleration. A method was devised which afforded an approximate simulation on the AMAL 50-foot centrifuge of catapult launching accelerations. The maximum level of acceleration was sustained for approximately 1.5 sec and five levels of acceleration were employed: 3.8, 6.0, 7.2, 9.6 and 11.3 G. Subjects performed a tracking task under acceleration simulating the kind of task performed by the pilot in attitude control after catapulting. Tracking scores were subjected to statistical analysis. There was no tendency for tracking error to increase with an increase in the level of acceleration from 3.8 to 11.3 G. It may be concluded that performance of a tracking task such as that which was employed in this experiment, when measured in terms of cumulative error scores, is not adversely affected by exposure to accelerations up to 11.3 G.

148

Brown, J.L. 1957 PROJECTED RESEARCH AIRCRAFT
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR26, August 20, 1957. Confidential

149

Brown, J.L. & M. Hudson 1958 INSTRUMENTS AND CONTROLS TO BE USED IN THE X-15 RESEARCH AIRCRAFT
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR36 March 5, 1958. Confidential

150

Browne, M.K. & J T. Fitzsimmons 1956 PHYSIOLOGICAL ASPECTS OF A MULTI-GRADIENT ANTI- 'g' VALVE. (RAF Institute of Aviation Medicine, Farnborough) FPRC 991

ABSTRACT: Many workers, British and American, have shown that man's tolerance to positive g is subject to wide individual variations. These are still present when anti-g equipment is used. It seemed possible, therefore, that in some subjects increased g tolerance might be obtained with new equipment.

151

Bruggink, G. M., and Daniel J. Schneider 1961
LIMITS OF SEAT-BELT PROTECTION DURING CRASH DECELERATIONS
(Aviation Crash Injury Research, Phoenix, Arizona)
Rept. no. AVCIR 61-8. TREC TR 61-115 September
ASTIA AD 265 868L

ABSTRACT: The protective limits of aircraft seat-belt protection, as discussed in the available literature, are compared with recent crash injury experience. To insure maximum survivability under the most adverse conditions, the strength of a seat-belt restraint system should be based on the threshold between the injurious and fatal limits of seat-belt restraint. The study indicates that an aircraft seat-belt restraint with an energy absorbing capability of 25 G's (occupant weight, 200 pounds) for a duration of at least .2 second may form a realistic compromise between the ideal and the pracicable strength of such a system. (AUTHOR)

152

Bruggink, G. M. & D. J. Schneider 1961 LIMITS OF SEAT-BELT PROTECTION DURING CRASH DECELERATIONS.
Rev. Med. Aero (Paris) 2:204-209, Dec. 1961

153

Bruggink, G. M. Feb. 1961 RESTRAIN YOURSELF. (Flight Safety Foundation, Inc., New York. Pilot's Safety Exchange Bull. 61-101, 28 Feb. 1961.)

154

Bruggink, G. M. & D. J. Schneider 1963 LIMITS OF SEAT-BELT PROTECTION DURING CRASH DECELERATIONS.
Industr. Med. Surg. 32:33-37, Jan. 1963

155

Bryant, Royal C. & W.D. Stewart 1958 DEVELOPMENT OF FOAMED-IN-PLACE PLASTIC ENERGY ABSORBING MATERIALS
(Atlantic Research Corporation, Alexandria, Va.) Contract No. DA-19-129-QM-838 Final Report Dec. 31, 1956 to March,31, 1958 ASTIA AD 206 052

ABSTRACT: This program of research dealt with investigations of materials, method and equipment which would be suitable for the production of foamed-in-place, plastic, energy-dissipating structures in the field ofr later assembly with aerial drop containers. Some of the requirements for suitability were stringent, e.g. the resin system should foam, cure, and develop the necessary energy-dissipating characteristics within twelve hours, under its own heat of reaction without an accessory source of heat, under field conditions at ambient temperatures of +42° F to +125° F. The energy-dissipating properties desired for the foams would be similar to those of foamed glass at comparable densities. Another phase of the program was concerned with investigations on the thermal balance of highly exothermic foamed-in-place plastic systems, which might have application as energy absorbers and as flexible and rigid insulating materials. It was also necessary to devise, construct, and install an inexpensive but reliable instrument for measuring and comparing the energy-dissipating properties of the experimental foams.

156

Byrne, W.A. 1943 FINAL REPORT ON TEST OF ANTI-"G" DEVICES UNDER SIMULATED COMBAT CONDITIONS
(Proof Dept., AAF Proving Ground Command, Eglin Field) Serial No. 4-43-40. AAF Board Project No. (M-4)205. 3 Nov. 1943

ABSTRACT: (a) Pilots wearing an anti-"g" suit have a definite tactical advantage over those not protected in combat. They are also less fatigued. (b) Guns can be fired without difficulty under as much as 8.8 "g". (c) The Berger Bros. GPS is definitely superior to the Clark-Wood AOS. (d) The instrument vacuum pump installation is more satisfactory than the Cornelius Air Compressor installation from the standpoint of reliability, ease of installation and maintenance, and adequacy at altitude. (e) Photographs of GPS and AOS are included.

157

Buckhout, R. 1962 A WORKING BIBLIOGRAPHY ON THE EFFECTS OF MOTION ON HUMAN PERFORMANCE
(Aerospace Medical Division, 6570th Aerospace Medical Research Lab., Wright-Patterson AFB, Ohio) Rept. No. MRL-TDR-62-77, July 1962. ASTIA AD 287 530

ABSTRACT: In this bibliography a list of reports is compiled from a number of disciplines which bear on the problem of motion and its effects on human performance. Psychophysiological reports in the area of spatial orientation, perception, and receptor mechanisms provide background on the human organism in relation to motion stimuli. The effects of aerospace vehicle motion are represented by a compilation of studies of performance under acceleration, vibration and buffeting, tumbling, and weightlessness. Finally reports on training and motion simulation, equipment and methodology, and general analyses of the whole problem area are presented.

158

Buhrlen, L. 1937 VERSUCHE UBER DIE BEDEUTUNG DER RICHTUNG BEI EINWIRKEN VON FLIEHKRAFTEN AUF DEN MENSCHLICHEN KORPER (Studies on the Importance of Direction in the Action of Force on the Body During Flying)
Luftfahrtmed., 1: 307-325

ABSTRACT: Large increases in speed cause visual disturbances. In the flat position (flying direction chest-back) visual disturbances occurred, but the brain and consciousness were not affected. Experiments were made in the sitting and lying positions.

159

Burgess, B.F. & H.N. Hunter 1955 TEST AND DEVELOPMENT OF ANTI-BLACKOUT EQUIPMENT
(Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 310; TED ADC AE-5201, 31 Dec. 1955

ABSTRACT: A study of G tolerances has been made on trained centrifuge subjects wearing various types of anti-G suits. (1) An experimental full-pressure half suit, due to severe discomfort, was found to limit the protection to no more than that provided by the standard Z-2 suit plus straining. (2) An integrated anti-blackout suit (basically a Z-2 suit with built-in parachute and restraint harness) was evaluated and found to be very comfortable and to provide the same protection as the standard Z-2 suit.

160

Burgess, B.F. & H.N. Hunter 1955 THE G-PROTECTION PROVIDED BY THE FULL PRESSURE HALF SUIT
(Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5511, 23 Sept. 1955

161

Burgess, B.F. 1956 INTEGRATED ANTI-BLACKOUT SUIT
U.S. Naval Air Development Center, Johnsville, Pa. NADC-MA-LR15, 6 Feb. 1956

ABSTRACT: In a total of 75 runs on the centrifuge, 4 subjects were used to evaluate the characteristics of the integrated anti-blackout suit. G protection with the suit ranged from 0.7 to 1.8 G with a mean protection of 1.1 G. The MA-1 parachute/safety harness integration did not interfere with, or reduce, the efficiency of these features. All subjects wearing this suit during the test found it more comfortable than the standard Z-2 suit with the parachute harness worn over the suit.

162

Burgess, B.F., Jr. 1957 THE EVALUATION OF A PULSATING ANTI-G SUIT.
(U.S. Naval Air Development Center, Aviation Medical Acceleration Lab., Johnsville, Pa.) NADC-MA-5702, 27 Jan. 1957. ASTIA AD 132 753.

ABSTRACT: An evaluation was made of the G protection provided by a pulsating type of anti-blackout suit. It was c mpared to the standard Navy Z-2 suit. Results indicate that this suit does not provide any more protection than the Z-2 suit and, in addition, is less comfortable.

Skin temperature measurements on the hands and feet suggest that the massaging type of action of the pulsating suit has no effect on peripheral circulation.

163

Burgess, B.F. 1957 ESTABLISHMENT OF A QUALIFIED PRODUCTS LIST FOR TYPE Z-3 (CUTAWAY) ANTI-BLACKOUT SUIT, CONFORMING TO SPECIFICATION MIL-S-5085 (Aer)-3 (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR29, August 30, 1957

ABSTRACT: The following suppliers submitted sample Z-3 suits for testing in accordance with MIL-S-5085 (Aer)-3: David Clark Company, Berger Brothers, Switlik Company, and Seymour Wallas and Company. The suits submitted by these suppliers were found to conform to specifications either by test or by certification, and it is recommended that these companies by entered on the Qualified Products List.

164

Burgess, B.F. 1958 TEST AND EVALUATION OF ANTI-BLACKOUT EQUIPMENT (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR42 Feb. 28, 1958

ABSTRACT: This report describes the test and evaluation of Z-2 anti-G suits that were modified to afford comfort to pilots operating under high temperatures. The Z-2 modification from COMNAVAIRPAC was altered by the removal of the upper torso at the level of the inflation tube, the seat and the crotch sections. These suits were tested on the centrifuge and were found to give 0.4 G less protection than the standard Z-2. This lack of G protection precludes their use. Suits were modified at Johnsville by removing the upper torso at a level 2 inches above the entrance of the pressure hose and the cloth was sewn to give additional strength and a snug fit was essential. This modification showed no decrease in G protection when compared to a standard Z-2 suit.

165

Burgess, B.F. 1958 TEST AND EVALUATION OF U.S. AIR FORCE EXPERIMENTAL CUTAWAY TYPE ANTI-BLACKOUT SUITS, DESIGNATED MA-1 (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR51 30 April 1958

ABSTRACT: The Air Force MA-1 suit and the standard Navy Z-3 suit were compared through tests conducted on the human centrifuge. Six experienced centrifuge subjects were exposed to acceleration stress while seated in a mocked-up cockpit seat with lap belt and shoulder harness. Each series of runs began at the 2.5 G level and subsequent runs were increased by 0.25 G increments until the end point was reached. The runs were 40 seconds in duration with peak G maintained for 15 seconds or until the subject noted peripheral light loss and stopped the run

himself It was concluded that there is no significant difference between the G protection provided by the Air Force MA-1 suit and the Z-3 suit. In general, the subjects found the Z-3 suit more comfortable while under acceleration. The major complaint against the MA-1 suit was that the larger abdominal bladder tended to produce slight nausea due to pressure in the "pit of the stomach." Because of this factor and the fact that both suits provided equal G protection it was concluded that the Z-3 suit was the more desirable of the two suits.

166

Burgess, B.F. 1958 INVESTIGATION OF DEFECTIVE TYPE Z-2 ANTI-G SUITS FURNISHED BY SEYMOUR WALLAS & CO., ST. LOUIS, MISSOURI UNDER CONTRACT N383-40133A (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR48, April 29, 1958

ABSTRACT: Four type Z-2 anti-G suits, manufactured by Seymour Wallas & Co., were submitted to AMAL in order to determine the causative factors producing excessive pressure points when worn by pilots. The suits were tested in accordance with MIL-S-5085 (Aer). Four subjects wore the suits for a total of 36 centrifuge runs and, although the suits showed a normal inflation time and normal G protection, pilot acceptability would be low due to the discomfort produced by the excessive pressure points. The suits were then examined by the Naval Air Material Center and it was found that the seam sealant of the bladders of the four defective suits was very stiff and brittle. According to the manufacturer, the suits having the unsatisfactory bladders cannot be repaired. It is therefore recommended that the defective suits be withdrawn from the supply system.

167

Burgess, B.F. 1959 TEST AND EVALUATION OF INTEGRATED COTTON-FORTISAN ANTI-BLACKOUT SUMMER FLYING COVERALL (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR88, July 9, 1959

ABSTRACT: Two cotton-fortisan anti-G suits were evaluated for anti-G protection on the AMAL centrifuge. An average of 1.5 G protection was found to be provided by the suits which is equivalent with the standard Navy Z-2 anti-G suit. Subjects found the suits comfortable. It is recommended that this suit not be adopted as standard equipment and that investigations continue in an attempt to find a lighter weight material that has a fire-resistant characteristic.

168

Burke, J. E. 1960 PHYSIOLOGICAL REQUIREMENTS INTEGRATED FLIGHT CAPSULE (Chance Vought Aircraft, Inc., Dallas, Texas) Contract NOa(s) 59-6150-C, Rept. No. AER-EOR-12841, 1 June 1959 - 1 March 1960; ASTIA AD-263 491L

ABSTRACT: The improvement of the pilot environment in the Integrated Flight Capsule required definition of the physiological capabilities and limitations of the man. This was accomplished for cabin pressure; atmospheric composition, temperature; ventilation rate; environmental toxicity; accelerations; noise; vibration; body restraint; oscillation and tumbling; pilot incapacitation sensing; vision; thermal radiation effects and body waste removal. The physiological requirements presented assumed that no personal protective equipment is worn. (AUTHOR)

169

Burkhardt, W. 1939 STURZ AUS DER HÖHE (Dives from High Altitude) Deutsch. z. Ges. Gerichtl. Med. (Berlin) 30: 334-341

170

Burns, H.I., & R.E. Stockman 1958 DESIGN AND DEVELOPMENT OF A PRESSURE AND CYCLE CONTROL FOR DYNAMIC SEAT CUSHIONS. (Wright Air Development Center, Air Research and Development Command, Wright-Patterson AFB, Ohio) WADC TR 58-616, Dec. 1958. ASTIA AD 209 386

ABSTRACT: The advent of long range aircraft has created a requirement for maximum long term seating comfort. Research and development have evolved in efficient Dynamic Seat Cushion. Successful operation of a Dynamic Seat Cushion depends on close control of air pressure and inflation cycles.

Engineering problems in design and development of this close control involve air pressure regulation, manual control, inflation and deflation valving, and cycle timing. The application of this control to aircraft use imposed additional requirements of light weight, small size, and reliability over wide ranges of environment and long term continuous use.

171

Burns, N.M., & E.C. Gifford 1959 PRESSURE SUIT MOBILITY: A PRELIMINARY STUDY. (Naval Air Material Center, Air Crew Equipment Lab., Philadelphia, Pa.) NAMC-ACEL-412, 15 Oct. 1959. ASTIA AD 227 656

ABSTRACT: Four subjects were used in this study, with each subject wearing each of the basic suit configurations on at least one occasion. The time taken to activate the appropriate switch, once the signal was given, and the time taken to complete a sequence of movements was recorded. The data was plotted graphically in order to demonstrate the restricting effects of the various suits and the effects of inflating the suit to 5 psi. This data is shown. The results indicate two primary findings. First, the three suits tested appear to be roughly equivalent with regard to their respective mobility. Secondly, in the event of a loss of cabin pressure, inflation of the suit to 5 psi can be expected to lengthen RT. The differences in RT among the three suits at 0 and 5 psi were statistically significant in every case.

172

Burns, N. M. and R. B. Ziegler 1960 ENVIRONMENTAL REQUIREMENTS OF SEALED CABINS FOR SPACE AND ORBITAL FLIGHTS. A BIBLIOGRAPHY OF PSYCHOPHYSIOLOGICAL STUDIES RELEVANT TO SPACE AND ORBITAL FLIGHT (Naval Air Material Center, Air Crew Equipment Lab., Philadelphia, Pa.) NAMC-ACEL-441, 26 Oct. 1960 ASTIA AD 246 414

ABSTRACT: A bibliography is presented of psychological, physiological and environmental reports pertinent to man's role in space and orbital flight. Five hundred and eight-two entries are provided on 3 x 5 inch file card forms with the content of the report indicated by the category into which it is placed. The literature review for this bibliography was completed in April 1960.

173

Burns, Neal M. & R.L. Burdick 1961 COCKPIT DESIGN STUDIES; STANDARD COCKPIT MOCKUP (PRESSURE SUIT MOBILITY, II. THE PROJECT MERCURY SUIT) (Air Crew Equipment Laboratory, Naval Air Material Center, Philadelphia, Pa.) NAMC-ACEL-443 Feb. 21, 1961 ASTIA AD 254 517

ABSTRACT: The present report is a continuation of the laboratory's efforts on the human factors problems involved in pressure suit design. The purpose here was to investigate the effects of suit pressurization on motor performance and

a modified reaction time experimental paradigm was used. The task console consisted of a modified Mercury control panel, with the subjects required to perform specific responses when the appropriate signal was displayed. Six of the Project Mercury astronauts served as subjects, and were first tested with the suit at 0 psi or, more accurately, ventilation air pressure. After a series of measurements of performance were obtained, the suit was inflated to a pressure of 5 psi. The same series of measurements were taken under both conditions. Inflation of the suit to 5 psi significantly increased the time required to activate the controls on the Mercury panel. In addition, the number of inadvertent actuations (i.e., errors) also increased under the 5 psi condition.

174

Bushnell, D. 1958 MAJOR ACHIEVEMENTS IN BIODYNAMICS: ESCAPE PHYSIOLOGY 1955 - 1958. (Historical Div., Office of Information Services, Holloman AFB, New Mexico) June 1958 ASTIA AD 201 282

ABSTRACT: In the study here presented, the author has carefully documented that portion of the work done in the Biodynamics and Space Biology Branches of the Air Force Missile Development Center's Aeromedical Field Laboratory towards the exploration of the punishing effects of wind blast and the tremendous forces of abrupt deceleration encountered during emergency escape from high-mach aircraft. The author has also mentioned the application of this experimentation to the effects of the magnitude and relatively long duration of g-loading experienced during sustained acceleration of multistage space vehicles.

This monograph is the fourth of a projected series of six related to the contributions of Holloman's Aeromedical Field Laboratory.

RESTRAINT, PROTECTION, AND EMERGENCY ESCAPE SYSTEMS

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Caldara, J. D. 1956 FLIGHT SAFETY TESTIMONY GIVEN BEFORE THE SUB-COMMITTEE OF THE COMMITTEE ON APPROPRIATIONS. (House of Rep., Eighty-fourth Congress, Washington, D.C.) Special Report No. 31-56, March 20, 1956.

176

Campbell, A. J., & J. T. Greenslade 1960 CREW EJECTION INVESTIGATION DURING LANDING APPROACHES FOR T33 AIRCRAFT. (Royal Canadian Air Force, Air Materiel Command, Central Experimental & Proving Establishment) CEPE Rept. No. 1527; ASTIA AD-248 347; Oct. 1960

SUMMARY: An investigation was made of the T33 ejection escape system during shallow dives (as encountered during approach-to-landing) and shallow climbs. A program of airborne tests indicated that tail clearance is not significantly affected by small changes in flight path angle at a given aircraft speed. The flight path angle was found to have a major effect on the height lost before the points at which full chute deployment and the start of stable descent are reached. These trajectory points give a measure of the safe minimum altitudes from which ejections should be attempted.
The problem has been evaluated theoretically as well as practically. Although in certain analytic "areas" there are quite wide numerical variations between theory and the practical results, the trends and general behaviour patterns found in both approaches agree favourably.
No practical tests were conducted on the Sabre system. It was felt however, after a theoretical comparison, that the Sabre and T33 ejection systems would behave almost identically during shallow dives and climbs. For either aircraft, the minimum altitudes for a possibility of a successful ejection are:

Type of Approach	Lanyard	No Lanyard
GCA (800 ft/min descent rate)	60 ft	350 ft
"Off the break" (4,000 ft/min)	160 ft	550 ft

177

Campbell, P. A. 1958-59 ESCAPE AND SURVIVAL DURING SPACE OPERATIONS
AUQR 10(4) Winter 1958-59.

178

Cannon, C.W. and E.F. Cox 1947 A PRACTICAL APPROACH TO OPERATOR'S COMFORT
(A technical paper presented at the SAE Nat. Tractor Meeting, 1947)
Farm Implement News 80, 9 Oct. 1947.

179

Car, H. A. 1954 PROCUREMENT SPECIFICATION DC-7C DAY-PLANE PASSENGER SEAT.
(Douglas Aircraft, Santa Monica, Calif.) Drawing No. A-7535260, 26 Nov. 1954

180

Carayon, A., & V. Andre 1956 NOTE SUR LES ACCIDENTS CRANIOCERVICAUX DU PARACHUTAGE. (NOTE ON CRANIO-CERVICAL INJURIES CAUSED BY PARACHUTING)
Societe de medecine militaire francaise, Bulletin mensuel (Paris)
50(4):124-126
April 1956

ABSTRACT: Cases are recorded of cranio-cervical injuries (fractures, dislocations, closed injuries, contusions) occurring during parachute jumps. Lesions are attributed to either a faulty jump due to bad terrain, violent winds, or bad body position, and to the shock produced by the opening parachute

181

Carriston, L.E. 1941 EMERGENCY EXIT FROM AIRPLANES WITH PUSHER PROPELLERS. (War Department, Air Corps, Materiel Division)
2 Jan. 1941. ASTIA ATI 186670.

ABSTRACT: The purpose of this report is to present the results of a study to determine the practicability of methods for emergency exit from airplanes with pusher propellers. Data from this study is to be used to influence design and operation of pusher propelled airplanes.

It has been found practicable to release the propeller before attempting egress from the airplane when such is necessary or desired. A pilot can be ejected from an airplane with pusher propeller by providing suitable means. Emergency exit can be incorporated with a minimum compromise in the basic design of an airplane.

182

Carter, R. L. & G.A. Holcomb 1959 HUMAN TOLERANCE TO FORCES IMPOSED UPON AN AIRMAN DURING SIMULTANEOUS SEAT BOTTOMING, KNEE ELEVATING AND LEG POSITIONING AND RESTRAINING IN THE A3J-1 ESCAPE SYSTEM. (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: The seat bucket on the A3J-1 escape system adjusts to accommodate various height airmen while the rest of the seat and the seat catapault remain stationary. The seat bucket must be bottomed prior to firing the seat catapult in order to have proper center of gravity-rocket thrust relations when the seat leaves the rails. At the same time, the seat is being bottomed, the knees are being elevated and the legs positioned and restrained. This prevents flailing of the lower extremities, insures symmetry of the ejected mass, and reduces the decelerative forces imposed by the dynamic wind pressure. All these operations are accomplished on 0.2 seconds by ballistically powered units. This paper presents data that show that all forces imposed upon the airman during these operations are within human tolerance limits. Production units were tested using anthropomorphic dummies and a human subject. No deleterious effect whatsoever was experienced, not even mild, transient pain. The knee raising bar impacted the legs with a maximum velocity of 7.6 feet per second. The leg restraining hooks impacted the legs with a maximum force of 110 pounds. Raising the knees did not produce spinal flexture. Movies of the human test are presented. (J. Aviation Med. 30(3): 179, March 1959.

183

Cartwright, E. O., et al. 1957 SHOCK ABSORBING SAFETY SEAT. (Chance Vought, Dallas, Texas) U. S. Patent 2, 981, 317, Nov. 1957

184

Casey, D.F. 1945 FINAL REPORT ON SUITABILITY TEST OF THE HAMMOCK TYPE SEAT FOR FIGHTER AIRCRAFT (Air Proving Ground, Eglin AFB, Fla.) 26 July 1945. ASTIA ATI 84893

ABSTRACT: The purpose of the tests was to determine the suitability of the hammock-type seat for use in fighter aircraft. The tests were also conducted to help evaluate the various types of canvas hammocks and frames submitted. It was determined that when properly adjusted, the hammock-type seat greatly reduces pilot fatigue and discomfort during long missions in P-510 type aircraft. The hammock seat as tested is unsuitable for operational use for the following reasons: (1) Adjustments provided for the fitting of various-sized pilots are completely inadequate. (2) The seat frame cannot be used in P-47 type airplanes. (3) Design and adjustment of the back support strap are unsatisfactory. Furthermore, the parachute sling is too long to permit proper positioning of the parachute and dinghy throughout the range of required hammock adjustment. Thorough indoctrination of all personnel who are to use the seat is essential.

185

Castor, J.G.B. 1946 ACCELERATION (G-FORCE) RESEARCH EQUIPMENT, STUDIES, RESULT AND TRAINING. (Hq., AMC, Wright-Patterson AFB, Ohio) Air Tech. Intelligence Review Rept. F-IR-127-RE, Dec. 1946. ASTIA ATI 12710.

ABSTRACT: In order to observe the changes of the intermediary carbohydrate metabolism produced by centrifugal effects in the direction of feet toward head or head toward feet, rabbits were subjected to centrifugal forces of 10 g for 10 seconds in various directions, and the changes in blood sugar and lactic acid were determined. Furthermore, the influence on the above changes by anesthetics (urethane and luminal), as well as by vegatative nerve stimulants (pilocarpine, atropine, adrenlin, and ergotamine) and by vagotomy, was analyzed.

From the experimental results it may be concluded that hyperglycemia and hyperlactacidemia which are gradually produced by centrifugal effects in the directional of feet toward head or head toward feet, and persist for 1-1-1/2 hours after stopping the centrifugal action, are probably due to the fact that the vegetative nerve center or the control center of the carbohydrate metabolism in the midbrain are irritated by the centrifugal forces. This stimulus, in turn, is transmitted to the liver via the sympathicus, where it results in the splitting of glycogen. It was furthermore pointed out that hyperlactacidemia which occurs immediately after stopping the centrifugal action in direction of head toward feet, and which is intensive but transitory, must be of peripheral and not of central origin.

186

Celent, C. 1960 HUMAN FACTORS: NEWEST ENGINEERING DISCIPLINE Electronic Ind., 19(2):85-100. Feb. 1960.

ABSTRACT: Rapid technologic advances have generated problems concerning man-machine compatibitlity that call for an exhaustive knowledge of humna behavior. These problems are especially critical in preparing for space travel, in that the man and the machine must be assigned the function each performs best. The space traveler must be protected against high or complex acceleration forces and weightlessness, and the effects of extremes of pressure, temperature, humidity, radiation, noise and vibration. Descriptions are given of various programs from industry, government, non-profit organizations, and private consulting firms which are attempting to solve these problems. Included are studies on the effect of motion and vibration on the ability of the pilot to control his craft; the development of telemetric devices for monitoring physiologic responses during space travel, and for lunar suit communications systems; the development of a satellite simulator to facilitate the design of living and working conditions in future extended-trip space vehicles; and the development of analog computers to simulate control situations in manned space vehicle re-entry.

187

Chaffee, J. W. 1960 ANTHROPOMETRIC CONSIDERATIONS FOR ESCAPE CAPSULE DESIGN
(Convair, Fort Worth, Tex.) (Internal Furnishings rept. no. 302)
(Cont. AF 33(600)36200) 18 Jan. 1960 ASTIA AD 240 484

ABSTRACT: The problem of determining the amount and configuration of the packaging space required within an escape capsule for the human operator of a high performance aircraft is discussed. A method, based upon photogrammetric techniques, of locating human body components and sensors in three-dimensional space is introduced. Means, standard deviations and 5th and 95th percentile statistics are presented for each of the Cartesians coordinates of a large number of body dimensions collected on twenty-four subjects while in body attitudes representative of the emergency abandonment sequence. Three-dimensional graphical summaries of design ranges are included along with suggestions and limitations regarding application of findings to specific problems. (Author)

188

Chaffee, J. W. 1961 ANTHROPOMETRIC CONSIDERATIONS FOR ESCAPE CAPSULE DESIGN
Hum. Factors 3(1):36-52, March 1961.

ABSTRACT: An experimental investigation was made of the location and spatial requirements of salient anatomical features of the human operator of high performance aircraft when simulating the use of an escape capsule. Twenty-four Ss representative of the Air Force flying population were measured. A system of anthropometric assessment was used which employs a nonstereographic, photogrammetric treatment requiring two to three ordinary eight-by-ten-in. view cameras together with adequate stroboscopic illumination. Data on the x, y, and z coordinates of 16 anatomical features of the operators when positioned in six body attitudes representative of the escape system's use were presented graphically. (Tufts)

189

Chambert, S. 1953 DESCENT IN PARACHUTE WITHOUT RELEASING THE EJECTION SEAT, (Descente en parachute sans largage du siege)--
Médecine aéronautique (Paris), 8 (4): 359-362. 1953 In French.

Summary: A double accident due to low bailout is discussed. Before the first pilot had a chance to release the canopy remover, the seat was catapulted; the parachute opened rather slowly, and the wind blew the pilot against a wall. In the second plane, the pilot failed to

release the ejection seat and was hanging with his head down. When the ejection seat launching mechanism fired, the pilot clung to a tree. He suffered from shock and was taken to the hospital where the following conditions were diagnosed: compound fracture of the lower portion of the right forearm; detachment of the styloid process from its base; subcutaneous lesions of the left foot and left leg extending to the exterior tibial tuberosity with emphysema around the wound; small fracture of the left heel bone, fracture of the right radius; and hematoma of the left carotid region. It was concluded that the accident was caused by technical failure. Instead of pulling the handle of the ejection seat, the pilot grabbed the arm brace of the seat. When he tried to open the parachute, he realized that the seat was not released and got entangled with the parachute.-- There are only a few instances known when a pilot was able to parachute to safety without the ejection seat being released. When opening the canopy, eye glasses, helmet and the mask frequently get lost. As a preventive measure, pilots prefer to fasten the oxygen supply tube to the parachute belt, so that it should be accessible when needed.

190

Chance Vought Aircraft 1960 AERODYNAMIC ANALYSIS OF F8U-1 INTERGRATED FLIGHT CAPSULE.
(Chance Vought Aircraft, Dallas, Texas) Rept. No. EOR-12823; 25 March 1960. ASTIA AD 263 512.

ABSTRACT: Under the Bureau of Naval Weapons Contract NOas 59-6150-c, Chance Vought Aircraft has conducted a preliminary design of an integrated flight capsule based on the fuselage nose section of the F8U-1 airplane. The necessary stabilizing fins were selected and designed. Low speed and high speed wing tunnel tests were conducted. Interference between the capsule and afterbody was evaluated. Capsule performance was demonstrated by a computer program and by ejections of dynamically similar models in a low speed wind tunnel. Acceleration of the flight capsule was detected by the computer method and by human tolerance. Results are presented in this interim report.

191

Chew, F. E., L. Oling & H. A. Clutz 1962 INVESTIGATION OF STABILIZATION AND CONTROL SYSTEMS FOR APPLICATION TO AERO SPACE VEHICLE ESCAPE CAPSULES.
(Flight Dynamics Laboratory, Aeronautical Systems Division, Air Force Systems Command, Wright-Patterson AFB, Ohio) ASD-TDR-62-243; June 1962.
ASTIA AD 284 618

ABSTRACT: Previous studies have established that methods for stabilization and control of escape capsules for low orbital manned vehicles are necessary. In this study the stabilization and control system requirements, methods, and problem

areas were established, and system designs for lifting and ballistic capsules were described. Study objectives were to establish the optimum design of a fully automatic system with manual backup which provides adequate escape capability with the minimum of complexity. Aerodynamic studies showed that attitude control outside the atmosphere, damping augmentation for all flight conditions, aerodynamic roll trim, and two position stabilizing surfaces are required for both capsule designs. The control systems selected for the two capsules were similar and contained a gyroscipic attitude reference corrected by infra-red horizon scanners, gyrocompassing and temperature sensors; hydrogen peroxide reaction jets to supply damping and attitude control moments; stabilizing flaps; and aerodynamic roll trim by center of gravity control. Some manual mode switching during the normal mission is used, thus reducing system complexity and allowing proper system functioning despite deviations from the planned mission profile; however, both systems are fully automatic upon separation from the parent vehicle. Significant problems were discovered in controlling the magnitude of socillatory accelerations during escape at high dynamic pressure and in measurement of capsule yaw angle. (ASTIA)

192

Chubb, R. M., W. H. Davidson, & W. D. Gable 1963 THE PATHOLOGY OF EJECTION FAILURE. (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 29 - May 2, 1963)

ABSTRACT: A review of all fatalities accessioned since 1957 at the Armed Forces Institute of Pathology as a result of ejection failures has been completed. The circumstances surrounding death and the autopsy findings, both anatomical and toxicological, have been studied in an effort to determine the causes of fatal injuries. The results of this study are presented in order to point out the patterns of injury seen in the different ejection situations. Representative cases are briefly presented in order to show the mechanism of injury and thus form a basis for recommendations for prevention of these injuries.

193

Churchill, H.E., P.G. Hykes & M.Z. Delp 1946 RIDE COMFORT, SAFETY, SUSPENSION REQUISITES SAE J1 54:74-5

194

Clamann, H.G. 1960 MEDIZIN UND RAUMFAHRT: DER MENSCH IN DER KAPSEL (Medicine and Space Flight: Man in Capsule) Flugkorper (Wiesbaden) 2(1): 16-18. Jan. 1960 (In German)

ABSTRACT: In a lecture delivered at Dusseldorf, Germany, the author reviewed current and projected areas of investigation in the medical problems of space flight. The subject discussed included acceleration tolerance, weightlessness, the use of pressure suits, hazards of Van Allen belt radiations, the food requirements and techniques for space flight feeding, methods of re-cycling water and of CO_2 -O_2 exchange, isolations, and tolerance to high dry-heat temperatures.

195

Clark Co., David Inc. 1960 DEVELOPMENT OF AN EMERGENCY PRESSURE SUIT COVERALL, HIGH ALTITUDE, VENTILATION-EXPOSURE TYPE CSU-5/P. (Wright Air Development Division Air Research and Development Command, Wright-Patterson AFB, Ohio) WADD TR-60-809, Nov. 1960. ASTIA AD 254 906.

ABSTRACT: This report describes the various features evaluated during the development of Coveralls, Flying, High Altitude, Ventilation-Exposure, Type CSU-5/P. Each progressively improved prototype garment is described and the results are reported. Practical solutions were achieved in some areas, but additional work is required in others.

196

Clark, C.C. 1961 SOME BODY DISPLACEMENTS AND MEDICAL EFFECTS OF LATERAL ACCELERATIONS DURING NAVY CENTRIFUGE SIMULATION OF EJECTION (Lab., Naval Air Development Center, Johnsville, Pa.) Final Report. NADC MA 6044, 11 April 1961. ASTIA AD 257 371.

ABSTRACT: For steadily applied lateral loads in the Martin-Baker Mark J5 Ejection Seat and restraint system in usein the YAO-1 aircraft, lateral displacement of the pilot is such as to make questionable safe ejection at 2 G past the canopy beam located 12.5 in from the seat center, even with the restraint harness tighter than would be the case in general flying. With additional equipment on the pilot inside of the restraint harness, lateral displacements will probably be increased. For steadily applied lateral loads above 2G, this study indicates that lateral displacements of the pilot would preclude safe ejection. The theoretical discussion in the previous section indicates that either body motion damping effects, reducing displacements, or resonance overshoot effects, increasing displacements might occur for the shorter duration acceleration pulses of air-craft in-flight accidents. Unit such time as the resonance frequencies and dump-

of this man-seat-restraint system canbe determined, the shoulder displacement values of this study are reasonable predictions of displacements to be expected in aircraft experiencing similar acceleration components. (Author)

197

Clark, Carl & Carl Blechschmidt 1963 HUMAN VIBRATION AND IMPACT ISOLATION WITH A PROTOTYPE FULL LENGTH AIR BAG RESTRAINT SYSTEM
Paper: 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif. April 28-May 2, 1963

ABSTRACT: A preliminary air bag restraint system has been developed, with the subject supported in front and back by full length air bags inflated within a box container of 22 x 34 x 84 inches at pressures up to 10 inches of water. An opening through the top bag and box allows respiration. By November 1, 1962, 95 vibration tests and 68 impact tests with three subjects had been carried out. With a box vibration of $1G_x \pm 3G_x$ (sine wave) at 11 cps and a lower bag pressure of 3.5 inches of water, the subject experienced $1G_x \pm 0.4G_x$ (sine wave) at 11 cps, for five minutes with only slight discomfort. To prevent waist flexure during impact, the subject lay on a back goard. With a box impact into sand from four feet up, hitting at 16 feet per second with a peak deceleration recorded of 310 G_x, and with the lower air bag at 10 inches of water pressure and the upper at 7 inches of water pressure, the accelerometer on the hip of the subject peaked at 17.2G_x. A valve system for dumping the bag pressure at maximum displacement, to prevent rebound, is under development. Technical developments of a means of control to prevent "bottoming" and to vary resonance frequencies warrant further exploration of acceleration isolation restraint systems.

198

Clar[illegible], N.P. & Charles R. Feeley 1962 AEROMEDICAL ASPECTS OF THE B-58 CAPSULE EJECTION SEAT
Paper: 33rd Annual Meeting of the Aerospace Medical Association, Chalfonte-Haddon Hall, Atlantic City, N.J., April 9-12, 1962

ABSTRACT: The evolution of aircraft escape devices from the open ejection seat into the encapsulated seat system brought many critical and crucial human factor problems. Paramount of these problems was in the area of biodynamics, in which the establishment of the additional human tolerance data was required for making man compatible with this new concept of escape. This paper presents the aeromedical support provided to the B-58 escape capsule program under the leadership of the Aerospace Medical Laboratory, Wright-Patterson AFB. Details of the tests conducted and the highlights of the related biodynamic factors will be discussed. The critical portions of the animal and human testing conducted by the contractor and the Air Force to validate the design principles and establish command confidence in this new escape concept will be discussed.

199

Clark, N.P. 1963 BIODYNAMIC RESPONSE TO SUPERSONIC EJECTION
Paper: 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 29-May 2, 1963

ABSTRACT: Six supersonic test ejections of the B-58 escape capsule were made from a specially modified Hustler. Five black bears and one chimpanzee were used as subjects. Ejection altitude was between 35,000 feet and 47,000 feet and speed varied between Mach 1.3 and 2.0. In the second test ejection, made from 45,000 feet at Mach 1.6, excessive positive pitching of the capsule induced unstable flight producing cyclic high amplitude lateral acceleration associated with oscillation in yaw. The bear subject sustained bilateral complete fractures of the acetabular branch of the ischium. In the following ejections, a change in orientation of the rocket thrust vector to prevent excessive pitching was tested and shown to be successful. In addition to the supersonic ejections, three subsonic ejections using bear subjects, one from 40,000 feet at Mach 0.8, one from 5,100 feet at Mach 0.9 and one rolling runway ejection at 100 knots were done to validate satisfactory performance of the capsule over the flight envelope of the aircraft after the change in rocket thrust vector. The results of these ejections will be discussed using engineering test motion pictures to illustrate capsule performance and to relate capsule motions and acceleration to the response of the subjects.

200

Cochran,R. and L. E. Morehouse 1948 THE ABILITY OF MAN TO REACH UPWARD DURING POSITIVE G
(Office of Naval Research, Washington, D. C.)
June 1948 Contract N6ori77

SUMMARY: The hands can be raised above the head under conditions of 8 positive G and a simulated Martin-Baker ejection seat release with a resistance of 30 pounds can be operated with ease.

A loss of visual fields in one subject was not accompanied by either losses in kinesthetic or touch sensations, or the ability to control learned movements with accuracy.

A reach above the head during positive G can be accomplished easier and more accurately if the elbows are first flexed and then the hands are drawn upward past the ears, than if the reach is performed with the arms raised upward in extension.

201

Cochran, L. B. 1953 STUDIES ON THE EASE WITH WHICH PILOTS CAN GRASP AND PULL THE EJECTION SEAT FACE CURTAIN HANDLES
J. of Aviation Medicine 24(1):23-28 February 1953

ABSTRACT: 1. Thirty naval fighter pilots, of various anthropometrical measurements, from NAAS, Cabaniss Field, Texas, VR-31, and VF-71, Com-Air-Lant, were tested on the Pensacola Human Centrifuge in their ability to actuate the Martin-Baker type ejection seat mechanism. For these tests the subjects, protected by anti-blackout suits, were subjected to levels of positive radial acceleration about 2.0 g above their relaxed blackout tolerance level.

2. The results suggest that, unless extremely fatigued, most suit-protected pilots should be able to perform the arm movements necessary to actuate the Martin-Baker type ejection seat at 2.0 g above their control blackout level if the g were a constant one. There were no means available by which their ability could be tested under conditions of fluctuating g-levels.

3. A marked degree of success would appear to depend on the pilot's pre-knowledge of the effects of such forces on him and his plane, and proper instruction as to procedure and techniques employed which facilitate his ability to actuate the ejection seat under high accelerative forces. This portion of success could be made available through lecture training and centrifuge indoctrination.

202

Cofer, F.S., Jr., H.M. Sweeney & C.E. Frenier 1946 ESCAPE FROM HIGH SPEED AIRCRAFT
(Engineering Division, Air Materiel Command, Army Air Forces) Eng. Div. Memo Report TSEAC11-45341-1-2 August 9, 1946 ASTIA ATI 9213

ABSTRACT: This publication presents the history, current progress, and future plans for escape from high speed aircraft. A summary of the accomplishments of the Air Materiel Command in connection with escape from high speed aircraft is contained in the following Appendices: Appendix 1 outlines the work of the Aircraft Laboratory; Appendix 2 outlines the work of the Aero-Medical Laboratory; Appendix 3 outlines the work of the Personal Equipment Laboratory; Appendix 4 is a bibliography on this subject. The contents of the Appendices of this report provide an introduction to the problems of escape from high speed aircraft for all concerned. The necessity for safe escape from high speed aircraft requires an immediate solution as well as long range research.

203

Colajanni, G. 1931 UN CASO DI EMORRAGIA RETINICA PER LANCIO NEL VUOTO CON PARACADUTE (Retinal Hemorrhage from Parachute Descent)
Annali di ottalmologia e clinica oculistica (Genova) 59: 1017-1020, Nov.-Dec.

204

Conley, M. 1952 A METHOD OF SUPPORTING THE HUMAN BODY STRUCTURE DURING SPACE FLIGHT
J. Space Flight 4(9): 3-4, Nov. 1952

ABSTRACT: Lightweight zippered supporters, made of webbed cotton fabric, are recommended for use in space ships to protect various parts of the body from effects of acceleration, deceleration, and zero-g conditions. They would be worn underneath the underclothing as a "second skin", to hold the body's shape and prevent rupturing of organs.

205

Convair 1960 F-106 PILOT'S ADVANCED ESCAPE SYSTEM. HUMAN POSITIONING TESTS.
(Convair, San Diego, Calif.) Rept. no. DL 60-132

ABSTRACT: Research was undertaken to provide the test subjects with experience in the rapid positioning prelaunch sequence of the B-seat. A reserve chest-type parachute was incorporated in these positioning tests to determine its placement for compatibility with the pre-launch positioning of the seat. A total of nine runs were conducted using a 95-percentile anthropomorphic dummy, a 50-percentile human, and a 65-percentile human, as test subjects. The dummy was tested in a MK IV full-pressure suit only, while the humans were tested in CSU-4/P full-bladder pressure suits, MK IV full-pressure suits, K-2B summer flying suits, and CWU-1/P winter flying suits. The present MK IV full-pressure suit was not compatible with the pre-launch positioning of the seat, even when unpressurized. These tests also indicated that a pressurized CSU-4/P suit offered excessive resistance to operation of the foot pan motor unit, causing the motor to stall, and preventing complete seat positioning. (Author)

206

Conway, S. M. O., & B. J. Cremin 1956 SOME MEDICAL PROBLEMS OF PARACHUTING IN MALAYA. J. Royal Army Med. Corps (London) 102(1):70-72, Jan. 1956

ABSTRACT: A 4.6% casualty rate was found in 995 operational or training parachute jumps of troops and medical personnel over the Malayan jungles. The hazards of jumping in the jungle include parachute hook-up and catching in branches and trees, or giving-way of the parachute after initial hook-up. The most common injuries occurred in the back, usually crush fractures of the lumbar and thoracic vertebrae. Other injuries occurred in the ankle, ribs, pelvis, clavicles, or any other bones which come in contact with direct violence by branches or the ground. Lacerations and bruises were usually treated on the spot, but more serious injuries were evacuated by helicopter. Casualties were reduced by air reconnaissance of the terrain prior to jumps.

207

Cooper, K.H. & F.M.G. Holmstrom 1961 INJURIES DURING EJECTION SEAT TRAINING Aerospace Medicine 32(3): 277, March 1961

ABSTRACT: The USAF ejection seat trainer used for emergency escape familiarization is an occasional cause of injury to trainees. Injuries that occur are usually minor and related to high headward acceleration of very short duration. Three new cases of coccygeal injury resulting from ejection seat training are reported. The character and magnitude of the accelerative forces, the role of body position, and the protective value of high energy absorbent seat cushions are discussed. Recommendations to minimize the recurrence of such injuries are included.

208

Craig, F. N. 1950 VENTILATION REQUIREMENTS OF AN IMPERMEABLE PROTECTIVE SUIT. (Med. Div. Res., Army Chem. Center, Md.) Med. Div. Res. Rpt. No. 5.

209

Crampton, G. H., W. J. Schwam and S. Warburton 1960 A METHOD FOR RIGID RESTRAINT OF UNANESTHETIZED CAT (Army Medical Research Lab., Fort Knox, Ky.) Rept. no. 416 4 Feb. 1960 ASTIA AD 232 505

ABSTRACT: A humane and rigid immobilization of cat is obtained with individually fitted bivalve plaster casts. Detailed instructions are

given. The method has been employed only in the study of vestibular sensitivity but should also serve for study of other sensory systems. (Author)

210

Craven, C.W. & E.L. Cole 1960 MANNED SPACE OPERATIONS
In: Vistas in Astronautics -- 1960, Volume III. Proceedings of Third AFOSR Astronautics Symposium, Los Angeles, Calif, October 12-14, 1960. (Society of Automotive Engineers, Inc., New York, N.Y.) Pp. 83-84. October 1960.

ABSTRACT: A brief review is given of some of the activities and problems of manned space operations. Acceleration, weightlessness, isolation, work cycles, radiation, restraint and support, and ecological systems are pointed out as areas in which intensified research is needed. (Tufts)

211

Cumming, F. G. 1961 ESCAPE FROM AIRCRAFT AT HIGH SPEEDS AND LOW ALTITUDES. In Bergeret, P., ed., Escape and Survival: Clinical & Biological Problems in Aero Space Medicine. (London, New York, Paris: Pergamon Press, 1961) AGARDograph 52. Pp. 5-9. ASTIA AD 261 881

ABSTRACT: The results of ejections from aircraft near ground level have in the past been very unsatisfactory, and while high speed ejections have safely taken place, they have mainly taken place at relatively high altitudes where the Mach number was high but the indicated airspeed was relatively low. In considering escape from an aircraft by means of an ejection seat, the height, speed, aircraft behaviour and attitude are the significant factors, and when dealing with escape at high speed, and low level, the latter is of fundamental importance.

212

Curriston, L.E. 1941 EMERGENCY EXIT FROM AIRPLANES WITH PUSHER PROPELLERS (U.S. Army Air Corps, Materiel Division, Wright Field, Ohio) Seriel No. EXP-M-51/P739, Jan. 2, 1941. ASTIA ATI 186 670.

ABSTRACT: This report presents the results of a study to determine the practicability of methods for emergency exit from airplanes with pusher propellers. Data from this study is to be used to influence design and operation of pusher propelled airplanes. It was found practical to release the propeller before attempting egress from the airplane when such is necessary or desired. Furthermore a pilot can be ejected from an airplane with pusher propeller by providing suitable means. Finally, emergency exit can be incorporated with a minimum compromise in the basic design of an airplane.

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213

Danaher, J. W. and A. Sylvestro 1961 AVIATOR ESCAPE SYSTEM TRAINING (Courtney and Co., Philadelphia, Pa.) 1 March 1961 ASTIA AD 256 342

ABSTRACT: The purposes of this study were to investigate Naval escape system training needs and to provide information upon which recommendations could be made to improve training procedures and devices. These data were gathered by means of a literature study; a Pilot Questionnaire; interviews with equipment manufacturers and training specialists; review and analysis of ejection accident data; and a training film survey. Recommendations were made regarding: the standardization of equipment and procedures involved in ejection, parachuting, ditching and survival; dissemination of accident information to all pilots; added realism in training devices; and a more holistic approach to escape training. (Author)

214

Darras, J. Oct. 1953 SHOULDER HARNESS WEBBING: A COMPARISON OF DACRON, NYLON, AND COTTON. Rept. No. ES-17449 (Douglas Aircraft Co., Inc., 6 Oct. 1953)

215

Darrow, C. W., J. Pathman, & W. Morse 1946 AUTONOMIC AND ELECTROENCEPHALOGRAPHIC EFFECTS OF POSTURE. (Institute for Juvenile Research, Chicago)

ABSTRACT: Inability in certain instances to demonstrate expected autonomic effects on the electroencephalogram (EEG) suggested possible compensatory effects by moderator (carotid sinus?) nerves. A test of effects of posture on autonomic activity and EEG offered an approach to the problem. Emotional effects of unusual or insecure postures have, however, to be taken into account.
Subjects were arranged for autonomic and EEG recording on a tilting table. Blood pressures were recorded from the wrists held across the chest. Tilting to a 45 degree feet down position, typically increased blood pressure, heart rate, palmar skin conductance, and voltage of EEG at alpha frequency. The effect was reversed on return to horizontal. Tilting 30 degrees from horizontal toward a head down position had variable effects depending on emotional concomitants. When blood

pressure and heart rate decreased with little change in skin conductance (indicating relatively uncomplicated effects) alpha potential was reduced. When, as was more often the case, change toward the head down position was attended by increase of blood pressure, heart rate, and palmar skin conductance (emotional effects?), there was an increase of alpha compared with level. Increased heart rate and skin conductance were more consistently related to increased alpha potential than were either posture or blood pressure.
Carotid sinus compensation accounts for many otherwise unexplained autonomic-EEG relations. (Federal Proceedings 5(1):21, 1946)

216

Davenport, H. W. 1944 ENVIRONMENTAL TEMPERATURE AND THE CARDIOVASCULAR EFFECTS OF INFLATING A PNEUMATIC SUIT (GPS) (Harvard) CAM No. 332; 31 July 1944

ABSTRACT: (a) Tilting normal subjects from recumbency to 70 degrees reduces blood content of the ear. There is great variation in the same subject on repeated tests at the same environmental temperature.
(b) Inflation of a pneumatic suit to 3 psi on a tilted subject increases the blood content of the ear but with considerable variation. The magnitudes of these 2 changes cannot be correlated with each other or with heighth, weight, or physical fitness of the subject.
(c) Effects produced at 25 degrees C by inflation of ankle, leg, and thigh bladders to 3 psi are not significantly modified by mild exercise, by fit of GPS, or by additional inflation of the abdominal bladder.
(d) Tilting to 70 degrees and return to recumbency decreases and increases respectively the blood content of the ear by approximately equal amounts at 25 degrees C and 40 degrees C, but at 3 degrees these changes are larger in extent and slower in development.
(e) Inflation of ankle, leg, and thigh bladders increase the blood content of the ear by approximately equal amounts at 40 degrees C and 25 degrees C but has little or no effect at 3 degrees C.
(f) Heart rate is increased by tilting to 70 degrees and decreased by inflation of the suit. Changes in heart rate are more pronounced at 40 degrees C and 25 degrees C and less pronounced or absent at 3 degrees C. Similarly, decrease in blood pressure is greater with tilting at 40 degrees C and 25 degrees C and less at 3 degrees C. Inflation of suit tends to raise blood pressure slightly more at 40 degrees C and 25 degrees C than at 3 degrees C.
(g) Inflation of the abdominal bladder in addition to leg bladders does not add significantly to the cardiovascular effects of the suit at any of the temperatures tested, but it must be emphasized that the observations involved a force of only 1 "g" on the tilt table and that results may well be different at higher "g".
(h) It is concluded that inflation of the pneumatic suit (GPS with equal pressure in all bladders) has more effect on the circulation to the head at high environmental temperatures than at low. However, the difference at 1 "g" are not great and the responses of any one subject are extremely variable.

217

Davidson, S., B. Rose., and W. K. Stewart 1954 A REVIEW OF THE PRACTICALITY OF, AND NECESSITY FOR, ANTI-G DEVICES IN THE RAF WITH PARTICULAR REFERENCE TO THE FRANKS FLYING SUIT, MARK III. (RAF Instit. of Aviat. Med., Farnborough, Eng.) FPRC 584. July 1954.

ABSTRACT: The FFS Mk III has been extensively flight tested by the RAF, Fleet Air Arm, and American 8th Army Air Force. It has been tested in Europe, the Mediterranean, and in Southeast Asia. In preliminary trials all three services regarded it favorably. In the final trials, only the FAA have strongly recommended it. The RAF have rejected it, and the 8th AAF at the time of the report was undecided. The chief objections to the suit were its bulk and awkwardness, the diffiuclty in servicing it, and difficulty in looking back while wearing it.

218

Davies, I.J., 1960 PARACHUTE HARNESSES. (Felland Aircraft) Pat. Spec., 844618 17 Aug. 1960

ABSTRACT: Relates to combined harnesses which not only provide attachment for the parachute pack to the airman but also serve to strap him in his seat (usually an ejecter seat). The two straps for securing the parachute to the airman, and for securing him in his seat are arranged to pass together over each shoulder of the airman and down his breast where they are both received by a common adjusting buckle through which either can be pulled independently of the other.

219

Davies, J. 1957 THE PROBLEM OF BACK FRACTURES DURING EJECTION FROM USAF AIRCRAFT. PERIOD: 1 AUG. 1949 THRU 31 MARCH 1956. (Norton AFB, Calif.) Publication 2-57, AFR 190-16, Jan. 1957.

ABSTRACT: To determine the frequency and causes of back fractures experienced during ejection escape, a review of ejection escape experiences over a seven year period was made. Reports from the personnel involved plus other relevant data were used as bases for recommendations toward reducing these fractures and for proposed research and development here.

220

Dayton, A., E. H. Jones, & J. J. Corrigan 1960 IMPROVED DRAG PARACHUTE INSTALLATION EVALUATION. (Boeing Airplane Co., Wichita, Kansas) Contract No. AF 33(600)39114; Document No. D3-3028; ASTIA AD-244 153; 15 July 1960

ABSTRACT: Engineering change proposal 846, effective on production airplanes 58-227 and on, was initiated to correct the maintenance problems relative to the parachute door, latch assemblies, and the retract shaft; to facilitate drag chute

loading and to comply with the B-52G CTCI request for alteration. This test was conducted to evaluate ECP 846M (kit) as an effective change prior to authorization of kits. The following general areas were reviewed: (1) drag chute loading; (2) door latch assembly removal and replacement; (3) laboratory tests; and (4) flight tests. Laboratory and flight test results indicate that he ECP 846 revisions to the drag chute installation were very effective. \STIA)

221

Deans, D. A. 1960 SAFETY HARNESS - SABRE AND SILVER STAR AIRCRAFT. (Royal Canadian Air Force, Central Experimental and Proving Establishment, Climatic Detachment, Namao, Alberta) Report 2068; ASTIA AD-241 729; June 1960

SUMMARY: Because of user complaints on "Z" type safety harnesses in both Sabre and Silver Star aircraft, tests were conducted to determine if more suitable combinations and arrangements of harnesses and buckles could be achieved. It was found that, while certain complaints were due to defects in seat pack retention and other causes not solely the fault of the harnesses, there were several defects in the harnesses themselves. As a result of the tests, the most suitable combination and arrangement of webbing and buckles, using currently available materials, was determined. It is recommended that safety harnesses for Sabre and for Silver Star aircraft be made of Terylene webbing described in para 2(b) (i) and use Adjustment Buckle described in para 2(a) (ii), and incorporate the detailed recommendations made in this report. (AUTHOR)

222

DeBarge, J. 1954 PLEA FOR A PASSENGER COMFORT CHARTER. Interavia. 9:675-678

223

DeForest, R. E., E. L. Beckman 1961 SOME MEDICAL CONTRAINDICATIONS TO THE USE OF THE STANDARD LIFE JACKET FOR SURVIVAL (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-6135; 9 August 1961

ABSTRACT: Survival from a disaster at sea is dependent upon the reaction of the victims to four major stresses; (1) spiritual failure, (2) heat loss and thermal failure, (3) dehydration and fluid balance failure, and (4) inanition and energy failure. The Mae West type of flotation equipment causes two deleterious physiological effects: (1) profuse diuresis based upon the Gauer-Henry left atrial volume receptor reflex which is stimulated by the negative pressure breathing

[illegible] partial water immersion, and the effects [illegible] (2) the rapid heat loss from the immersed part of the body would be [illegible] rotating even at sea temperatures of 70 degrees F which are now thought to be innocuous. These physiological effects which result from the use of the Mae West type survival equipment increase the severity of an already overwhelming stress. An alternative type of individual flotation garment which would obviate many of these difficulties has therefore been recommended for further consideration. (AUTHOR)

224

DeGaugh, R.A. & J.R. Keller 1957 EJECTION SEAT TRAINING IN THE STRATEGIC AIR COMMAND. (Air Force Personnel & Training Res. Center, Randolph FAB, Texas) Tech. Memo. OL-TM-57-16.

225

DeHaven, H. 1948 THE FUNCTION OF SAFETY BELTS IN CRASH PROTECTION. (Crash Injury Research, National Research Council, Washington, D.C.) 20 February 1948.

226

DeHaven, H., & A. H. Hasbrook Feb. 1951 USE AND EFFECTIVENESS OF SHOULDER HARNESS IN SURPLUS MILITARY AIRCRAFT FLOWN BY CIVILIAN PILOTS. (Cornell University Medical College) AFTR 6461

ABSTRACT: An analysis was made of 82 accidents involving single-engine, World War II trainer-type military aircraft to determine the use and effectiveness of shoulder harness. There was no evidence of shoulder harness in 68% of the planes. The harness had either been removed or was not used at the time of accident in 77% of the cases, 73% of the pilots who retained the harness in their planes were wearing it at the time of their accidents. The probability of head injury in survivable accidents was significantly greater when the harness was not worn; nondangerous head injuries occurred twice as frequently, and dangerous and nondangerous injuries combined occurred 6 times as often. It is recommended that pilots be indoctrinated in the protection value of the shoulder harness and that a more acceptable type of harness be provided.

227

DeHaven, H. 1952 CURRENT SAFETY CONSIDERATIONS IN THE DESIGN OF PASSENGER SEATS FOR TRANSPORT AIRCRAFT. (Crash Injury Research, Cornell University Medical College, New York, N. Y.) June 1952; ATI-155 851

SUMMARY: Well designed forward facing seats - and secure tie-down for "20g" safety belts - should give high degrees of protection in civil air transports, up to the point where flooring and surrounding cabin structures are destroyed. Although Crash Injury Research has developed considerable data on the effectiveness of safety belts, harness and forward facing seats, very limited information from actual crashes has become available on the protective values of various types of rearward facing seats. Some of the current military installations suggest hazards which, except under the most fortuitous crash conditions, may cause dangers which are not present in the design of improved forward facing passenger seats. Merely building "beefed up" seats and turning them around is not the answer - safety-wise. Rearward facing seats must be carefully designed and their protective qualities - as well as their deficiencies - must be thoroughly analyzed from accident-injury studies, so that the full value of rearward facing seats can be developed. Details of survivable crashes in civilian, as well as military transports, should be studied from the crash-injury point of view, so that valid conclusions can be reached on: 1) The magnitude, direction and duration of crash forces in survivable transport accidents. 2) The desirable strength for seats and safety belt installations; 3) The effectiveness of safety features in seat design; 4) The relative merits of forward facing and rearward facing seats. (AUTHOR)

228

DeHaven, H. 1952 ACCIDENT SURVIVAL--AIRPLANE AND PASSENGER CAR (Society of Automotive Engineers) Preprint No. 716, 1952.

229

DeHaven, H. 1952 PACKAGING THE PASSENGER
S.A.E. Journal 60(6): 55-56, June 1952

ABSTRACT: During the last ten years, there has been a slow but steady increase in the deliberate use of aircraft configuration to protect pilots and passengers in accidents. Many of the developments should be useful in cutting the crash-injury rate in passenger cars.
The most frequent injuries in survivible aircraft and automobile accidents are fractures of the skull, lesions of the brain, smashing of facial bones, and other dangerous head injuries. Studies in 1942 on impact velocities and data from plane accidents led to studies of the injury potential of objects commonly struck by the head. Shoulder harness does an amazing job of protecting the head, but is not even on the horizon for autos. The safety belt does not effectively check the velocity of the head but modifies the injury-potential area.
Crash-engineering has been built into the instrument panels, windshields, flooring,

[illegible] controls, et cetera, of aircraft. In six new planes crash-engineering [illegible] been extended to the cabin and its adjacent structures. The use of structures to protect the body in accidents is a very young engineering art. Without specific crash-injury data, engineers cannot understand the factors responsible for dangers and cannot judge the need for safer design. The only way to find out is to extend the scope of present accident investigations and, in addition to getting reports on typical causes of accidents, get reports on typical and repeated causes of injury. (J. of Aviation Medicine 23(5): 533-534, October 1952)

230

DeHaven, H. & A. H. Hasbrook 1952 HOULDER HARNESS: ITS USE AND EFFECTIVENESS. (Medical College, Cornell Univ.) 1 Nov. 1952.

231

DeHaven, H. 1953 DEVELOPMENT OF CRASH-SURVIVAL DESIGN IN PERSONAL, EXECUTIVE AND AGRICULTURE AIRCRAFT.
(Crash Injury Research, Cornell Univ. Medical College)

ABSTRACT: The designs of the CAA-Texas A and M agricultural plane, the Beech Bonanza and Twin-Bonanza, the Helioplane Courier, and the Meyers 145 are discussed in detail. The various methods by which manufacturers have improved these models to provide more complete crash protection for pilots and passengers are described. The appendix contains a reprint from Aviation Week, March 13, 1950, on how lighter planes can be made safer.

232

DeHaven, H. 1953 PROTECTIVE DESIGN IN FORWARD AND REARWARD FACING SEATS IN TRANSPORT AIRCRAFT. (Paper, SAE Annual Meeting, The Sheraton-Cadillac, Detroit, Jan. 12-16, 1953) (Crash Injury Res., Cornell Univ. Med. College) pp. 1-6. SAE Preprint No. 29.

ABSTRACT: In considering seats for aircraft, the serious problems of weight, cost, maintenance and comfort are new and major considerations of passenger protection in seat design. Another new consideration is whether future seats should face backwards or whether supports, base frames, seat-backs, and arm-rests should be redesigned and strengthened, in order to support the passenger's head and body under severe impact. A good many survivable accidents, including some recent ones in transports equipped with rearward facing seats, suggest that 20 g rearward facing seats may not be essential for protection in run-of-the-mill types of survivable airline accident- and the suggestion that 40 or 50 g seats would be still safer is open to even greater doubt. In any case, it seems

almost certain that accident results ultimately will show that military personnel should be equipped with a combination safety belt and shoulder harness, to hold them in their seats - against the seat-backs- in order to fully utilize the advantages of rearward facing seats.

233

De Haven, H. 1953 REARWARD AND FORWARD-FACING SEATS.
Aeron. Engr. Rev. 12(3):1-2

ABSTRACT: Elected weather minimums and passenger comfort are two of the reasons for believing that different considerations enter the problem of using rearward facing seats in military and civil air transports. In order to fully utilize the advantages of rearward-facing seats, military personnel should be equipped with some combination of safety belt and shoulder harness to hold them in their seats - against the seatbacks. Civil airline operators are not satisfied with the supposition that rearward-facing seats are safer than forward-facing seats. They want specific information. So far, there have been few accidents in aircraft using rearward-facing seats. Facing the facts, in the recent accidents in scheduled U.S. air liners, we find little evidence that rearward-facing seats would have made a significant difference in passenger safety.

234

DeHaven, H., B Tourin & S. Macri 1953 AIRCRAFT SAFETY BELTS: THEIR INJURY EFFECT ON THE HUMAN BODY
(Crash Injury Research, Cornell U. Medical Coll., New York, N.Y.) July 1953
ASTIA AD 14 643

ABSTRACT: An examination was made of the injuries sustained by 1039 survivors of 670 lightplane crashes. Chi-square methods were employed in statistical analyses to relate the use of the belt and body injuries of survivors. Safety belts were shown to be an infrequent cause of injury and to serve as effective protection. Severe snubbing action of safety belts as seen in 80 cases showed no significant correlation with the occurence of intra-abdominal and lumbar spine injuries. Critical intra-abdominal and lumbar spine injuries appeared related to each other and to vertically acting forces. Bruises and minor contusions were attributable to safety belts. Injuries which occurred without any signs of snubbing were jolt loads transmitted by supporting structures and seats. Injuries of the upper and lower torso were associated with and increased by failure of safety belt installations. The percentage of all trunk injuries sustained by users and nonusers of safety belts was similar. No increased frequency was observed in injuries to the torso, neck and spine by the use of the belt. Survivors not using safety belts suffered more serious injury than those that used them. Upper and lower torso injuries were also related to failure of belt installations. Dangerous-to-life injuries of head and body were associated and increased with vertical crash forces. (ASTIA)

[illegible] 1954 CURRENT SAFETY CONSIDERATIONS IN THE DESIGN OF PASSENGER SEATS FOR TRANSPORT AIRCRAFT. (Reissued by Aviation Crash Injury Res., Cornell-Guggenheim Aviation Safety Ctr., New York) pp. 1-12, May 1954. (A revision of a paper of same title issued June 1952)

ABSTRACT: Well designed forward facing seats- and secure tie-down for "20 G" safety belts- should give high degrees of protection in civil air transports, up to the point where flooring and surrounding cabin structures are destroyed. Although Crash Injury Research has developed considerable data on the effectiveness of safety belts, harness and forward facing seats, very limited information from actualcrashes has become available on the protective values of various types of rearward facing seats. Rearward facing seats must be carefully designed and their protective qualities- as well as their deficiencies- must be thoroughly analyzed from accident-injury studies, so that the full value of rearward facing seats can be developed. Details of survivable crashes in civilian, as well as military, transports should be studied from the crash-injury point of view, so that valid conclusions can be reached on: (1) The magnitude, direction and duration of crash forces in survivable transport accidents; (2) The desirable strength for seats and safety belt installations; (3) The effectiveness of safety features in seat design; and (4) The relative merits of forward facing and rearward facing seats.

236

De Haven, Hugh and A. Howard Hasbrook 1956 SHOULDER HARNESS: ITS USE AND EFFECTIVENESS.
(Aviation Crash Injury Research of Cornell University) Rept. No. 32-0-38.

237

DeHaven, H., et al. 1956 REARWARD SEATING URGED FOR AIRLINE USE
Aviation Week, 16 Jan. 1956

238

DeHaven, H. 1960 CRASH DECELERATION, CRASH ENERGY, AND THEIR RELATIONSHIP TO CRASH INJURY. (Medical College, Cornell University) TR 6242, Dec. 1960.

239

DeHavilland, C. 1962 PERSONNEL RESTRAINT SYSTEMS.
(Aviation Crash Injury Research, Phoenix, Ariz.) AvCir 62-16

240

..., N. R. Burch, D. Chiles & J. Steel 1956 THE ...RS IN LONG RANGE FLIGHT. Aviation Med. 27(1):18-22, Feb. 1956.

ABSTRACT: The human factor problems of performance, personal maintenance and measurement of stress and fatigue were studied during fifty-six hours continuous confinement in a grounded F-84 aircraft cockpit. Performance deterioration was associated with changes in bio-electric measurements which objectively reflect state of consciousness.

Results show that current jet aircraft cockpits are habitable for fifty-six hours without major physiological stress if limited protective equipment is employed.

241

Dempsey, C.A. 1961 HUMAN PROTECTION IN ABRUPT ACCELERATION ENVIRONMENTS In: 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D.C. (Mt. Prospect, Ill.: Institute of Environmental Sciences, P.O. Box 191) Pp. 365-370

ABSTRACT: The accelerations encountered in space flight are divided into three distinct segments: vibration, abrupt acceleration and long term acceleration. When these forces are acting as an integrated function they produce a singular subjective experience to the individual. The various maneuvers of manned space flight which produce abrupt accelerations are soft surface landings, emergency escape, air deceleration and hard surface landings. In addition, the potential hazard of explosion is significantly increased in space vehicles and forms another major source of high transient accelerations.

The human body can be categorized as a complex combination of systems which respond to the abrupt acceleration forces in accordance with the laws of a viscous elastic system under the action of a constant unbalanced force or harmonic motion. While the body might at first appear to act as an integrated whole; it in reality, is segmented into four different parts which respond individually to the force and then in turn transmit their response to the other segments. These individual segments are: dorsal cavity, thoracic cavity, pelvic cavity, and body extremities. Vital body organs can sustain high transient accelerations when the force vector is oriented in the proper direction and the body is completely supported throughout the load period. Present research efforts are dedicated to the premise of completely understanding the protective requirements which are necessary to sustain the astronauts during abrupt acceleration conditions in all areas of aerospace operations.

242

Dempsey, C. A. 1962 THE AIR FORCE STUDIES SEAT DESIGN: BODY SUPPORT/RESTRAINT Product Engineering, April 16, 1962

243

Dempster, W.T. 1955 SPACE REQUIREMENTS OF THE SEATED OPERATOR. GEOMETRICAL KINEMATIC, AND MECHANICAL ASPECTS OF THE BODY WITH SPECIAL REFERENCE TO THE LIMBS. (USAF, Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 55-159, July 1955.

ABSTRACT: The structure of the limb joints and the range and type of their motions were studied on cadaver material, with supplementary work on living subjects, in order to clarify geometric, kinematic and engineering aspects of the limb mechanism. Plans for the construction of manikin joints which showed normal ranges of limb movement were developed from this information. Specifications were also worked out for drafting board manikins which show correct limb ranges for seated postures. Subjects comparable to the model physique of Air Force flying personnel and highly selected small samples of muscular, thin, and retund builds supplied information on the range of possible hand and foot movements which was consistent with the seated posture. Maximum dimensions of the work space for seated individuals were determined; a study of the kinematic factors involved permitted an evaluation of the potential utility of different regions within reach. Eight cadavers were dismembered to provide data on such physical constants as mass of parts, segment centers of gravity, density and moments of inertia. This work was supplemented by data on the distribution of body bulk in the living subjects studied. Applications of the above information to analyses of horizontal push and pull forces in terms of couples permitted an evaluation of the effectiveness of body mass, leverages and support areas. (Author)

244

Dempster, W.T. 1960 THE ANTHROPOMETRY OF BODY ACTION.
(Aero. Med. Lab., Wright-Patterson AFB, Dayton, Ohio) WADD Technical Report 60-18, ASTIA AD-234005, January 1960

ABSTRACT: If a dynamic anthropometry relating to movement patterns is to be developed, it must be based on an understanding of the nature of body kinematics and the importance of forces in relation to posture and movement. The actual movements must be studied and recorded, preferably with adequate permanent records of the motions; the purposes of the study will determine the parameters for measurement. The anthropometry may fairly relate to but one individual rather than to a population; alternately, the data may have significance only in relation to a population group. In the latter instance, it would appear preferable, rather than to use a random group of study subjects, to select the subjects carefully, so that they match definite dimensions in the population to which the data are to be applied. The over-all potential range of motion can be defined, or a purposeful class of behavior may be measured, when carefully selected representative individuals are studied in actual or well-designed mock situations. Static measurements made with subjects in one posture cannot be reassembled to represent dynamic patterns. Static measurements

made with subjects in one posture cannot be reassembled to represent dynamic patterns. Static measurements, however, do have importance in the defining of a population for which dynamic measurements may have pertinence. They likewise provide a basis for the judicious selection of study subjects for dynamic measurements.

245

DeVault, R. T. 1952 AN AERODYNAMIC ANALYSIS OF THE CONDITIONS ENCOUNTERED BY AN EJECTED ORJECT (University of Southern California, Los Angeles 7, Calif.) USCEC Rept. 16-1, 15 April 1952.

ABSTRACT: Pressure differentials, accelerations, and approximate trajectories are estimated for a pilot-seat combination ejected at flight Mach numbers of 0.5 to 2.0 and altitudes from sea level to 35,000 ft. The general problem of viscous, compressible flow around blunt bodies is presented and discussed. Approximate similarity relations are given to compare ejection conditions. The need for high Mach number lift data on ejection seat configurations is pointed out, by showing the large trajectory deviations that result from moderate changes in lift.

246

Devaux, P. 1940 LA RESISTANCE PHYSIOLOGIQUE AU CATAPULTAGE ET AUX ACROBATIES AERIENNES (THE PSYCHOLOGICAL RESISTANCE TO CATAPULTING AND TO AIRCRAFT ACROBATICS)
Nature (Paris) 67: 299-302

247

Dill, D. B. 1941 THE COTTON G-SUIT.
(U. S. Army Air Corps., Wright Field, Ohio) Memo Rept. No. EXP-M-54-660-11D, Dec. 1941.

248

Dillon, F.P. 1942 AUTOMATIC DIVE BOMBER PILOT'S SEAT.
U.S. Patent Office No. 2.304.781.

ABSTRACT: Basic patent on any pilot's seat which automatically places the pilot's body supine, tangential to the arc and perpendicular to the radius of the turn or pull-out, when plane is subjected to"g". Patent describes method using a hydraulic system, and is now assigned to the U.S. Government.

Directorate of Flight Safety Research 1955 OPERATIONAL EXPERIENCE WITH EJECTION ESCAPE SYSTEMS FROM 1 JANUARY 1949 THROUGH 31 DECEMBER 1954. (Directorate of Flight Safety Research, Norton AFB, Calif.) Pub. no. 23-55, 1 Aug. 1955. ASTIA AD 72 809

ABSTRACT: During the period 1 January 1949 through 31 December 1954, reports of 518 ejection escapes from USAF aircraft were received. Successful escape has been made from aircraft in various attitudes, at altitudes from 500 to 38,000 feet, and at airspeeds up to 560 knots indicated. The percentage of fatal injuries has gradually decreased from a high of 27 per cent in 1951 to 21 per cent in 1954. Violent contact with the ground as a result of ejecting too low has been the major cause of ejection fatalities. During 1954, the percentage of fatal injuries during ejections initiated below 3000 feet declined considerably over previous years. Wider use of the automatic opening lap belt and automatic opening parachute, and provisions for ejecting through the canopy are considered to be partially responsible for this improvement. In addition, the recommended procedure of unfastening the manual type lap belt prior to ejecting below 2000 feet when position can be maintained in the seat, is partially responsible for the decrease in fatalities. It is still apparent, however, that some personnel, particularly those in high speed dives and uncontrollable maneuvers are delaying ejection until they reach too low an altitude. In addition to fatal injuries during ejection, two other areas of major concern are revealed by this study: accidental and premature ejections, (52 cases) and instances in which personnel were unable to eject because of canopy or ejection seat difficulties (105 cases). Improvement in these areas and a decrease in the percentage of fatal ejections are possible through better design, maintenance, inspection and crew trainingon ejection escape systems. Aircrew training should place greater emphasis on the altitude at which ejection escape should be initiated.

250

Dodd, K.N. 1959 DYNAMICAL COMPUTATIONS FOR AN EJECTION SEAT SLED (Royal Aircraft Establishment Gt. Brit.) Technical note no. M.S. 59, Oct 1959 ASTIA AD-232 616

ABSTRACT: A scheme is given for the calculation (on a high-speed computer) of the dynamics of a rocket-propelled vehicle to be used for ejection seat tests. (Author)

251

Dodson, H. L. 1961 EVALUATION OF MARTIN-BAKER SEAT POSITIONING AND RESTRAINT. (Naval Air Test Center, Patuxent River, Md.) Proj. P44AE23-15, Rept. No. 1, 29 December 1961. ASTIA Doc. No. AD-271 189.

ABSTRACT: Various lap belt/lap belt attachment assemblies for selection for use in the F9F-8T airplane Engineering Change Proposal 114. The assem-

blies were utilized during [illegible] landings, [illegible] and extended cross-country flights and were evaluated under conditions simulating parachute descent and emergency egress from a cockpit on the ground. It is concluded that the Naval Parachute Facility configuration of lap belt lap belt attachment, which is currently in service, and the modified MA-2 integrated torso harness is the most suitable assembly for incorporation in the F9F-8T. (Author)

252

Donal, J. S., C. J. Gamble, & R. Shaw 1934 THE CARDIA OUTPUT IN MAN. AN ADAPTION OF THE KATHAROMETER FOR THE RAPID DETERMINATION OF ETHYL IODINE IN ESTIMATIONS OF CARDIA OUTPUT BY THE ETHYL IODINE METHOD. A STUDY OF THE EFFECT OF POSTURE UPON CARDIA OUTPUT AND OTHER CIRCULATORY AND RESPIRATORY MEASUREMENTS. Amer. J. Physiol. 109:666-682.

253

Dorman, P. J., & R. W. Lawton 1951 MODIFICATION, INSTALLATION OF SUPINE SEAT AND RELATED COMPONENTS, INFLUENCE OF THE SEAT. (Naval Air Development Ctr., Johnsville, Pa. NADC-MA-L5208; 10 Dec. 1951

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Dorman, P. J., & R. W. Lawton 1952 MODIFICATION, INSTALLATION OF SUPINE SEAT AND RELATED COMPONENTS, INFLUENCE OF THE SEAT. (Naval Air Development Ctr., Johnsville, Pa. NADC-MA-L5208; 10 Dec. 1952

255

Dorman, P. J., & R. W. Lawton 1954 PHYSIOLOGICAL INVESTIGATION OF INCREASING RESISTANCE TO BLACKOUT BY PROGRESSIVE BACKWARD TILTING TO THE SUPINE POSITION. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5406; 30 June 1954

256

Dorman, P. J., & R. W. Lawton 1955 INFLIGHT PHYSIOLOGICAL AND PSYCHOLOGICAL REACTIONS TO THE SUPINE POSITION. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 300; TED ADC AE-6560; 31 Dec. 1955, PHASE I

ABSTRACT: Using a prototype supine seat, at 65 degrees back tilt, 40 healthy male

subjects were able to withstand up to 7.0 G for 30 seconds, without grayout. It was necessary for approximately 40 per cent of the subjects to wear a standard U. S. Navy Z-2 Suit to combat the accelerative forces, in addition to the 65 degree supination. Chest pain and discomfort were not reported.

257

Dorman, P. J., & R. W. Lawton 1955 LETTER REPORT - DEVELOPMENT OF SUPINE SEAT AND RELATED COMPONENTS. (Letter Report on NM 001 100 300, TED ADC AE-6300, 30 Nov. 1955) (Naval Air Development Ctr., Johnsville, Pa.)

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F

Dorman, P.J., & R.W. Lawton 1956 THE EFFECT OF PARTIAL SUPINATION COMBINED WITH THE ANTI-G SUIT ON G TOLERANCE IN NAVY PILOTS. A PRELIMINARY REPORT. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5606, 8 May 1956. ASTIA AD 98 515.
See also J. Aviation Med. 27(6):490-496, Dec. 1956.

ABSTRACT: A preliminary study of the G protection afforded by the combination of partial supination (65 degrees) and the Navy Z-2 anti-blackout suit is presented. A total of 305 runs on 9 trained centrifuge subjects and 233 runs on 24 Navy pilots were performed. Using grayout (peripheral light loss) as an end point, 66.7 percent of the fleet pilots were able to withstand 7 G for 15 to 30 seconds sitting upright, wearing a standard Navy Z-2 suit inflated to 7-9 psi pressure. The remainder failed the 7 G, 30-second run. The 65 degree supine position alone failed to improve the performance of this latter group. All of these subjects were then retested in the 65 degree supine position wearing an inflated Z-2 suit (7-9 psi pressure). One hundred percent of subjects thus tested successfully withstood 7 G for 30 seconds, although the unprotected tolerance in some subjects was as low as 2.5 G. (Author)

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Dorman, P. J., & R. W. Lawton 1956 EFFECT ON G TOLERANCE OF PARTIAL SUPINATION COMBINED WITH THE ANTI-G SUIT. J. Avia. Med. 27(6):490-496, Dec. 1956
See also (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5606

ABSTRACT: A total of 305 runs on nine trained centrifuge subjects and 233 runs on twenty-four Navy pilots were performed. Using grayout (peripheral light loss) as an endpoint, 66.7 per cent of the fleet pilots were able to withstand 7 g for 15 to 30 seconds sitting upright, wearing a standard Navy Z-2 suit inflated to 7 - 9 p.s.i. pressure. The remainder failed the 7 g, 30-second run. The 65 degree supine position alone failed to improve the performance of this latter group. All of these subjects were then retested in the 65 degree supine position wearing an

inflated Z-2 suit (7-9 p.s.i. pressure). One hundred per cent of subjects thus tested successfully withstood 7 g for 30 seconds, although the unprotected tolerance in some subjects was a s low as 2.5 g. (AUTHOR)

260

Douglas Aircraft THE CAUSES, EFFECTS AND PREVENTION OF EJECTION INJURIES, MODEL A4D-2 AIRPLANE. (Douglas Aircraft Co., Inc., El Segundo , Calif.) Report no. ES 26820

261

Douglas Aircraft A SURVEY OF PILOT ATTITUDES CONCERNING INTEGRATED GEAR IN THE MODEL A4D-2 AIRPLANE. (Douglas Aircraft Inc., El Segundo, Calif.) Report no. ES 27062

262

Douglas Aircraft Co. 1948 HUMAN TOLERANCE TO ACCELERATION DURING EJECTIONS (Douglas Aircraft Co., El Segundo, Calif.) ES 21072. 27 Feb. 1948.

263

Douglas Aircraft RESEARCH PROGRAM PROPOSAL, AIRCREW FREEDOM-RESTRAINT SYSTEM. (Douglas Aircraft Inc., El Segundo, Calif.) ES 26820

264

Douglas Aircraft Company, Inc. 1960 MAN AND SPACE. A SYSTEM TO DETERMINE MINIMUM SPACE REQUIREMENTS FOR THE SEATED OPERATOR OF A FLIGHT VEHICLE. (Presented at: SAE National Aeronautic Meeting, 1960, Paper 173 A) (Santa Monica, Calif., Douglas Aircraft Company, Inc., Jan. 1961) Rep. ES 40025.

ABSTRACT: A system for determining minimum space requirements for the seated operator of a flight vehicle is presented graphically. Scale drawings of anthropometric manikins are given with the basic functional envelope development for a single body size. A typical composite functional envelope which would accommodate all sizes from the fifth to 95th percentiles is also shown. (Tufts)

265

Douglas, W.S. 1942 FRANKS SUIT.
(National Research Council, Canada) Report #C-2848, November 23, 1942

ABSTRACT: This is a report of a conference held at Headquarters, Fighter Command, R.A.F., November 16, 1942, to discuss the adoption of the Franks Flying Suit.

266

Downey, V.M., F.V. Lorentzen & E.H. Lambert 1949 EFFECT OF THE CROUCH POSITION ON THE INCREASE IN TOLERANCE TO POSITIVE ACCELERATION AFFORDED BY AN ANTI-BLACKOUT SUIT
J Aviat. Med. 20(5): 289-299

ABSTRACT: A change from the upright sitting position to a crouch position in which the eye level was lowered 11 cm. increased the tolerance of centrifuge subjects to positive acceleration by an average of 1.2 G as determined by use of visual symptoms, blood content of the ear and the ear pulse as criteria of G tolerance.

The protective value of the G-4 anti-blackout suit was 54 per cent greater when assayed in the crouch position than it was in the upright sitting position.

Four of ten subjects were unable to support their heads in the crouch position employed at accelerations of 7 G and greater.

267

Draeger, R.H., J.S. Barr et al. 1945 A STUDY OF PERSONNEL INJURY BY "SOLID BLAST" AND THE DESIGN AND EVALUATION OF PROTECTIVE DEVICES
(U.S. Naval Med. Res. Instit. & U.S. Naval Hosp., Bethesda, Md.)
Res. Proj. X-517; Rept. No. 1; March 1945.

268

Dressel, J. H. 1958 LOW LEVEL ESCAPE IN NAVAL AIRCRAFT.
SAE Reprint S 86., May 1958.

ABSTRACT: This report concerns the different types of ejection seats with parachute combinations, which are in use or being developed by the U. S. Marines. It pertains to systems which can be used in low altitude. For the future, one will use the Martin Baker MKA5 ejection seat and the rocket ejection which is being developed. Meanwhile one tries to improve the prestige of the present apparatus of ejection.

269

Dressel, J. H. 1958 SAFE PILOT EJECTION LEVEL DROPS TO 500 FT. S. A. E. Journal 66(7):119, Part. 2.

ABSTRACT: Low-speed ejection fatalities have affected the design of airplane seats and controls. Now the pilot moves one control and the ejection seat automatically throws him into the proper parachute descent at low or high altitude.

Bailing out under 2000 ft resulted in death 50% of the time when the pilot first had to release the canopy, then fire the seat, release himself from the seat, and pull the rip cord. The death rate climbed to 75% for jumps under 1000 ft.

The Martin-Baker seat adapted by the Navy now provides saf bail-out from altitudes of 500-700 ft. straight and level.

This rapid low-level ejection system has a barometric and speed limiter to prevent parachute failure. The barometric control prevents pilot-seat separation above 10,000 ft. The speed limiter is actually a "g" meter, which delays the pilot's chute from opening until his deceleration rate drops below the safe value for the chute. These provisions make the system safe for normal flight bail-out.

270

Drillis, Rudolfs June 1961 ON BIOMECHANICS OF UPPER EXTREMITY. (Paper Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Material Center, Philadelphia, Penn. June 14-15, 1961).

ABSTRACT: The human arm is a superior many-sided tool which enables the man to perform skillfully an immense variety of activities. Since the eye is not able to catch and preserve the fast-changing patterns of arm and hand movements, objective methods of recording are needed. The most frequently used methods for recording movements are optical and electrical. They permit simple reduction of data and enable quantitative measurements of displacement, velocity and acceleration. Normally each movement can be submitted to a biomechanical analysis in terms of temporal, kinematic and kinetic factors. The analysis discovers the acting forces and indicates the possibilities for work simplification and increase of movement and tool efficiency.

271

Drury, D.R. 1947 PHYSIOLOGICAL, BIOCHEMICAL, AND ANATOMICAL EFFECTS OF ACCELERATION ON THE BODY RELATIVE TO PILOT POSITION IN HIGH SPEED AIRCRAFT. (University of Southern Calif., Depart. of Aviat. Med., Los Angeles) Contract no. N6ori77, Task 1, January 1947

272

DuBois, E. F. 1944 ANATOMY AND PHYSIOLOGY OF THE AIRPLANE COCKPIT. (National Research Council, Washington, D. C.) CAM Report #375, 16 Nov. 1944.

273

DuBois, E.F. 1945 THE ANATOMY AND PHYSIOLOGY OF THE AIRPLANE COCKPIT. Aeronaut. Engng. Rev., 4(4):15, 17, 21.

ABSTRACT: Suggests a reconsideration of cockpit design with reconstruction planned according to principles of human anatomy, physiology, and psychology. Proposes relocation of and standardization of position and actions of instruments and controls. Urges jettisonable canopies and "radically new methods" for escape in spins or at very high speeds.

Cites DeHaven's studies as evidence that the human body could stand enormously high decelerations (30 g and probably 40 g) if the resulting pressures were reasonably supported and distributed. Cockpits should be stressed, therefore, so that they will not collapse under forces that develop less than 30 g. (CARI)

274

DuBois, E.F. 1945 THE SAFER COCKPIT. Skyways, 4:41, 90

ABSTRACT: The survey and analysis of crashes has developed several points of fundamental importance. The first is the fact that the human body when supported by the proper belt and shoulder harness can withstand decelerations of great magnitude for short intervals, probably 40 g's or more. This means that if the cockpit does not collapse and if the seat, harness and their attachments do not break, a pilot can crash at high speed and still escape serious injury. If a belt without a shoulder harness is worn, the pilot or passenger jacknifes forward and survives only if his head does not swing into a structural member or rigid instrument panel. Some pilots are killed by steering wheels; others sustain fractures of the legs by "ankle traps" in the form of poorly designed rudder pedals. A large number of head and face injuries caused by sharp edges and spiked switches on the instrument panel could be prevented. In general, the farther the pilot or passenger is placed from the engine and instrument panel, the greater are his chances of survival.

275

DuBois, Eugene F. Sept. 1952 SAFETY BELTS ARE NOT DANGEROUS
Brit. Med. Journal, Sept. 27, 1952, pp. 685-686.

ABSTRACT: The once wide-spread belief that 1,000 lb. safety belts cause internal injuries in the case of crash, has been refuted by the efforts of the Crash Injury Research unit of the Cornell University Medical College (New York City). An analysis of the crash of a Viking aircraft, on October 31, 1950, at London Airport, and a tabulation of autopsy findings, showed complete absence of abdominal injuries. Almost all safety belts and seat anchorages had broken at the very first impact. In other accidents, where even stronger belts than in the Viking had been used, hardly any evidence of belt injuries was found, as the 858 crash analyses show.

276

Duddy, J. H., & C. A. Dempsey 1958 LIGHT-WEIGHT SEATING: DESIGN RESEARCH AND DEVELOPMENT OF A NET SEAT FOR PROJECT MANHIGH. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 58-307; ASTIA AD-206 922; Dec. 1958

ABSTRACT: This report describes the design research and development of a light-weight nylon net seat for project MANHIGH. Experiments were conducted to determine the ways in which the complex contours of a continuous body supporting surface could be generated with nylon net. Three independent factors, found to affect the curvature of the surface, were varied empirically to develop an experimental seat design for submission to the Project MANHIGH contractor. Contractor forces developed an aluminum and nylon net facsimile of the proposed seat for installation in the balloon gondola. An evaluation of the seat was conducted by the pilot during OPERATION MANHIGH II.

277

Dvorak, J. 1951 URAZOVOST PRI SESKOKU PADÁKEM (Injuries During Parachute Jumps)
Vojenské Zdravotnické Listy (Prague) 20: 135-136, May-June 1951

278

Dye, E.R. 1942 PILOT'S SEAT (PLASTIC) - MODEL SBD-3 (Douglas Aircraft Co., Inc., El Segundo Plant, Calif.) Report No. 6042, Test No. 343, ASTIA ATI- 104 982, August 1942

ABSTRACT: The purpose of the tests on the pilot's seat was to determine the strength of a pilot's seat made of plywood. It was found that the main main structure of the seat was rigid and satisfactory under the ultimate load of these tests.

During the tests, it was observed that the lap belt attachment fitting should be attached to the seat in a more secure manner either by increasing the size and gauge of the bolt head bearing plate or by using a three bolt connection. The attachment fitting screws used in this seat should be replaced by clevis or A.N. bolts to exposed unthreaded surface to bearing on the wood.

279

Dye, E. R. Dec. 1951 RESEARCH ON PADDING MATERIAL (Cornell Aero. Lab.,Inc.) Rept. No. OG-674-D-2, Dec. 27, 1951.

280

Dye, E.R. 1957 DESIGNED FOR LIVING (Cornell Aeronautical Laboratory, Inc.) Research Trends 5(3): Fall 1957.

ABSTRACT: Over 60 safety concepts have been incorporated in the Cornell Liberty Safety Car, designed to afford maximum protection to passengers during a crash. "Accordion" doors for easy entrance and exit, bucket seats for better lateral support to the hips, body-restraining panels and seat belts, are among the safety features illustrated here.

281

Dye, E.R., and M.D. Smith 1958 IMPACT PROTECTION WITH FOAM PLASTICS. Mech. Eng., 80(12):65-67, Dec. 1958

ABSTRACT: Paper discusses the methods of selection of a low-density cellular plastic of the right dimensions and mechanical properties to protect the head during impact.

282

Dyme, H. C. 1950 REPORT ON USAF RESCUE AND SURVIVAL CONFERENCE (Air Materiel Command, Wright Patterson AFB, Dayton, Ohio) 4-6 April 1950.

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283

Earle, K. 1959 MARTIN-BAKER SYSTEM PARACHUTE AND HARNESS DESIGN IMPROVEMENT AND EVALUATION (Joint Parachute Test Facility, U. S. Naval Auxiliary Air Station, El Centro, Calif.) Naval Parachute Unit Technical Rept. #3-59; TED ELC AE-5242.5; ASTIA AD-266 378; 2 Apr. 1959

SUMMARY: As a result of conference considering Fleet and contractor reported and Bureau of Aeronautics Inspection Team discovered discrepancies existing in Martin-Baker escape system installations and other considerations, the Bureau of Aeronautics initiated concurrent coordinating "A" priority projects at the Naval Parachute Unit and the Air Crew Equipment Laboratory to sponsor expedited development and evaluation of a universal improved system for retrofit into all Martin-Baker seats. Mutual support and coordination between these laboratories was directed.
The Naval Parachute Unit fabricated approximately eighteen special modifications and assemblies of the NBA horseshoe pack, including ripcord, various kinds of lap belt and kit suspension assemblies, and integrated torso suits and harnesses to support evaluation tests at the Naval Parachute Unit, Air Crew Equipment Laboratory, and the SMART Hurricane Mesa facility. The Naval Parachute Unit received various ACEL versions of certain of the foregoing components both for testing and for fabrication into assemblies which were returned to ACEL in support of that activity's evaluation program.
The Naval Parachute Unit evaluation program included four in-flight dummy ejections, thirty live jumps, dummy drop tests, and numerous ditching drills, components tests in the seat and in the inverting fixture for seat restraint. In addition, arrangements were consummated whereby the Naval Parachute Unit modified parachute and lap belt were utilized in two F8U-3 cockpit rocket sled tests at the SMART facility in conjunction with Chance Vought MK G5 ejection seat evaluation.
Ultimate coordination of the laboratories' project developments will be affected. It is considered that utilization of several of the Naval Parachute Unit modifications will significantly improve the present interim Martin Baker parachute from the standpoints of comfort, adjustability, ease of ditching with survival gear, manual bailout, and overall system compatibility. (AUTHOR)

284

Early, . . C. 1945 ANTI-BLACKOUT SUITS, EFFECT OF WEARING ON V AND G DURING SYLLABUS TRAINING. (Tactical Test, U. S. Naval Air Test Center, Patuxent River, Md.) Project No. TED NO. PTR - 2404, 16 July 1945

285

Early, J. C. 1951 THE NAVY EJECTABLE COCKPIT. J. Aviation Med. 22(1):46-49.

SUMMARY: The ejection seat has proved effective and safe as a means of emergency escape from aircraft at current operational speeds and altitudes. However, prospective improvement in aircraft performance will render this device obsolete because of the hazards of windblast, anoxia, and extreme cold.

The Navy Ejectable Cockpit is designed to provide positive, safe, emergency separation from high performance aircraft, and a safe, even comfortable, descent and landing. The pilot is ejected in an enclosed, pressurized, and relatively warm cockpit. After landing, the cockpit becomes a usable lifeboat at sea, and an effective shelter on land.

This survival feature is of great importance in cold weather operations.

286

Edelberg, R. 1953 PROBLEMS OF EMERGENCY ESCAPE IN HIGH SPEED FLIGHT: TUMBLING. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC Document #53WC-1470

287

Edelman, W. E. 1957 THE DYNAMICS OF SEAT BELT DESIGN. (Master's Thesis for MS in ME, University of Minnesota) Dec. 1957

288

Educational Research Corporation 1959 A BIBLIOGRAPHY ON HUMAN FACTORS RELATED TO MANNED SPACE VEHICLES (Educational Research Corporation, Cambridge, Mass.) Contr. N 61339 294, ERC proj. 496, Oct. 1959.

ABSTRACT: This bibliography on human factors related to manned space vehicles is intended to supplement other listings in the same area by adding to rather than by displacing them. A list of such sources is presented alphabetically by author and with annotations that are intended to give the reader some idea whether the citation refers to something he might be interested in. A subject index is included.

289

Edwards, George A. 1944 FINAL REPORT ON TEST OF CUSHION, BACK AND SEAT, NEOPRENE FOAM
Army Air Forces Proving Ground Command, Eglin Field, Florida) AAF Bd. Proj. No. (M-4) 546 Serial No. 7-44-13 June 12, 1944 ASTIA ATI 73 196

ABSTRACT: Tests were conducted using two types of pad assemblies-parachute back, and 3 types of cushion assemblies-parachute seat, filled with neoprene. The tests were conducted to determine whether or not the equipment possessed the following necessary military charactersitics: (1) The cushions should be of a suitable size and weight to fit the parachute harness. (2) The filler should not have any tendency to pack, break up, or shift. (3) After prolonged use, the degree of fatigue of the user should be less than with the present standard parachute back pad and seat cushion. After completion of the tests, it was concluded that the subject equipment was of light weight and of a size suitable to fit the seat-type parachute harness. Furthermore, the neoprene filler did not pack, break up or shift as does the hair filler now in use in many parachutes. The fatigue of the user was less, after prolonged use, than with the hair filled pads and cushions, and similar or slightly less than with the old-type combination rubber-air cushion. Finally, the seat chshion weighing 2.63 pounds is the most comfortable of the 3 types furnished.

290

Edwards, H.H. 1962 EMERGENCY DETECTION AND ESCAPE INITIATION SYSTEM, PART I. LIQUID PROPELLANT BOOSTERS (Aeronautical Systems Division, Wright-Patterson AFB, Ohio) ASD Technical Documentary Report 62-276, Part I; 4 May 1962

291

Eiband, A.M. S.H. Simpkinson & D.O. Black 1953 ACCELERATIONS AND PASSENGER HARNESS LOADS MEASURED IN FULL-SCALE LIGHT-AIRPLANE CRASHES
(National Advisory Committee for Aeronautics, Washington, D.C.) NACA TN 2991; August 1953. ASTIA AD 15 669

ABSTRACT: Full-scale light-airplane crashes simulating stall-spin accidents were conducted to determine the decelerations to which occupants are exposed and the resulting harness forces encountered in this type of accident. Crashes at impact speeds from 42 to 60 miles per hour were studied. The airplanes used were of the familiar steel-tube, fabric-covered, tandem, two-seat type. In crashes up to an impact speed of 60 miles per hour, crumpling of the forward fuselage structure prevented the maximum deceleration at the rear-seat location from exceeding 26 to 33 g. This maximum g value appeared independent of the

impact speed. Restraining forces in the seat-belt -- shoulder-harness combination reached 5800 pounds. The rear-seat occupant can survive crashes of the type studied at impact speeds up to 60 miles per hour, if body movement is restrained by an adequate seat-belt -- shoulder-harness combination, so as to prevent injurious contact with obstacles normally present in the cabin. Inwardly collapsing cabin structure, however, is a potential hazard in the higher-speed crashes. (NACA)

292

Eisen, L., & R. S. Zeigen 1959 A SUPINE SEAT FOR HIGH-STRESS TESTING OF PRIMATES. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 59-165; ASTIA AD-219 894; April 1959

ABSTRACT: This study summarizes the design rationale of a supine seat and restrain harness, with surrounding inclosure, for high stress bioscience experiments with a Macaca cynomolgus monkey (Macaca iris). This configuration is intended for test under various abnormal stresses including high g centrifuge runs. Testing and feed ing of the subject in the inclosure will be accomplished to determine his reaction to these stresses. With minimum modification, The Macaque supine seat and restrain harness could accept any primate for ground tests or bioexperiments in space flight A brief description of an earlier supine test seat and restraint harness for low-stress experiments using a squirrel monkey is included.

293

Ellingson, H. V. 1960 AVIATION MEDICINE
In Piersol, G. M., and E. L. Bortz, Ed., Cyclopedia of Medicine, Surgery and Specialties: Review Service (Philadelphia, F. A. Davis Company: 1960), pp. 22;-246.

ABSTRACT: The scope and implications of aviation and space medicine are summarily discussed. Consideration is given to the general and specific stresses which may be encountered, to medical and psychiatric problems, air travel and transportation of patients, pilot and astronaut selection, protective equipment and clothing, and to flying safety and accidents involving nuclear weapons.

294

Ellis, B.C. E.A. Ripperger and J. N. Thompson 1961 DESIGN OF CUSHIONING SYSTEMS FOR AIR DELIVERY OF EQUIPMENT. (Structural Mechanics Research Lab., U. of Texas, Austin) ASTIA AD-270 241L, August 1961

ABSTRACT: A description of effective systems is given by which the impact on ground contact may be reduced within permissible limits through the use of cushioning materials. In addition to theory of cushioning, the properties of cushioning materials, and the fragility of vehicles, the procedure for designing a cushioning system for a vehicle is given. (Author)

295

Ellis, J. D. 1940 THE INJURED BACK AND ITS TREATMENT. (Springfield, Illinois: C.C. Thomas and Co., 1940.)

296

Ellis, J. D. 1944 COMPRESSION FRACTURES OF THE VERTEBRAL BODIES AND OTHER CHANGES MISTAKEN FOR THEM. The Journal of Bone and Joint Surgery 26(1):139-145.

297

Ellis, M. M. 1921 PULSE-RATE AND BLOOD PRESSURE RESPONSES OF MEN TO PASSIVE POSTURAL CHANGES. Amer. J. Med. Science 161:568-578

298

Ellis, M. M. 1922 PULSE RATE AND BLOOD PRESSURE RESPONSES OF MEN TO PASSIVE POSTURAL CHANGES. ii. UNDER LOW OXYGEN. Air Serv. Inform. Cir. (Wash. D. C.) IV, No. 359-75.

299

Elzufon, E. E. and P. Goldberg 1956 ANALYSIS OF COMPONENTS INVOLVED IN AN EJECTION SEAT MALFUNCTION (Naval Ordnance Lab, White Oak, Md.) 6 June 1956 NAVORD rept. no. 4319 ASTIA AD 113 862

ABSTRACT: "Studies were conducted at the Laboratory to determine: (1) the sensitivity of the PECC Mk 1 Mod. 0; (2) the output characteristics of the firing mechanism; and (3) the adequacy of design of the firing mechanism and cartridge assembly. Approximately 900 primers were fired under varying conditions. Conclusions drawn for these firing tests can be summarized as follows: (1) penetrations of .-12 inches are marginal and, therefore, unsatisfactory; (2) primer penetrations of .017 inches or better will reliably fire the primers; (3) spring strength as low as 25.5 lbs/inch compression gives reliable results providing a minimum penetration of .017 inches is obtained; (4) primers can be fired with varying firing pin eccentricities up to .055 inches with .017-inch primer penetration and a 31-pound spring; (5) the weight of the piston has little effect on the sensitivity of the primer itself; (6) when firing pins are forced into primers slowly, misfires are possible with penetrations of up to .070 inches; and (7) primer penetrations of .061 ± .017 inches and spring strengths of 36 ± 5 pounds gave reliable firing. Based on available information, the conditions under which the accident occurred were such that reliable functioning should have been expected. Undeterminable parameters which may have contributed to the accident were discussed. Analysis of the firing mechanism showed poor design of several components. Examination of sample firing mechanisms revealed components out of tolerance in critical dimensions." (NOL abstract)

300

Emanuel, I. and J. Barter 1957 LINEAR DISTANCE CHANGES OVER BODY JOINTS. (Wright Air Development Center, Wright-Patterson AFB, Ohio) TR 56-364, ASTIA AD-118 003, February 1957

ABSTRACT: Measurements of joints and joint complexes on 30 men. Summary statistics and design values are presented for 48 linear distant changes.

301

Emanuel, I., & M. Alexander 1957 HEIGHT-WEIGHT SIZING AND FIT-TEST OF A CUTAWAY G-SUIT, TYPE CSU-3/P. (Aero Med. Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TR 57-432; ASTIA AD 130 912, July 1957.

ABSTRACT: Body size data from the 1950 air force anthropometric survey have been reanalyzed to yield a statistical sizing program based on height and weight

This six-size program was incorporated into the Type CSU-3/P Cutaway Anti-g Garment, which was tested from the standpoint of fit and comfort. Suit selection was accomplished simply by asking each subject his height and weight. Of seventy three subjects fitted, seventy-two were comfortably accommodated by the size indicated by height and weight values. It is concluded that this sizing procedure will result in the saving of time and money because of the ease of fitting, reduction of individualized tailoring and simplification of procurement. (DACO

302

Emrick, W.H. 1954-55 DEVELOPMENT OF CATAPULT, AIRCRAFT PERSONNEL CAPSULE T16 AND T16E1, FOR THE MX 15548 (F103) AIRCRAFT CAPSULE ESCAPE SYSTEM. (Reaction Motors, Inc., Rockaway, N.Y.) Rept. no. RMI-024-F; Contract DA 30-069-ord-1240: ASTIA AD-113381; 4 Jan. - Dec. 1954. May 1955

303

Ender, W.K. 1949 STUDY-EJECTION SEAT TRAJECTORY - TIME REQUIRED TO APPROACH TERMINAL SPEED WITHOUT THE USE OF A DROGUE CHUTE. (Douglas Aircraft Co., Inc., El Segundo, Calif.) Report No. ES-15220

304

Ernsting, J., H.L. Roxburgh & P.R. Wagner 1960 RAPID DECOMPRESSION IN THE HELMET, JERKIN, ANTI-G SUIT SYSTEM--A PRELIMINARY REPORT (Flying Personnel Research Committee, Farnborough) FPRC/1150 April 1960 ASTIA AD 261 160

ABSTRACT: Experiments were conducted by the R.A.F. to establish the effects of rapid decompression on aircrew wearing the R.A.F. partial pressure suit system incorporating the anti-g suit, the partial pressure jerkin and the partial pressure helmet. During the tests it was found that the expiratory valve in the partial pressure helmet has a marked resistance to flow even when there is no compensating pressure. This resistance to flow is increased by virtue of the compensation of this valve to a pressure in the helmet inlet tube which is maintained by the Mark 3 jerkin connector. The pressure jerkin is not inflated sufficiently quickly to prevent full and rapid distension of the lungs. In the present investigation no damage to the personal equipment was noted even in the simulated lung experiments where peak pressures of the order of 80 mm Hg were applied very rapidly to the pressure helmet.

305

Ervin, R. G. 1960 HUMAN FACTOR CONSIDERATIONS IN THE DESIGN OF THE B-58 ESCAPE CAPSULE. (Paper, 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960)

306

Esgar, J.B. & W.C. Morgan 1960 ANALYTICAL STUDY OF SOFT LANDINGS ON GAS-FILLED BAGS
(National Aeronautics and Space Administration) NASA TR R-75; ASTIA AD 242 357

ABSTRACT: An analytical procedure was developed that is valid for bags of various arbitrary shapes and is applicable to planetary or lunar landings for sinking speeds that are small compared to the sonic velocity of the gas within the bag. For landing on the earth at speeds consistent with normal parachute descent, the relative merits of four bag shapes were evaluated both with and without gas bleed from the bags. Deceleration and onset rates acceptable for well-supported humans seem feasible.

307

Esgar, Jack B. 1962 SURVEY OF ENERGY-ABSORPTION DEVICES FOR SOFT LANDING OF SPACE VEHICLES
(National Aeronautics and Space Administration, Washington) NASA TN D-1308

ABSTRACT: Energy-absorption methods that may be useful for impact attenuation of space vehicles landing on lunar or planetary surfaces were surveyed. Relative merits of various systems are discussed, the effectivenesses are compared, and conclusions are drawn as to the more promising types of systems.

308

Estes, E. H., Jr., H. D. McIntosh, A. M. Weissler, and J. V. Warren 1956 VASODEPRESSOR SYNCOPE. EFFECT OF G SUIT INFLATION ON CARDIAC OUTPUT. Circulation 14:933.

309

Evans, R. Nov. 1954 THE RELATIVE CRASH PROTECTIVE QUALITIES AND DEFICIENCIES OF PASSENGER SEAT MIL-S-7877 (AER) I FORWARD AND AFT FACING POSITIONS. (Aero Medical Equipment Lab., Naval Air Material Center, Philadelphia, Pa.) Rept. TED No. NAM AE 6303, 15 Nov. 1954.

310

Evrard, E. 1957 LE SAUVETAGE DES AVIATEURS PAR SIEGE EJECTABLE (RESCUE OF AVIATORS BY MEANS OF EJECTION SEATS (Air Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio) Rept. no. ATIC-305111-A; 1957, ASTIA AD-140 536

ABSTRACT: During a period of five years (1952-1956) fifteen cases, wherein ejection seats were used in the pursuit plane squadron of the Air Force, were recorded. Fove ejections ended in the death of the users. Ten cases of ejection saved the pilot's lives. An analysis of the medical aspects of the ejection conditions and their consequences for the aviator may be taken as precious, practical lessons. Effort is made: (1) to describe the circumstances surrounding the ejection where the consequences were fatal, and those where the conditions under which the ejection took place were abnormal. (2) to contemplate the consequences from the study of these cases as far as practical purposes are concerned. (Author)

311

Everling, O. 1942 WIND TUNNEL EXPERIMENTS WITH A CATAPULT SEAT - PART 2 OF 5 PARTS (WINDKANALVERSUCHE AN EINERN SCHLEUDERSITZ)
Zentrale fuer Wissenschaftliches Berichtswesen , Berlin-Adlershof (Not translated ASTIA ATI 67 725

ABSTRACT: Wind-tunnel experiments were conducted with a catapult seat to insure safe escape of the pilot from aircraft flying at high speeds. The seat turns about any axis regardless of the aerodynamic forces. Accelerations are brief, and therefore have no detrimental physiological effect. Various model tunnel tests were made for purposes of comparison with measured and calculated accelerations.

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312

Fabre, J. 1959 PROBLEMES MEDICAUX LIES A L'UTILISATION DU SIEGE EJECTABLE (Medical Problems of Ejection Seat Utilization) Report CERMA 1896

313

Fabre, J. and B. Graber 1959 RÔLE DU COUSSIN DE SIÈGE DANS LA GENÈSE DES ACCELERATIONS LORS DU CATAPULTAGE DU SIEGE EJECTABLE (SEAT CUSHION ROLE IN ACCELERATION PRODUCTION ON EJECTION SEAT CATAPULTING) Report CERMA 904.

314

Fabre, J. 1961 ASPECT MÉDICAL DES ÉJECTIONS PRATIQUÉES EN FRANCE SUR DIFFERENTS TYPES DE SIÉGES ÉJECTABLES. In Bergeret, ed., Escape and Survival: Clinical & Biological Problems in Aero Space Medicine. (London, New York, Paris: Pergamon Press, 1961) AGARDograph 52. Pp. 18-29. AGTIA AL 2w1 861

ABSTRACT: Over a period of 7 years, a wide diversity of ejection seats have been used in France. This study, reviewing 100 ejections, deals with a survey on the influence of altitude and speed, the percentage of fatalities, major and minor injuries, and of cases in which pilots come out unhurt, in relation with the type of seats used and the improvements which have been added. The second part deals with the specific traumatology of the ejection phenomenon, i.e. injuries of the spine. The author emphasizes the drawback of seats using non-telescopic guns, which involve, within too short a time, values of g which are too high and often exceed the tolerance threshold of the spine.

315

Fabre, J. &Y. Houdas 1961 PHYSIOLOGICAL DETERMINATION OF FACTORS RESPONSIBLE FOR SEVERE LESIONS AT THE TIME OF SUPERSONIC EJECTIONS. Rev. Med. Aero (Paris) 2:190-192, Dec. 1961 (Fr)

316

Fabre, J. & Y. Houdas 1962 A PROPOS D'UNE OBSERVATION D'UNE SUJET AYANT SUBI UNE EJECTION SUPERSONIQUE (CASE REPORT OF A SUBJECT HAVING UNDERGONE A SUPERSONIC EJECTION)
Revue des Corps de sante des armees (Paris) 3(2): 247-251. April 1962. (In French)

ABSTRACT: This the first French case, and the second or third known case, of ejection at supersonic speed (1,000 - 1,100 kilometers/hour) at an altitude of about 12,000 feet, in which the pilot survived. The pilot was comatose upon landing and his parachute torn during opening at high speed. Medical examination revealed left hemiplegia, right facial paralysis, and fracture of the 12th dorsal and 1st lumbar vertebrae. Coma persisted for 8 days; however, good psychomotor recovery followed. The origin of the disorders was attributed primarily to the effects of three factors; (1) blast, (2) deceleration, and (3) rotation of the seat and pilot.

317

Faget, M. A., R. O. Piland 1960 MERCURY CAPSULE AND ITS FLIGHT SYSTEMS. Aerospace Engineering, 19(4):48-53, 58 April 1960

CONTENTS:

1. Detailed description of measures against too high temperature inside cabins.
2. The system of regulating the outer as well as inner circumstances of cabin and space suite.
3. The systems of regulating the stand of the cabins in space. (hand service).
4. Radio-communication systems.
5. Energy provisions.
6. Measurement of scientific instruments carried within flight.
7. The air cushion that "catches" the landing shock.
8. The instrument panel.

318

Fairbanks, D. H., & B. Moore 1956 DOUGLAS A4D SEAT-EJECTION TESTS. (Naval Ordnance Test Station, Supersonic Track Division Test Department, China Lake, Calif.) Rept. No. NOTS 1068; ASTIA AD-105 846; 3 Feb. 1956

ABSTRACT: A series of aircraft seat ejection tests were conducted on a rail track to investigate the operational characteristics of the A4D ejection system at speeds approaching 600 knots. Data were obtained concerning the time-motion relationship

of the sled; the ejection characteristics of the canopy, seat, and dummy, including ejection velocity; and the trajectory of the canopy, dummy, and seat relative to the airplane. The tests gave no indication of collision of the canopy with the dummy, and revealed a minimum safe clearance by the dummy of the tail. Dismemberment of the dummy, loss of personal equipment, and blowing of parachute panels was observed, indicating the high air loads encountered at these velocities. As a result of the tests, the A4D was released for further flight tests with the standard Navy seat gun and cartridge.

319

Fairbanks, D.J. 1953 STATIC " D " RING GRIP TESTS.
(Stanley Aviation Corp., Buffalo, N.Y.) Document no. 214
ASTIA AD-129 143, November 1953

ABSTRACT: A standard downward ejection seat was equipped with arm slings which would pull both arms simultaneously, horizontally backwards and outwards at a 45 degree angle. The slings were lever loaded and equipped with cable tension instruments capable of recording maximum tension. An instrument was also attached to the "D" ring cable.

The three instruments were calibrated in the Stanley Aviation Corporation Dillon Tensile Tester and a report is included.

It was realized that the airman being tested might use his shoulders and upper arms to load the arm slings in addition to his grip on the "D" ring. Several tests were run with hands off the "D" ring and it was found that the shoulders and upper arms could load the slings to approximately 125 pounds.

320

Fairbanks, D. J. 1954 "D" RING SHOCK ABSORBER TOWER TESTS
(Stanley Aviation Corp., Buffalo, N.Y.)
Contract AF 33(600)22530 March 1954 ASTIA AD 129 144

ABSTRACT: Five tower tests were conducted at WADC at Wright Field, Ohio, to evaluate the adequacy of the 2D102100 "D" ring shock absorber for downward ejection seats. It was established by this testing program that although the "D" ring extended as far as 4-3/4 inches (2 inches for initiator firing) from its stowed position there was no tendency for the elbows to move outwards and hang up on the hatch. In each case it was observed that the elbows moved inwards rather than outwards. Occupants for the tests were selected so as to cover as far as possible the sizes of personnel who use the downward ejection seats. It was further established that the "d" ring cable tension loads using the 2D102100 "D" ring shock absorber were on the average 211 pounds. A 16mm slow motion picture was taken of each test and should be used in conjunction with this report. (Author)

321

Fales, E.D., Jr. 1958 SEAT BELTS: SAFE OR HAZARDOUS? AMA Reprint from Today's Health, Oct. 1958.

ABSTRACT: This publication contains the answers to questions commonly asked about seat belts. It also reviews the opinions of several safety experts concerning the actual need for seat belts in case of accident.

322

Falk, D. M. 1949 OPERATIONAL SUITABILITY TEST OF PULSATING SEAT AND BACK CUSHIONS. (Air Proving Ground, Eglin Air Force Base, Fla.) Project No. 34864 - 5; 31 March 1949; ATI-64 411

ABSTRACT: A pulsating seat and back cushion assembly was tested to determine its operational suitability. The item tested was the Aeromat Products' type M-4 pulsating seat and back cushion assembly, which is composed of dual rubber connecting hose and six parts: a control valve, a pneumatic valve, a jack insert box, quick releases, pulsating seat cushion, and a pulsating back cushion. It was developed to increase pilot efficiency through the reduction of compression fatigue. It was recommended that the item be tested on missions of at least ten hours in duration and that further development work be carried out by the USAF in order to increase the comfort of aircrew members participating in long-range missions. (ASTIA)

323

Farley, N. E. 1959 THE SAFETY THE MOTORIST GETS (Society of Automotive Engineers, Inc., New York, N. Y.) Rep. SP 165, June 1959.

ABSTRACT: Four papers dealing with the question of what automotive engineers are doing to assure safety in the modern American automobile are included in this report. The specific aspects of the automobile that are treated are: 1) the chassis, 2) the body, 3) electrical-accessory, and 4) over-all car appraisal. Various phases of product development to meet the changing requirements of traffic conditions and the human factor in the vehicle-driver complex are discussed. Quality control methods that are used to assure that the safety designed in is actually built into the car are discussed thoroughly. (Tufts)

324

Federov, E.K. 1962 THE DECISIVE STEP IN THE CONQUEST OF COSMIC SPACE
Science and Culture (Calcutta) 28(1): 11-14, Jan. 1962

ABSTRACT: Soviet space efforts preparatory to manned space flight included studies dealing with: (1) the conditions encountered during space flight (accelerations, temperature changes, weightlessness, radiations) and means of protecting the astronaut from their effects; (2) providing normal living conditions in the space cabin; and (3) medical selection techniques and training format for astronauts. The system devised for the constant medical supervision of both the pilot's health and working capacity in all stages of flight is discussed. Y.A Gagarin's orbital flight (April 12, 1961) is briefly mentioned.

325

Ferguson, Clarence N. Risto P. Lappala, & F. Bruce Trenk. 1959
DEVELOPMENT OF IMPROVED FLIGHT HELMET LINEAR
(Bjorksten Research Laboratories, Inc., Madison, Wisconsin)
WADC Tech. Rep. No. 59-435 October ASTIA AD 231 284.

ABSTRACT: Various low-density plastic foam systems were evaluated for suitability for a padding helmet liner providing maximum comfort with greatest protection against shock and impact. Means of fabricating uniform and reproducible liners by injection of fluid foam into molds were studied.

A linear was developed which appears to meet specification requirement for comfort, protection, ease of application, and durability. It consists of a complete inner layer of a maximum comfort, open-celled, hydrophobic, polyurenthane foam, integrally bonded to an outer layer of high-energy, absorbent, polyurethane foam which is thickest over the pariental, upper occipital, and temporal areas and also provides chin area protection.

Polyurethane foam systems are shown to be capable of providing the desired combination of properties for this application, utilizing techniques adaptable to production processing.

326

Feldinger 1945 TESTING OF EJECTION SEAT. (Versuche mit dem Schleudersitz) ASTIA ATI 51836, February 1945

ABSTRACT: A number of ejection tests were conducted on an ejection seat with dummy to test its functioning. From these tests the characteristics of the

seat were determined for the early part of acceleration immediately following the detonation of the charge. It was concluded that with proper installation and normal functioning of components a smooth ejection can be attained. The maximum acceleration under prescribed conditions was 130 m/s^2; pressure required to release the seat by hand was determined at 25 kg.

327

Ferguson, H. 1953 INVESTIGATION OF THE ACCELERATION AND JOLT HISTORIES DURING ESCAPE FROM HIGH SPEED AIRCRAFT
(Wright Air Development Center, Johnsville, Pa.) WADC TR 52-278, Suppl. 1; Sept. 1953. ASTIA AD 27 126

ABSTRACT: Improvements are obtained for the upper-bound acceleration-time curves previously derived (AD-5010) by replacing the constant drag coefficient assumed earlier by a uniform 1-step drag coefficient. In this way, account is taken of the expected sharp drag coefficient change which occurs as the escape unit passes through M=1.0. This leads to a discontinuity in each curve of the family of acceleration curves and results in a restriction on the altitude range for which the bounding acceleration curves are valid. In this report, the algebraic sign of the acceleration is not suppressed at the end; it refers to lower bounds of negative accelerations rather than upper bounds of acceleration magnitudes. (ASTIA)

328

Ferwerda, T. 1941 TEST OF EXPERIMENTAL PNEUMATIC STOCKINGS AND BELTS FOR AVIATORS. (Anacostia Naval Airport) CAM No. 28; 24 Sept. 1941

ABSTRACT: Spencer acceleration belt and stockings tested in plane. When inflated to 1.5 psi pressure, they relieved aching in legs following pull out. Use of belt did not affect initial blackout at 5 "g", but after blackout vision cleared and remained clear for as long as 5 "g" could be held on plane. When inflated to 1.5 psi, apparatus had no effect on "g"-tolerance at forces greater than 5.5 "g". When belt alone was used, very painful pressure was felt in legs.

329

Ferwerda, T. 1942 ANTI-BLACKOUT EQUIPMENT -TEST OF -REPORT ON.
(Navy Dept., Naval Air Station, Anacostia, D.C.) 27 April 1942

330

Ferwerda, T. 1956 ANTI-BLACKOUT DEVICE
U. S. Patent 2,760,484; 28 Aug. 1956

ABSTRACT: An anti-blackout device is described and illustrated for use by aviators in combat or other aircraft. The objects of this device are to: (1) permit the aviator to withstand more g without graying or blacking out; (2) provide an automatic gradient pressure means for subjecting the body to increased g resulting from acceleration forces, and provide a pressure suit with a gradient pressure controlling device fixedly mounted on the aircraft with a quickly detachable connection between them permitting the aviator to detach his suit from the equipment fixed to the aircraft instantaneously should it become necessary for bailout.

331

Field, H., & A. V. Bock 1925 ORTHOPNEA AND THE EFFECT OF POSTURE UPON THE RATE OF BLOOD FLOW. J. Clin. Invest. 2:67-76

332

Finch, D. M., & J. D. Palmer 1957 DYNAMIC TESTING OF SEAT BELTS
Trans. Soc. Automot. Engrs. 64:541-51.

333

Fischer, A. & Pavel Kantorek 1958 URYCHLENIE METABOLICKEHO ZOTAVENIA A ZNIZENIE O_2 DLHI PO TELESNEJ PRACI CHLADOVYM PODNETOM APPLIKOVANYM V POPRACOVNOM OBDOBI (Acceleration of the Metabolic Recovery and Decreasing of O_2 Deficit Following Physical Labor by Means of a Stimulus of Cold Applied in the Period after Finished Work)
Cesk. Fysiol (Praha), 7(6):513-514

334

Fisher, A.C., Jr. 1955 AVIATION MEDICINE ON THE THRESHOLD OF SPACE: SERVICE DOCTORS, FACING MEDICAL PROBLEMS UNKNOWN ON EARTH, MAKE POSSIBLE MAN'S EXPLORATION OF THE HOSTILE HEAVENS
The National Geographic Magazine 108(2): 241-278, August 1955

ABSTRACT: The author reports on his visits to several military and civilian institutions that work on research into the human factors of flight. He describes the effects of the centrifuge at Johnsville, Pennsylvania. Escape from aircraft

ditched in water is a subject under investigation at Pensacola, Florida. The author discussed a weightless ride during his visit at Edward's Air Force Base, California. Heat resistant and pressure suits for pilots are under development at Wright-Patterson Air Force Base, Ohio, and at Randolph Air Force Base, Texas. Hyperventilation is another field of research at Randolph Air Force Base. Extreme acceleration and deceleration forces are the subject of a conversation between the author and Col. John P. Stapp. Pilot ejection and the effects of fatigue are being studied at Wright-Patterson Air Force Base. The article is very detailed about the research in all of the fields. (CARI)

335

Fisher, J.C. 1949 NAVAL ORDNANCE LABORATORY DROP TESTER (40') XD-1A, DESIGN, CONSTRUCTION AND CALIBRATION OF
(Naval Ordnance Lab., White Oak, Md.) 14 June 1949 ASTIA AD 103 435

336

Fisher, J.R. and M. Theodore 1957 JET AGE CRASH HELMET.
Modern Plastics, 34(12):88-91 Aug. 1957

ABSTRACT: Key to the dramatic success of the new APH-5 aviators' crash helmet, now being used by the U.S. Navy is found in a number of plastics applications. The exacting requirements of high-speed flight necessitated a revolutionary design employing a new concept in head protection.
This concept, which involves the absorption of impact energy by the crushing of a rigid cellular material, is implemented by the use of an expanded polystyrene. The complete helmet is an integrated assembly of shell, visor communications equipment, and attachment for an oxygen mask. It is an intricate structure that contains a surprising total of 105 parts, the most important of which are plastics.

337

Fitzsimons, J. T. & M. K. Browne 1956 PHYSIOLOGICAL ASPECTS OF A MULTIGRADIENT ANTI-G VALVE. (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. 991. Nov. 1956.

338

Flagg, J. E., J. A. Ruseckas, & D. M. Clark 1956 INFLATABLE GARMENT FOR AVIATORS AND THE LIKE. U. S. Patent 2,762,047, 11 Sept. 1956

ABSTRACT: An improved and simplified inflatable garment of flexible gas-tight material for aviators is described and illustrated. Pressures in the garment are adapted to counteract the disturbing physiological effects of violent accelerative forces which can be exerted on vulnerable portions of the wearer's body. The whole or any portion of the wearer's body, with no loss of mobility, can be uniformly pressurized to the desired degree without discomfort and possible harmful effects caused by the pressure medium seeking to enter a body opening, due to the pressure differential existing between the pressurized interior of the garment and prevailing respiratory pressure.

339

Flamme, A. L. 1936 CONSIDERATIONS MEDICALES SUR LE PARACHUTISME (Medical Considerations on the Parachutist)
Revue de l'armee de l'air (Paris) 2:977-1006.

340

Flechtner, J.A. 1959 LOW SPEED WIND TUNNEL TEST OF A .15 SIZE PILOT CAPSULE MODEL TO OBTAIN AERODYNAMIC CHARACTERISTICS DURING SEPARATION FROM THE AFTERBODY
(Chance Vought Aircraft) Report No. E9R-12497 ASTIA AD 263 504

ABSTRACT: A .15 Size Pilot-Capsule Model was tested in the CVA Low Speed Wind Tunnel during the period September 8 through September 16, 1959. The Long Capsule (C_2) and the Short Capsule (C_3) were tested in the presence of the Afterbody during separation. A typical "Separation Position" of the Capsule is shown as photographed in the Test Section. The Afterbody was moved in increments body longitudinally and vertically as designated. Data was obtained on the Capsule alone during runs 3 through 10 and in the presence of the Afterbody in runs 11 through 52. The purpose of the test was to obtain the Aerodynamic Deltas due to the presence of the Afterbody. These Delta Coefficients are presented for both the pitch and yaw runs.

341

Fleishman, E.A. 1953 THE PERCEPTION OF BODY POSITION. EFFECT OF SPEED, MAGNITUDE, AND DIRECTION OF DISPLACEMENT ON ACCURACY OF ADJUSTMENT TO AN UPRIGHT POSITION. (Perceptual and Motor Skills Research Lab., Air Training Command, San Antonio, Tex.) HRRC Research bull. no. 53-1; ASTIA AD-14 729; 30 Jan 1953
See also J. Exper. Psychol. 46:261-270, 1953.

ABSTRACT: A tilting-chair apparatus was used to investigate the influence of certain factors on the accuracy of adjustment to an upright position in the absence of a visual frame of reference. Relationships were found between degree and speed of tilt and the accuracy with which the subject adjusted the chair to an upright position. The experiment demonstrated that the greater the degree of tilt and the slower the speed of tilt, the greater the average error in returning the chair to an upright position. Significantly greater average error in returning to the upright position was observed when the original tilt was to the right rather than to the left. The constant error of adjustment was generally in the direction of initial displacement; constant error increased as the magnitude of displacement increased. The amount of average error and constant error was influenced by slight changes in magnitude of initial displacement as well as in speed of displacement.

342

Fleishman, E.A. 1953 THE INFLUENCE OF FIXED VERSUS FREE HEAD POSITION ON THE PERCEPTION OF BODY POSITION. (Perceptual and Motor Skills Research Lab., Lackland Air Force Base, Tex.) HRRC Research Bull. 53-371
ASTIA AD-24 654

ABSTRACT: Further study of the perception of body position in the absence of a visual frame of reference was conducted employing 90 subjects whose heads were held in fixed position. Adjustment to an upright position was attempted by subjects displaced to various degrees of tilt and subjected to various speeds of displacement in a tilting chair apparatus. Greater precision of adjustment to the upright position resulted with free head positions. A smaller constant error of adjustment resulted with the fixed head position, although the constant error was in the direction of initial displacement under both conditions. Greater precision of adjustment resulted in both tests when speed and magnitude of displacement under both conditions. Greater precision of adjustment resulted in both tests when speed and magnitude of displacement decreased and when the direction of displacement was to the left rather than to the right. The difference between free and fixed positions were greater at earlier stages of practice. The consistency of individual performance was high under both conditions.

343

Fletcher, K.E., & S.E. Neely 1960 USAF EMERGENCY ESCAPE EXPERIENCE 1949-1959. (Paper, Aerospace Med. Congress, 1960)

344

Florentino, M. Ralph 1949 STRENGTH TESTS OF TURNBULL MODEL 131 NAVIGATOR AND RADIO OPERATOR'S SEAT (ENGINEERING TEST REPORT)
(Glenn L. Martin Co., Baltimore, Md. Turnbull Enterprises, Inc., Baltimore, Md.)
Engineering Test Report No. 1013 ASTIA ATI 67 810

ABSTRACT: Tests were conducted on three Model 131 Navigator and Radio operator seats for use in C-119 cargo airplanes to determine the strength of the seats in compliance with AAF Spec. 25276A. Two seats were made of 24ST aluminum alloy tubing frame with a pressed aluminum bucket-type seat pan, while the third was of the same design, except for two pieces of 4130 normalized steel tube replacing a section of the lower back frame tubes. The first seat supported the 1700 lb. ultimate down load satisfactorily without yield or apparent set. In subsequent safety belt tests failure of the right hand seat support tube at the pedestal attachment occurred. The aluminum tubing was replaced with 4130 normalized steel tubing, which then supported 103% of the specification ultimate load.

345

Floyd, W. F. and A.T. Welford 1954 SYMPOSIUM ON HUMAN FACTORS IN EQUIPMENT. (Symposium on human factors in equipment design held at the University of Birmingham, 18th - 20th April 1951)
(London: H.K. Lewis, 1954)

346

Flynn, John T. 1961 PROTECTION AGAINST CRASH INJURY
Flying Sept. 1961. Pp. 47, 77-78

ABSTRACT: The author claims that even severe impact can be survived with proper safety gear and aircraft design. A detailed report of the effectiveness of the seat belt and harness is given with instructions on how they should be used.

347

Follis, R.H. Jr. 1943 SHOULDER SAFETY HARNESS. (War Dept., Air Force, Materiel Div.) ENG-M-49-698-10, 23 March 1943

348

Forbes, A.R. 1959 PREFERRED LOADS FOR THE AUXILIARY FIRING HANDLE OF THE MARK 3 EJECTION SEAT. (Flying Personnel Research Committee, Gt. Brit.) Report no. FPRC-999, ASTIA AD-229 169, April 1959

ABSTRACT: Six male subjects were tested under static conditions and three male subjects exposed to positive acceleration of 5 g to determine the optimum load on an ejection seat auxiliary firing handle. The range of loads investigated was from 65 lb to 95 lb, using the techniques of absolute judgments and paired comparisons. The maximum load on this handle should not exceed 75 lb for a two-handed pull. It is recommended that aircrew should be given training in its use to acquaint themselves with the amount of force required to pull it. (Author)

349

Forrest, J., E. A. Wade, W. K. Carter, & R. F. Slechta 1958 LIGHT-WEIGHT SEATING: DESIGN RESEARCH ON A NYLON NET SEAT; ONE OF A SERIES OF STUDIES PERTAINING TO CREW COMPARTMENT HABITABILITY FOR EXTENDED MISSIONS. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADC TR 58-309; ASTIA AD-209 380, Dec. 1958

ABSTRACT: This report describes a design research program for a light-weight aircraft seat made from nylon netting. An empirical approach was used to evaluate a series of exploratory designs and to modify solutions on the basis of subjective reports by individuals occupying the seats. A number of specific design problems were investigated with the results indicating that human factors requirements of a seat for long term occupancy can be met by a nylon net seat. (Author)

350

Forrest, J., et al. 1959 COMFORT EVALUATION OF THE C-124 CREW SEAT (WEBER) (Aerospace Medical Lab., Wright-Patterson AFB, Ohio) Oct. 1959

351

Forrest, J. & R.F. Slechta 1959 COMFORT EVALUATION OF THE C-97A/KC-97E PILOT SEAT (WEBER). (Tufts University, Dept. of Sociology, Bio-Mechanics Lab, Mass.) November 1959.

352

Foster, D. L. 1961 STRATO LAB HIGH #2 POST FLIGHT REPORT. (Winzen Res. Inc. Minneapolis, Minn.) Rept. 1266-R 19 Jan. 1961.

353

Fouch, H. W. 1946 HUMAN SUBJECT EJECTION TESTS FROM P-61B AIRPLANE (Air Material Command, Wright Field, Dayton, Ohio) Rept. No. TSEAC 11-45341-2-1, 26 Aug. 1946, ASTIA ATI- 9212

ABSTRACT:

1. Interviews with the human subject immediately after ejection and again on 21 August 1946 disclosed that no unusual sensations were experienced, except for the slight forward rotation of the seat upon entering the air stream.

2. The human subject stated that the shock received upon the opening of the parachute seemed less severe than those imposed by average routine troop jumps using a static line at speeds of approximately 122 knots. This would indicate that the human subject had reached terminal velocity before his parachute opened.

3. The test indicates that a 12 "G" catapult charge is adequate to propel the occupant and the seat clear of the empennage of most conventional fighter planes without causing physical injury to the human subject or damage to the airplane, at speeds up to 263 knots.

354

Fouch, H. W. 1947 PILOT EJECTION SEAT TESTS ON THE P-61B AIRPLANE AT MUROC ARMY AIR BASE, - AND APPENDIXES 1-11 - MEMORANDUM REPORT (AMC, Wright-Patterson AFB, Dayton, Ohio) TSEAC 11-45341-2-6, 25 July 1947, ATI 119 664.

ABSTRACT: The purpose of this publication is to report on a series of twenty pilot ejection seat flight tests from a P-61B airplane at Muroc Army Air Base from 8 October to 4 November 1946 and from 14 February to 7 March 1947, inclusive. Test "M", considered the most critical condition

in the flight plan, used a low charge of 57.4 gms; an ejection angle of 33°; an indicated airspeed of 260 knots; with a pressure altitude of 10,000 feet. The pilot ejection seat with dummy and parachute equipment, having a total weight of approximately 300 pounds, ejected out of the forward gunners compartment, cleared the upper surface of the vertical stabilizer by approximately 24 feet. Extrapolation of curves for the trajectory of the seat and dummy leaving the test airplane vs. airspeed; tail clearances vs airspeed, shows that safe escape using ejection force, can be made using 0°, 23°, and 33° angles of ejection, flying at speeds up to 260 knots. The automatic opening devices for releasing the safety belt and dummy's parachute are not entirely satisfactory in their present stage of development. Due to the number of opening device failures, it was necessary to double check each unit at the time of rigging and just before take-off time. The maintenance of this type of equipment is very involved. The P-61B airplane is not fast enough to be used for future pilot escape flight tests within the compressibility range of airspeeds. Tests requiring this speed range will be conducted with the P-82 and P-80B airplanes.

355

Fouch, H. W. 1948 PILOT EJECTION SEAT TESTS FROM REMOTE CONTROLLED P-80B ROBOT AIRPLANE (U. S. AF, AMC, Wright-Patterson AFB, Ohio) MCREXA7-45341-3-7 15 July 1948 ASTIA ATI 34691

ABSTRACT: A series of flight tests were conducted on the pilot ejection seat from a F-80B remote controlled airplane. The tests were not completed due to a crash, however it is recommended that, a two place airplane, capable of airspeeds approaching and exceeding Mach number .82, such as the TF80C airplane, be used to complete the original flight plan.

356

Fouch, H. W., & T. E. Sierer 1949 TESTS OF NAMC TYPE CATAPULT PERSONNEL EJECTION ON THE AERO MEDICAL LAB. 100 FOOT VERTICAL TRACK. (Air Material Command, Wright-Patterson AFB, Ohio) Rept. MCREXA 45341-3-10, Jan. 1949

357

Frankford Arsenal 1954 CARTRIDGE ACTUATED DEVICES FOR AIRCRAFT USE (Engineering Manual, Frankford Arsenal, Philadelphia, Pa.) Jan. 1954.

358

Franks, W. R. 1940 ADDENDUM TO WING COMMANDER GREIG'S REPORT ON TESTS WITH "SPECIAL FLYING SUIT" CARRIED OUT BETWEEN JUNE 1st AND JUNE 5th, 1940, USING SPITFIRE L. 1090. (National Research Council, Canada) Report #C-2831.

ABSTRACT: Notes are made on certain technical difficulties of the fitting and adjusting of the flying suits. It is concluded that no difficulties have presented themselves which could not be overcome by suitable manufacturing means.

359

Franks, W.R. 1940 MEMORANDUM - FLIGHT TEST OF EXPERIMENTAL SUIT. (National Research Council, Canada) Report #C-2829, May 14, 1940

ABSTRACT: In over twenty test dives developing accelerations of over 5 G it was shown that the experimental suit designed to counteract "blackout" was effective in conferring such protection.

360

Franks, W.R. 1940 PROGRESS REPORT ON FLYING SUIT TO PROTECT AGAINST PRESSURE EFFECTS OF ACCELERATION. (National Research Council, Canada) Report #C-2832, October 2, 1940

ABSTRACT: Progress in the design of the anti-G suit is reviewed, and recent developments of manufacturing procedures are outlined. It is also noted that construction of the accelerator and that of the human centrifuge has begun.

361

Franks, W. R. 1941 ANTI-BLACKOUT SUIT (National Research Council, Canada) C-2062.

ABSTRACT: On the basis of flight tests made by S/L Briggs and F/L Franks, some tests in the Harvard Aircraft, others in a Curtis P-40 Aircraft with accelerations up to plus 7'G' showed that the Franks suit Type E had been effective in eliminating or delaying the onset of blackout symptoms beyond the normal limit of acceleration obtainable in fighter aircraft. Also that the continued wear of the suit has no serious effect on the well being of the wearer, that the suit does not hinder the pilot in control of movements and there is a feeling of complete normality during heavy accelerations when the suit is worn. The report concerns liaison with British and American authorities in the development of this suit.

362

Franks, W.R. 1941 THE FRANKS SUIT.
(National Research Council, Canada) Report #C-2840, October 1941

ABSTRACT: This memorandum reports the service trials of the Franks Flying Suit in England and suggests simplifications in the design of the suit be conducted in Canada where tests can be made on the human centrifuge.

363

Franks, W.R. 1941 HYDROSTATIC SUIT IN GUNNER'S POSITION OF DEFIANT.
(National Research Council, Canada) Report #C-2834, July 1941

ABSTRACT: In tests at R.A.E. Farnborough, the hydrostatic suit was found to protect the passenger seated up right in gun turret against 6 G lasting for 6 seconds. Tests in the decompression chamber at simulated altitudes up to 38,000 feet showed that the suit caused no symptoms of discomfort.

364

Franks, W.R. 1941 REPORT OF ACTIVITIES AT PHYSIOLOGICAL LABORATORY, R.A.E. FARNBOROUGH.
(National Research Council, Canada) Report #C-2836; July 7, 1941

ABSTRACT: Demonstration by flight tests of the effectiveness of methods developed in Canada to raise the G tolerance of personnel, demonstration by flight that this does not interfere with proper handling of aircraft in all fighter maneuvers, demonstration by dog flights that pilots so protected have an increased maneuverability with resultant tactical advantage, and demonstration that gunners so protected have a G tolerance above that of the aircraft despite their unfavourable position are reported. An aircraftsman of the R.A.F. has been instructed in the principles and methods in fabrication of the applicance used. Modification of the appliance to simplify its design, make more practical and allow for combination with life preserver jackets and high altitude pressure suits is in progress.

365

Franks, W.R. 1941 TEST FLIGHTS WITH HYDROSTATIC SUIT.
(National Research Council, Canada) Report C-2849
F.P.R.C. 301, 27 May 1941 ASTIA ATI 206 421

ABSTRACT: Progress reports on the flight trials with the Franks Flying Suit concluded that the blackout threshold of the passengers was raised from 4.5 to 6 G.

366

Franks, W.R. 1942 REPORT ON TRIAL NO. 23 - FRANKS FLYING SUIT. (National Research Council, Canada) Report #C-2843, 16 July 1942

ABSTRACT: This report summarizes briefly the security aspect of the Franks Flying Suit, accelerative forces in flying, a description of the Franks Flying Suit and its fitting and servicing. Arrangements of the Service trial are described. The dangers of the use of the Franks Flying Suit and its advantages are pointed out. It was found that it enables the wearer to withstand 1 1/2 to 2 G more than he normally can.

367

Franks, W.R. 1944 LIAISON REPORT TO ACAMR, N.R.C., CANADA, ON VISIT COMMANDER W.R. FRANKS TO THE UNITED KINGDOM DECEMBER 1 TO DECEMBER 22, 1944. (National Research Council, Canada) Report #C-2799

ABSTRACT: A brief report is made of operational problems in aviation medicine overseas, with particular respect to the status of the Franks' flying suits, crash harnesses, cooling of ground crew in the tropics, special breathing apparatus, oxygen fila, operational problems in the Canadian squadrons, and treatment of shock.

368

Franks, W. R., J. A. Carr, W. R. Martin & W. A. Kennedy 1944 USE OF INCREASE IN WEIGHT OF A MASS UNDER G TO PROVIDE SOURCE OF COMPRESSED AIR FOR FFS (AB-BG SYSTEM) (National Research Council, Canada) Report C-2722, Sept. 28, 1944.

369

Franks, W.R. and W.R. Martin 1944 LIAISON REPORT ON MEETING OF SUB-COMMITTEE ON ACCELERATION OF THE NATIONAL RESEARCH COUNCIL, WASHINGTON, JUNE 7, 1944. (National Research Council, Canada) Report #C-2711

ABSTRACT: This liaison report covers discussion on American experience with Anti-G equipment in the Pacific and the European theatres of war. The recent designs of Anti-G suits, accelerations on parachute openings, blood pressure changes produced by a negative G tilt-table and standardization of centrifuge runs

370

Franks, W. R., E. A. Ryan, and W. A. Kennedy 1944 THE COOLING OF PILOTS AT READINESS UNDER SIMULATED TROPICAL CONDITIONS BY BUBBLING AMBIENT AIR THROUGH A MARK III FFS PARTIALLY FILLED WITH WATER. (In Proc. Assoc. Committee Aviat. Med. Res., N.R.C., Canada) Rept. No. C-2721, 4 Sept. 1944.

371

Fraser, A.M. 1943 THE EFFECT OF THE FRANKS FLYING SUIT ON THE INCIDENCE OF DECOMPRESSION SICKNESS.
(National Research Council, Canada) Report # C2561, 30 June 1963

ABSTRACT: In 24 (57%) of the control flights severe pains (requiring descent) occurred in the lower extremities, wheras, in only 2 (6%) of the flights in which the Franks Flying Suit was worn did such pains occur, and both of these were present in the same subject. Severe pains in the upper extremities occurred in 9 (21%) of the control flights and in 8 (26%) of those in which the Franks Flying Suit was worn. The hydrostatic column applied in wearing the Franks Flying suit, and which is found here to prevent pains in the lower extremities is much shorter than that previously found necessary to relieve such pains. It is pointed out that this is in agreement with the general experience that greater decrease in altitude is necessary to relieve decompression sickness, than is required to prevent it. This effect of hydrostatic pressure in preventing pains of decompression sickness is regarded as additional support for the view that the origin of limb pain is peripheral.

372

Fredericks, R. H. 1960 PROGRESS IN SAFE VEHICLE DESIGN
(Ford Motor Comp., Dearborn, U. S. A.)

373

Fredericks, R. H. 1962 PROGRESS IN SAFE VEHICLE DESIGN. (In M. K. Cragun, ed., The Fifth Stapp Automotive Crash and Field Demonstration Conference, Sept. 14-16, 1961) Pp. 225-240

374

Freeman, H. E. 1960 PERSONNEL RESTRAINT SYSTEM PROGRESS REPORT FOR JUNE--JULY 1960. (Chance Vought Aircraft) AF 33(600)-41418, CVA-AST/EOR-13079, August 1960.

375

Freeman, H.E. 1962 A RESEARCH PROGRAM TO DEVELOP A 60 "G" PERSONNEL RESTRAINT SYSTEM. In Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, (National Academy of Sciences, National Research Council) Pp. 259-264 Publication No. 977.

ABSTRACT: A 60 G personnel restraint system was developed. The central components are an individually fitted, fiber glass, torso garment and a similarly fitted seat pan. These rigid components were selected to provide broad support and preserve the normal body shape under inertial loading. A flexible, low-rebound liner is used for comfort and intimate fit. The torso shell is retained to the seat structure with steel cables to minimize stretching and the resultant rebound. A dacron strap system, positioned by a leather helmet, was chosen to minimize stretching and the resultant rebound. A dacron strap system, positioned by a leather helmet, was chosen to minimize forward head motion. Lateral head supports are mounted on a carriage that adjusts vertically relative to the seat structure for crew-size variation. Low-rebound padding in the helmet cushions the ear area. Arm support is provided by contoured armrests and hand-holds with a strap passed over the crook of the arm holding the arm back and down. The dummy's legs are positioned and restrained by the sides of the shell, a central divider, a contoured leg backrest, and a leg cover. Anti-submarine protection for the torso is also provided by the leg cover, which supports the forward inertial loads of the thighs and legs and stabilizes the pelvis by a direct load path through the femur into the pelvic socket. The contoured lower skirt on the torso backshell and sides of the seat pan reinforce the pelvic socket by limiting lateral shifting of the thighs. The support structure is a tubular steel frame articulated to provide a torso forward position for boost and torso aft position for less stressful flight elements. Full immobilization and restraint are applied in the forward position

376

Freeman, H. E., W. C. Boyce, & C. F. Gell 1962 INVESTIGATION OF A PERSONNEL RESTRAINT SYSTEM FOR ADVANCED MANNED FLIGHT VEHICLES. (6570th Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio) AMRL-TDR-62-128, Dec '962

ABSTRACT: To develop new concepts for personnel restraint, the following studies were conducted. Characteristic accelerations were defined for advanced manned flight systems. Ballistic reentry, generating 8 to 12 G associated with ballistic reentry, produce the most severe physiological stress. Landing impact, generating low-total-energy accelerations of 60 to 100 G's peak on the capsule, produced the most severe structural loading. Human tolerance to acceleration was studied by a survey of the available test data and a structural analysis of the human body. Case histories of accidental falls and suicides were studied to gain insight into human tolerance to high-peak-magnitude low-total-energy acceleration exposures. Several basic crew restraint concepts were evolved and evaluated. One employing rigid contoured support was selected to limit body-element displacement and distortion and to minimize rebound. A test system was designed and fabricated. Mechanisms were designed to proposition and pretension the crewman mechanically before impact. The system should be thoroughly tested to determine the protection achieved by rigid contoured restraint. (AUTHOR)

377

Frenier, C.E. 1947 BELT ASSEMBLY - SHOULDER HARNESS, PILOT EJECTION SEAT - DRAWING NO. X4766061 (Army Air Forces, Materiel Command) TSEAP-7B-1-826, 16 Jan 1947, ASTIA ATI-179 498

ABSTRACT: The purpose of this report is to present the results of the comparative strength tests between subjects belt assembly and the standard Type B-18, Belt Aircraft Safety Shoulder, Specification 94-3262. The type B-18 Shoulder Harness, Exhibit A, was modified by removing the metal attachments fittings, Part Nos. 42B6034-L-1 and 42 6034-R-1 and installing webbing loops and rolling edges in to form an oval cross-section, stitching being used to secure loop and oval cross-section. As a result of the tests, it was found that webbing formed loops are superior to weak steel fittings. That webbing formed loops protected to prevent wear would be suitable for service use

378

Freudenthal, A. M. 1957 SAFETY AND SAFETY FACTORS FOR AIRFRAMES (AGARD, Paris, France) Rept. 153, Nov. 1957

379

Frost Engineering Dev. Corp. 1961 INVESTIGATION OF THE DYNAMICS OF HUMAN RESTRAINT SYSTEMS. (Frost Engineering Dev. Corp., Denver, Colo.) 30 July 1961.

ABSTRACT: Excluding effects due to improper restraint system configuration, which may cause the imposition of intolerably high localized loads on the body structure or organs, the effective stiffness and damping characteristics of a restraint system has a very great influence upon the physiological tolerability of short period accelerations. This report describes the dynamic fundamentals of restraint and makes recommendations concerning a research program of restraint dynamics.

380

Frost, Richard H. 1952 INTEGRATION OF EQUIPMENT IN THE CAPSULE (Paper, Conference on Problems of Emergency Escape in High Speed Flight)

381

Frost, R.H. 1955 ESCAPE FROM HIGH SPEED AIRCRAFT.
I.A.S. Preprint 532, (Stanley Av. Corp., presented at the 23rd Annual Meeting, January 24-27, 1955)

ABSTRACT: A view is given of the development of the emergency escapes for planes with high speed. In the second World War the Germans did research in this field. Before the end of the war, the Germans made use of ejection seats. After the War England as well as U.S. busied themselves with bail-out problems. The author summarizes the expectations for the near future from researchers in Germany, Sweden, Great Britain and America.

382

Frost, R.H. 1955 ESCAPE CAPSULE.
J. Aviation Med. 26(6):452.

ABSTRACT: We believe at present that the ejection seat will be just about at its upward limit of use at speeds corresponding to little more than sonic flight at sea level, because angular and translational accelerations encountered will approach human limitations and because of the problems of retaining protective equipment and body extremities in the airblast. Some alleviation can be expected by increasing the weight of the seats and incorporating special stabilization and retaining devices. However, when this point is reached, it is our belief that we might as well go on to the complete capsule, because it will probably cost little if any more in weight, space, and complexity. Moreover, the capsule has many advantages over ejection seats; better protection of the occupant from environmental conditions, opportunity for considerable integration of personal equipment, and protection for the user after he has reached the surface...

Whichever capsule configuration is chosen, it will unquestionably be capable of retaining pressure, withstanding landing impact, and floating for long periods after water landing. The recovery system can be expected to be completely automatic in operation, probably consisting of a drogue stabilizer chute deployed immediately after ejection and subsequently released by some sort of altitude- and force-sensing device. At release, the drogue will deploy a single or multistage recovery parachute that will lower the capsule all the way to the ground or water. The intention will be that the occupant stay in the capsule through the entire descent and, if desired, until rescue is accomplished. However, I strongly suspect that all capsules will have to provide for manual bail out at any time desired, at least until a great deal of experience has been gained to prove their reliability, and this requirement will diminish full realization of the capsule potentialities. In any event, I am convinced that airplanes capable of supersonic flight at low altitude should and will be equipped with capsules, and I expect the result will then continue the trend already apparent from ejection seat statistics- an increasing percentage of successful escapes from combat airplanes. (Author)

383

Frost, R.H. 1957 ENGINEERING PROBLEMS IN ESCAPE FROM HIGH PERFORMANCE AIRCRAFT
J. Aviation Med. 28(1):74-77, Feb. 1957.

ABSTRACT: A discussion of the elements of over-all problem of ejection: (1) Decision to abandon the aircraft; (2) operation of emergency controls; (3) removal of obstructions to egress; (4) egress from the crew station; (5) avoidance of airplane structure after egress; (6) prevention of injury caused by impact pressure, temperature, deceleration and/or tumbling; (7) prevention of injury caused by ambient pressure and/or temperature; (8) retention, and protection until use, of life-saving and survival equipment; (9) operation of life-saving equipment; (10) prevention of injury during landing, considering both vertical and horizontal velocities, and type of surface encountered; (11) counteracting effects of surface environment, including hunger and thirst; (12) Facilitating search and recovery operations by friends; avoiding these operations by enemy; (13) training in operation and maintenance of the system.

384

Frucht, A. H. & K. Otto 1959 DRAHTLOSE UBERTRAGUNG DES EKG MIT TRANSISTOR-KLEINSTSENDER VOM MENSCHEN ODER TIER (Wireless Transmission of the EKG of Man or Animal by Means of a Miniature Transistor Transmitter)
Pflug. Arch. ges Physiol. (Berlin) 270(1):82

385

Fryer, D. I. 1958 AIRCRAFT PASSENGER SEAT DESIGN AND CRASH SURVIVAL.
(RAF, Institute of Aviation Medicine, Farnborough) FPRC No. 1055
August 1958

ABSTRACT: In this review, an attempt is made to describe the forces likely to be encountered in an accident and the best means by which to minimize their various effect on passengers.

386

Fryer, D. I. 1959 PASSENGER SURVIVAL IN AIRCRAFT CRASHES
Aeronautics (London) 40(2):31-37

ABSTRACT: Medical and physiologic data concerning factors affecting human survival in aircraft crashes are reviewed and discussed. Recommendations are made for protecting passengers against crash forces in the direction most commonly involved: forward and downward. This includes appropriate aircraft design and positioning of passenger accommodations.

387

Fryer, D. I. 1961 OPERATIONAL EXPERIENCE WITH BRITISH EJECTION SEATS. A SURVEY OF MEDICAL ASPECTS.
(Flying Personnel Research Committee, Gt. Brit.)
Rept. no. FPRC-1166 July 1961 ASTIA AD 267 788

ABSTRACT: A survey is presented of experience in the emergency use of ejection seats of British design and manufacture. The escapes and attempted escapes included are believed to constitute a complete list of ejections from aircraft flown by the Royal Navy, the Royal Air Force, the Ministry of Aviation (formerly Ministry of Supply), and the British aircraft industry up to 1st July, 1960. It does not include test ejections carried out in the development of ejection seats, or the R.A.F. experience with American seats. Although reference to the indications for ejection and the mechanism whereby this is executed if frequently necessary, the primary aim is a medical survey of the difficulties inherent in escape by this means, and the nature, causes and contributory causes of injury during and following ejection. (Author)

388

Fryer, D. I. 1962 RAF EXPERIENCE WITH SAFETY HARNESSES
Am. Occup. Hyg. 5:113-127

ABSTRACT: In the development of safety harness from its earliest stages to the present complex systems in current aircraft, a number of important strides have been made and these are briefly reviewed. The main advances have been in the provision of shoulder harness, the recognition of the need for attachment to the airframe rather than the seat, the design of harness such that the centre of gravity of the body is not lower than the junction point of the straps, and the construction of harness such that it will withstand the forces encountered in very severe impacts. The three principal aims of harness in aircraft are to provide restraint during various in-flight manoeuvres, to provide retention during crash decelerations and to maintain optimum body positioning during operation of the ejection seat. The relevance of the features of current harness to the requirements for safety belts for motor vehicles is briefly discussed.

389

Fuchs, L. A., & B. S. Hutchins 1960 UNDERWATER RESEARCH TO SAVE PILOTS
(Paper, 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960)

390

Fulton, C.L. 1958 EFFECT OF ENVIRONMENTAL CONDITIONING ON AN AIRCRAFT EMERGENCY ESCAPE SYSTEM. (Pitman-Dunn Laboratories Group, Frankford Arsenal, Philadelphia, Pa.) Memo Rept. MR-667, Feb. 1958. ASTIA AD 204 692.

SUMMARY (a): Three "mock ups" of an emergency escape system were each subjected to nearly 100 cycles of environmental conditioning. This conditioning simulated an aircraft traveling from sea level, 70° F, to 50,000 feet, -65°F, and return.

Two of the "mock ups" were disassembled and found to contain various amounts of moisture; the third was successfully functioned while at -65°F.

While the results show that there was moisture accumulation within the "mock ups" successful functioning of one at -65°F indicates that the accumulated moisture is not sufficient to adversely affect the functioning of the system. (Author).

391

Fulton, J.F. 1941 PNEUMATIC AND WATER SUITS AND OTHER AGENTS DESIGNED TO COUNTERACT ACCELERATION IN AIRCRAFT
(National Research Council, Committee on Aviation Medicine, Washington, D.C.) CAM Rept. No. 15, 22 July 1941

ABSTRACT: This is a brief review of protective devices which was made preliminary to the commencement of OSRD research. The German methods of combating "g" are summarized. It is recommended that the effects of adrenal cortical hormones on "g" tolerance be studied and that the relative merits of abdominal belts and pressurized leggings be determined. It is also suggested that a water suit be pressurized with air and that standards of service testing for acceleration be drawn up.

RESTRAINT, PROTECTION, AND EMERGENCY ESCAPE SYSTEMS

G

392

Gaer, R. L. 1957 OPERATIONAL REGIONS AND BIO-AERODYNAMIC LIMITATIONS OF FUTURE AIRCRAFT ESCAPE SYSTEMS. (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TR 57-590; Oct 1957

393

Gagge, A.P. PRINCIPLES OF SEATING IN FIGHTER TYPE AIRCRAFT AAF Memo Report TSEAL-3-695-58

394

Gagge, A.P. 1943 PERSONNEL EQUIPMENT PROBLEMS IN ETOUSA AND NATOUSA Appendix 12: AN IMMEDIATE APPLICATION FOR THE ANTI-G-SUIT. (War Dept., Air Forces) ENG-49-695-34, 20 September 1943

395

Gagge, A.P. 1945 HUMAN FACTORS IN AIRCRAFT DESIGN. Air Surgeon's Bulletin, 2(9):298-301
See also U.S. AAF-ATSC, Engineering Division, Aero Medical Laboratory Memo. Rept. TSEAL-3-695-53, 29 May 1945.

396

Galban, P. and J. Fabre 1961 ETUDE DES EFFECTS DE L'ÉJECTION SUR LA TAILLE DES PILOTES (STUDIES ON EJECTION EFFECT ON THE PILOTS HEIGHT) Report CERMA 1025

397

Galiana, T. de 1952 TECHNIQUES NOUVELLES DE PARACHUTAGE (NEW TECHNIQUES OF PARACHUTING) Atomes (Paris) 7(79):333-337

ABSTRACT: This is an illustrated summary of the functioning of the ejection seat and the physiological effects of high-altitude bailout. The outlooks of recently developed techniques, such as the ejection capsule, are briefly discussed

398

Galkin, A. M. et al 1959 MEDICO-BIOLOGICAL RESEARCH IN ROCKETS: RESEARCH ON THE LIFE ACTIVITY OF ANIMALS DURING FLIGHTS IN HERMETICALLY SEALED CABINS OF ROCKETS UP A HEIGHT OF 212 KM: RESEARCH ON THE LIFE-ACTIVITY OF ANIMALS DURING FLIGHTS IN THE HERMETICALLY SEALED CABINS OF ROCKETS UP TO AN ALTITUDE OF 110 KM

Trans. of mono. Preliminary Results of Research by Means of the First Soviet Artificial Earth Satellites and Rockets (Moscow) PP. 109-149, LC or SLA 59-22466.

399

Gandelot, H. K. and P. C. Skeels 1962 CONSIDERATIONS IN CRASH ENERGY ABSORPTION. (In M. K. Cragun, ed., The Fifth Stapp Automotive Crash and Field Demonstration Conference, Sept. 14-16, 1961) Pp. 219-224.

400

Gantz, K.F., Ed. 1959 MAN IN SPACE: THE UNITED STATES AIR FORCE PROGRAM FOR DEVELOPING THE SPACECRAFT CREW
(Duell, Sloan and Pearce, New York)

ABSTRACT: Contents include: "The Threshold of Space"; "From Aviation Medicine to Space Medicine"; "Basic Factors in Manned Space Operations"; "Biomedical Aspects of Space Flight"; "Biodynamics of Space Flight"; "The Engineered Environment of the Space Vehicle"; "Human Performance in Space"; "Weightlessness"; "Observations in High-Altitude, Sealed-Cabin Balloon Flight"; "Experimental Studies on the Conditioning of Man for Space Crews"; "Escape and Survival During Space Operations' "Time Dilation and the Astronaut"; "The Spiral Toward Space"; "Human Factors Support of the X-15 Program"; "The U.S. Air Force Human Factors Program"; "Blueprint for Space"; "The Military Impact of Manned Space Operations"

401

Gard, P. W., & L. B. Cochran 1956 INSTALLATION AND EVAIUATION OF TV-2 TYPE ARM RESTS ON SPECIAL DEVICE, 6-EQ-2a, EJECTION SEAT TRAINER. (Naval School of Aviation Medicine, Pensacola, Fla.) Special Rept. No. 56-16; 24 Apr. 1956

ABSTRACT: The modification of the 6-EQ-2a ejection seat trainer to incorporate a direct TV-2 type trigger arm rest firing mechanism is described and illustrated. The modified seat trainer proved to work successfully, utilizing either face curtain or arm rest firing technique. This training device is used to indoctrinate student and naval aviators in escape procedures from high speed aircraft.

402

Gardner, W. J. and D. F. Dohn 1956 THE ANTIGRAVITY SUIT (G-SUIT) IN SURGERY
J. of American Medical Association, 162:274-276, Sept. 22, 1956

ABSTRACT: The principle of the antigravity suit (G-suit) used in aviation is effective in combating postural hypotension during operations with the patient in the sitting position. It is also helpful in the management of induced hypotension during operations with the patient in the supine position A simplified G-suit, consisting of a plastic bladder, may be wrapped about the lower part of the body and inflated from a tank of gas. Crile applied this principle to the control of blood pressure during surgery more than fifty years ago. (J. of Aviation Medicine 29(5):365, 1958)

403

Garn, Stanley M. 1960 THE INNER MAN
(Paper, American Rocket Society Anatomy of Manned-Space Operations Conference, Dayton Biltmore Hotel, Dayton, Ohio, October 10-12, 1960)

ABSTRACT: A man is not just his outline, measured and traced on OSCAR, but the sum of his inner components, of which, the fat-free compartment and the fat compartment are the two of greatest current interest

404

Garrett, J. W. 1962 AN EVALUATION OF DOOR LOCK EFFECTIVENESS: Pre-1956 vs Post-1955 Automobiles. In M. K. Cragun ed. The Fifth Stapp Automotive Crash and Field Demonstration Conference, Sept. 14-16, 1961. PP. 20-31.

405

Garrett, J.W., & P.W. Braunstein 1962 THE SEAT BELT SYNDROME
The Journal of Trauma, 2(3):220-237, May 1962.

ABSTRACT: The data examined in this study were based on accident and medical records drawn from a total of 2,778 automobiles in each of which at least one occupant was wearing a seat belt when an accident occurred. These cars contained 3.673 occupants; 3,325 occupants wore seat belts and of these, 944 were injured.

A total of 150 occupants received some injury to the lower torso; 26 of these except in one case, but the injury was not related to seat belt use; both car and occupant were completely crashed in a collision with a bus. The frequency of lower torso injuries among injured seat belt users was essentially similar to that observed among occupants in injury-producing accidents without belts (about 15 per cent for both).

In the majority of the 26 cases where serious lower torso injuries occurred, accident circumstances were rather severe. Only 7 of these patients showed any evidence of severe seat belt application--bruises, contusions, etc.

406

Gatland, K.W. 1954 PROGRESS TOWARDS ASTRONAUTICS
Journal of the British Interplanetary Society 13(3): 142-166, May 1954

ABSTRACT: Review of achievements and opinions recorded in 1949 and progress made by 1954; aerodynamic research techniques developed in United States; specific research aircraft described; design of pressure suits; human centrifuge research in high atmosphere; and guided missiles.

407

Gatling, F. P. 1959 EJECTION SEAT STUDY (USN Safety Ctr., Norfolk)
Rept. No. AM 2-59, ASTIA AD 220 667.

ABSTRACT: The ejection rate for calendar 1958 was the highest in the history of Naval aviation, but there is an indication that the rate of increase is slowing. Lack of altitude is still the greatest factor in unsuccessful ejections. There was a large increase in on-the dock ejections in 1958, and the main altitude at which ejections were made in 1958 was the lowest yet recorded, 7474 feet. There was a substantial increase in fatal ejections that began above 3000 feet. The mean speed at which ejections are made continued to decrease to 217 knots. Attitude data again failed to reveal any connection between attitude and fatal injury. Among aircraft had the smallest percentage of fatal injuries.

408

Gauer, O.H. 1944 RÖNTGENKINEMATOGRAPHISCHE DARSTELLUNG DER FLIEHKRAFTWIRKUNG (Roentgencinematography Presentation of the Effects of Centrifugal Force) Luftfahrtmedizin (Berlin) 9: 109
See also: (Dept. of the Air Force), German Aviation Medicine, World War II, Vol. I., "X-ray Photographs During Acceleration"

409

Gauer, O.H. 1950 EVIDENCE IN CIRCULATORY SHOCK OF THE ISOMETRIC PHASE OF VENTRICULAR CONTRACTION FOLLOWING EJECTION
(Paper, The American Physiological Society 59th Annual Meeting, Atlantic City, New Jersey, April 17-21, 1950) Federation Proceedings 9: 47

ABSTRACT: Simultaneous pressure recordings in the outflow region of the left ventricle and the aortic root were taken with 2 miniature manometers mounted on the tips of intracardiac catheters in an anesthetized dog. In the normal animal the summits of the ventricular and aortic pressure curves are congruent and considerable displacement of the ventricular catheter does not affect the pressure contours. If the catheter is kept in this region of the heart and circulatory shock is induced by exsanguination, unusual pressure records may be anticipated when the mean arterial pressure falls below 50 mm. Hg. While the ventricular curve follows an almost sine wave pattern with maximum pressures of 120-200 mm. Hg, the aortic pressure drops abruptly after reaching a peak of 50-60 mm. Hg. This picture is more pronounced in certain stages of adrenalin effect under shock. It can be readily explained by the assumption that the ventricle continues to contract isometrically with considerable force after having expelled its pathologically small blood content. This condition may help to account for the high incidence of subendocardial hemorrhages observed in humans and experimental animals suffering from prolonged circulatory shock

410

Gauer, O.H. & G.D. Zuidema, eds. 1961 GRAVITATIONAL STRESS IN AEROSPACE MEDICINE
(Boston: Little, Brown, & Co., 1961)

ABSTRACT: Contents include: "The Physiology of Acceleration" by O.H. Gauer; "Historical Aspects of Gravitational Stress" by O.H. Gauer; "Definitions: Magnitude, Direction, and Time Course of Accelerative Forces" by O.H. Gauer; "The Hydrostatic Pressure" by O.H. Gauer; "Arterial Blood Pressure Responses to Positive Acceleration in Animals" by R.W. Lawton; "Blood Volume and Gravitational Stress" by O.H. Gauer; "The Circulation in Man Under Gravitational Stress and

in the Giraffe" by O.H. Gauer; "Reflex Responses of the Circulation" by O.H. Gauer and E.W. Salzman; "Effect of Acceleration on the Heart" by H.O. Sieker; "Effect of Acceleration on Respiration" by O.H. Gauer and S. Bondurant; "Visual Performance Under Gravitational Stress" by W.J. White; "The Physiology of Acceleration-Performance" by J.L. Brown; "The Physiology of Positive Acceleration" by O.H. Gauer and G.D. Zuidema; "The Physiology of Negative Acceleration" by O.H. Gauer; "The Physiology of Combined Accelerations" by R. Edelberg; "Transverse G: Prolonged Forward, Backward, and Lateral Acceleration" by S. Bondurant; "Escape from High Performance Aircraft" by R.R. Hessberg; "Human Tolerance to Severe, Abrupt Acceleration" by J.P. Stapp; "Sub-Gravity and Weightlessness" by D.C. Simons; "Some Physiological Considerations of Space Flight" by G.D. Zuidema; "Clinical Evaluation of Low G Tolerance" by S.D. Leverett, R.U. Whitney and G.D. Zuidema; "The Hydrostatic Indifference Level" by O.H. Gauer; "The Hydrostatic Pressure in the Arterial Tree" by R.W. Lawton; and "Standardization of Human Centrifuge Techniques" by S.D. Leverett and G.D. Zuidema.

411

Geer, R. L. 1957 OPERATIONAL REGIONS AND BIOAERODYNAMIC LIMITATIONS OF FUTURE AIRCRAFT ESCAPE SYSTEMS. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 57 590, Oct. 1957. ASTIA AD 131 089.

ABSTRACT: The boundaries and conditions for practical flight within the atmosphere are delineated. The region where flight is practical is divided into areas of different escape requirements. Three figures are included to illustrate the various flight regions as a function of altitude and Mach Number. (Author)

412

Geer, R. L., & J. F. Rayfield 1959 DEVELOPMENT AND TEST OF A BALLOON BORNE MANNED VEHICLE (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 59-226; ASTIA AD-227 244; June 1959

ABSTRACT: Balloon borne vehicles are well suited for use as a means of lifting parachutists to a very high altitude for test jumping. The design, fabrication, and testing of a vehicle, developed at the Wright Air Development Center for this purpose, are discussed in this report. Included are presentations of novel designs for a pressure-retaining hatch and an energy-absorbing parachute landing device

413

Geiger, R. C. 1948 PROOF TEST OF PILOT'S, CO-PILOT'S, AND NAVIGATOR'S SEAT INSTALLATIONS MODEL XB-48-2(Glenn L. Martin, Co., Baltimore, Md. USAF Contract No. W33-ac-13492, 26 Aug. 1948.

ABSTRACT: Proof tests were made on the pilot's, co-pilot's and navigator's seat installations in the XB-48-2 bomber. Deflection readings were taken and the results plotted. The pilot's, co-pilot's, and navigator's seat installations were satisfactorily proof loaded with no indication if imminent failure little deformation, and no appreciable permanent set. The various test results indicate that the installations are satisfactory from a strength standpoint

414

Gell, C.F. 1951 MODIFICATION OF F7F, INSTALLATION OF SUPINE SEAT AND RELATED COMPONENTS, INFLIGHT EVALUATION OF THE SEAT
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-L5104, Sept. 12, 1951 ASTIA AD 133 233

ABSTRACT: An F7F aircraft was modified to include a supine seat and related components in order to evaluate and correlate previous experimental findings concerning the effect of supination on pilot tolerances to G forces. A syllabus consisting of seven hourly periods, six of which were to be in the air, was formulated to instruct test pilots in flying the supine seat. Control of the aircraft was maintained through a PIK autopilot and instruments while the pilot was supinated. The reactions of three subjects tested has been very favorable.

415

Gell, C.F. 1952 MODIFICATION OF F7F, INSTALLATION OF SUPINE SEAT AND RELATED COMPONENTS, IN-FLIGHT EVALUATION OF THE SEAT
(Naval Air Development Center, Johnsville, Pa.) NADC-MA-L5208, 10 Dec. 1952 ASTIA AD 133 234

ABSTRACT: A supine seat was installed in an F7F fighter plane and tested. Its relatively small size, and points of constriction, as well as the lack of visibility and difficulty of escape it imposed, were found to be undesirable features. In flight, control of the plane was made possible by means of an autopilot (PIK) device allowing the pilot to change position if desired. Additional tests on the human centrifuge are recommended to investigate the physiological implications of the supine seat under acceleration. It is further recommended that the assembly be modified for stick and rubber installation, improved instrument, visibility, and greater physical comfort.

416

Gell, C.F. 1954 EVALUATION OF ANTI-BLACKOUT SUIT WITH PARACHUTE SAFETY HARNESS AS INTEGRAL PART
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR2 March 9,1954

ABSTRACT: The subject anti-blackout suit met the requirements of para. 4.2.3 of MIL-S-5085 (Aer) in providing adequate G protection for the subject after being tested and evaluated on the human centrifuge. However, this protection was accompanied by subjective discomfort of excessive pressure from the belly bladder even though the G valve was on the low setting. The same subject had no comparable discomfort when protection of the same magnitude of G was provided by a conventional anti-blackout suit attached to the G valve on the high setting.

417

Gell, C.F. & H.N. Hunter 1954 PHYSIOLOGICAL INVESTIGATION OF INCREASING RESISTANCE TO BLACKOUT BY PROGRESSIVE BACKWARD TILTING TO THE SUPINE POSITION
(Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5406; 30 June 1954 ASTIA AD 36 856
See also: J. Aviat. Med. 25(6): 568-577, Dec. 1954.

ABSTRACT: Physiological instrumentation for the tests on the supine seat included the measurements of ear opacity, ear pulse, ECG, systolic blood pressure pulse, and respiration. The subjects were monitored by peripheral and central lifht responses. The runs consisted of 5-sec exposures from 1 g to the g level where grayout occurred for each position. At the grayout level, the g tolerance was evaluated after the seat was tilted backwards and fixed into position. Excessive discomfort in any position due to abdominal or thoracid pressure was also considered an end point. The angular relationship of the back of the seat with the retinal-aortic dimension was determined by x-ray when the seat was positioned at 20 degrees, 65 degrees, and 85 degrees. No change was indicated in the blackout tolerance between 0 degrees to 35 degrees backward tilt. The first increases in tolerance were noted at the 45 degree position. At 77 degrees, the anti-blackout protection did not exceed the protection afforded by an inflated anti-g suit with the subject in the upright position. The study indicated that to receive the full protection against blackout afforded by supination the subject must be tilted back beyond 77 degrees. (ASTIA)

418

Gell, C.F. & H.N. Hunter 1954 PHYSIOLOGICAL INVESTIGATION OF INCREASING RESISTANCE TO BLACKOUT BY PROGRESSIVE BACKWARD TILTING TO THE SUPINE POSITION
J. Aviat. Med. 25(6): 568-577

ABSTRACT: A healthy male subject can tolerate 15 transverse G while supinated at 85 degrees for five seconds with no indication of impending blackout. At 77 degrees backward tilt, the anti-blackout protection does not exceed that protection afforded by an inflated anti-G suit with the subject in the upright seated position. To insure full protection against blackout, the subject must be supinated beyond 77 degrees backward tilt. At relatively low G in the 65-77 degrees backward tilt position, a sense of fulness, pressure, or burning sensation often appears in the thorax indicating, again, that the optimum position is beyond 77 degrees backward tilt. The pressure-pain occasionally elicited in the thorax is due to pressure of the rib cage on the thoracic cavity as well as the pressure on the abdomen forcing the abdominal contents against the diaphragm. (Author)

419

Gell, C. F. Capt., E. L. Hays and J. V. Correale, Jr. 1957 CHRONOLOGICAL DEVELOPMENT HISTORY OF THE NAVY'S FULL PRESSURE HIGH ALTITUDE SUIT (Air Crew Equipment Laboratory) NAMC-ACEL-334

420

Gell, C.F., E.L. Hays, and J.V. Correale 1958 THE NAVY FULL-PRESSURE, HIGH ALTITUDE SUIT J. Aviation Med. 29(3): 324, March 1958

ABSTRACT: The development and design features of a Navy full-pressure suit for the protection of aviators at extreme altitudes are described.

421

Gell, C. F., E. P. Hays, & J. V. Correale 1959 DEVELOPMENTAL HISTORY OF THE AVIATOR'S FULL PRESSURE SUIT IN THE U.S. NAVY. J. Aviation Med. 30(4):241-250.

ABSTRACT: This article gives a complete history of research conducted on various full pressure suits since the one made for Wiley Post. It also surveys the research in certain related fields such as decompression, cold water

exposure, anti-G protection and other physiologic studies. At the present time, the U.S. Navy's full pressure high altitude suit provides protection for potential disabilities at high altitude. Above 35,000 feet, whether the altitude is reached by design or due to aircraft cabin decompression, the suit system will maintain a 35,000 foot atmospheric pressure level with 100 per cent oxygen to the respiratory apparatus. In this manner it provides full protection against anoxic anoxia, aeroembolism or the damaging effect of explosive decompression.

422

Gell, C. F. 1960 BIO-ENGINEERING OF PROTECTIVE SYSTEMS
(Paper, 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960)

423

Gell, M.E. 1946 NOTES ON THE OPENING SHOCK OF A PARACHUTE
(War Dept., Air Forces, Wright-Patterson) TS 328, 29 April 1946

424

Gelman, R. & J.L. Helfrich 1954 PERFORMANCE OF CATAPULTS IN VARIOUS FORCE FIELDS
(Pitman-Dunn Labs., Frankford Arsenal, Philadelphia, Pa.) Proj. No. TS1-15-C44; Memo. Rept. No. MR-594; Oct. 1954; ASTIA AD 48 517

ABSTRACT: The conclusions reached in this report are not to be considered either final or exact, as experimental firings have not been made under the conditions being considered. These results have been obtained by extrapolating the ballistics equations and comparing the results obtained with those of such experimental firings as seemed to be applicable.

The catapults considered were the models M1, M2, M3, M4, T10, and T14, in force fields of one, three, five, and seven g's. Of particular interest was the performance of the M4 catapult in a 3-g field.

The results indicated that all final velocities would be very little affected by a 3-g field. In addition, final velocities of the M1, M3, and T10 would be little affected by a 5-g field. For all catapults, increasing the force field beyond either three or five g's caused noticeable decreases in final velocities. These conclusions are listed in more detail in tabular form.

425

Gemmill, C. L. 1943 TESTS ON ABILITY OF ANTI-G SUITS AS A PROTECTION AGAINST AEROEMBOLISM. (Naval School of Aviation Medicine, Pensacola, Fla.) Research Rept. X-147, 22 Feb. 1943

426

Gemmill, C. L. 1944 COMPARISON OF DIFFERENT TYPES OF PARACHUTE HARNESS WITH PARTICULAR REFERENCE TO EASE OF RELEASE. (Naval School of Aviation Medicine, Pensacola, Fla.) Research Rept. X-292.1., 7 March 1944

ABSTRACT: Extensive studies on the U.S. Navy Type and the British "quick release type of parachute release, with advantages and disadvantages of each.

427

Gerathewohl, S.J. & B.E. Gernandt 1962 PHYSIOLOGICAL AND BEHAVIORAL SCIENCES In: National Aeronautics & Space Administration, Wash, D.C.: Bioastronautics NASA SP-18, Dec. 1962

ABSTRACT: The bioastronautical program of the National Aeronautics and Space Administration is based on the classical disciplines of the life sciences as major areas of research. Since man is a terrestrial organism, he has been studied almost entirely under this aspect. However, with his entry into extraterrestrial space, new conditions arise which warrant intensive investigation. Generally, the physiologic research concerns the fundamental bases of human functions, the determination of man's tolerances, and his protection against stressful alterations of his biological homeostasis. The behavioral studies mainly deals with man's performance capabilities and limitations under normal and extreme conditions In accordance with NASA's mission, the work in these areas is primarily applied and supporting in nature; but there is also a need for basic research. The scope of these investigations reached from such academic problems as biologic pattern formation and localization at the cellular level to the practical application of cybernetic principles for the monitoring of the organism and the complex systems, communication and information theory, and orientation and navigation processes in animal and man. Also included in this program is the blending of the disciplines of biology and physics in such fields as biotechnology and bionics, which are aimed at the development of improved techniques and instruments as well as of the acquisition of new information. The requirements of man in space necessitate those research efforts, which will result in design criteria for various types of equipment, protective devices, life support systems, communication channels, displays, and controls for space flight and planetary explorations. However, in many ways is the life scientist not yet in a position to inform the engineer, which conditions he must produce in order to accommodate the man or what systems must be made available for his protection. This paper will describe some of the NASA's efforts to answer this question. The bioastronautics program of the NASA will cover a much wider range of subjects in which the universities can play a major role. (Author)

428

Gero, D. R. 1956 EJECTABLE AIRCRAFT SEAT CAPSULE
U. S. Patent 2,733,027; 31 Jan. 1956

ABSTRACT: An ejection seat for occupants of high-speed airplanes consisting of a capsule or enclosure for such seats and providing an airtight means of protecting the occupant to safely escape from the aircraft in flight is described and illustrated. Capsule operation is automatic and can be initiated from a single lever or switch. This is to insure safe escape of an occupant who is wounded and who could not perform the normal escape functions in an open ejection seat. The capsule includes as standard equipment an armor plate, an adjustable seat parachute for the occupant, a recovery drogue chute, oxygen supply, and ejection guns, track, and support structures. The capsule is capable of floating when landing on water.

429

Gex, R.C. 1961 PERSONNEL SUBSYSTEM TESTING AND EVALUATION FOR MISSILES AND SPACE SYSTEMS (AN ANNOTATED BIBLIOGRAPHY)
(Lockheed Missiles and Space Division, Lockheed Aircraft Corp., Sunnyvale, Calif.)
Special Bibliography SB-61-21 April 1961. ASTIA AD 257870

ABSTRACT: 259 references are included, most of which contain abstracts. The emphasis is on evaluation of performance of teams of personnel engaged in operating and maintaining complex man-machine systems. Training and training equipment, personnel requirements and human engineering studies were included if they contained information relevant to personnel evaluation.

Sources checked: ASTIA, LMSD reports catalog, AFBMD reports catalog, STL reports catalog, Air University Periodical Index, Psychological Abstracts. Classified reports are included. The titles were taken from unclassified sources.

430

Gibbens, Murray E. & W. V. Smith 1957 THE DOCTOR AND THE AUTOMOBILE ACCIDENT
The Journal of the American Medical Association, 163(4):255-259 Jan. 26, 1957.

ABSTRACT: Certain well-tested automobile improvements that would lower the mortality and injury rates could be incorporated into the modern car easily and inexpensively. Better roll-over frames are necessary, and safety seat belts should be standard equipment. Safety door latches, padding of the dashboard, elimination of projecting items inside and outside, shock-absorbing steering wheels, a mechanism for restraining all folding seats, provision for holding luggage securely, and certain improvements in lights, mirrors, and signal systems would often save lives. A physician treating accident victims has an opportunity to encourage their relatives and friends to work in favor of the adoption of automobile safety features. A check-list of safety principles is suggested for consideration as a "Good Driver's Code."

431

Gibson, J. C., W. K. Stewart, & Z. Pekarek 1943 PREVENTION OF INJURY IN AIRCRAFT CRASHES
(RAF, Institute of Aviation Medicine, Farnborough) FPRC 556, Dec. 1943.

432

Glaister, D. H. 1959 A TECHNIQUE FOR THE EVALUATION OF SEAT PACK EJECTION CHARACTERISTICS. (Royal Air Force, Inst. of Aviation Med., Farnborough) FPRC Memo. No. 139, Nov. 1959.

ABSTRACT: A technique for the evaluation of seat pack ejection characteristics before actual trial on an ejection rig is of value both in reducing testing time and in increasing safety, as only potentially safe packs need be tested with human subjects on the rig. A technique for static testing of seat packs was developed by Guignard 1958 (unpublished), in which oscillations following a blow on the pack were recorded by means of accelerometers. This suffered from undue sensitivity to high frequency vibrations which are of no physiological importance as they are damped out by the human body. These vibrations made evaluation of the primary oscillations difficult. The test blow was given to the whole upper surface of the pack and was therefore unsuited to testing packs where the contents were distributed in relation to the bearing area of a sitting subject - i.e. the shaped water cushion in the Q pack.

With these considerations in mind the rig was modified so that actual displacement induced by a blow on the pack was recorded rather than acceleration. The pack is loaded statically, the distribution of the load corresponding to that of a seated person. A second weight is dropped a fixed distance on the static load and the resulting oscillations are recorded

433

Glaister, D.H. 1961 PROPERTIES OF POLYURETHANE FOAMS IN RELATION TO THEIR USE AS EJECTION SEAT CUSHION MATERIAL. (Flying Personnel Research Committee, RAF Institute of Aviation Medicine, Farnborough, Hants) FPRC Report No. 1184, Memo Report no. 158, Aug. 1961. ASTIA AD 279 574.

ABSTRACT: Polyester and polyether grades of polyurethane foams have been subjected to a number of tests to determine their physical properties in relation to their suitability for use as cushions on ejection seats. Properties measured were density, compressibility, permanent deformation following prolonged compression, rates of recovery following brief compression, and measures of damping under lightly and heavily loaded conditions.

434

Glanvill, A.D., et al. 1937 THE MAXIMUM AMPLITUDE AND VELOCITY OF JOINT MOVEMENTS IN NORMAL MALE HUMAN ADULTS
(Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TN 55-159
See also: Human Biology 9: 197-211

435

Glenn, J. H., Jr. 1962 PILOT'S FLIGHT REPORT. (In Results of the First U. S. Manned Orbital Space Flight, February 20, 1962) (NASA Manned Spacecraft Ctr.) Pp. 119-136.

436

Glushkov, I. 1961 PARACHUTES WITH ROTATING CANOPIES
(Kryl'ya Rodiny, Nr. 12, 1961, pp. 24-26) Prepared by: Translation Services Branch, Foreign Technology Division, WP-AFB, Ohio FTD-TT-62-983/1+2 August 7, 1962 ASTIA AD 284 113

ABSTRACT: This article reports on several types of parachutes: parachutes with canopies with flat, axially-symmetrical forms having shroud lines of varying lengths; parachutes with flat surfaces having an unbroken canopy; parachutes of feathered construction; parachutes with special construction and form of the canopy; and rotating parachutes.

437

Goddard, J.L. & W. Haddon, Jr. 1961 AN INTRODUCTION TO THE DISCUSSION OF THE VEHICLE IN RELATION TO HIGHWAY SAFETY. (Presented at the Joint Conference on Automotive Safety, Evaluation of Automotive Design and Res., West Point N.Y., 17-19 May 1961.)

438

Godshall, J. C. 1959 UNDERWATER ESCAPE PROGRAM: F4D-1 CANOPY LOAD AND HUMAN EGRESS TESTS ABOARD A SUBMARINE. (Naval Air Development Center, Johnsville, Pa.)

SUMMARY (a): Preliminary tests for underwater egress from an F4D-1 cockpit section installed on a fleet type submarine at New London, Conn., during July 1958 are described in this report. Pilot egress problems are discussed, including the waterflow effect which tends to close the canopy. It is recommended that certain further tests be conducted at higher sink rates to obtain additional information using both the single-place fighter cockpit, F4D-1, and a two-place trainer cockpit.

438

Godshall, John C. 1959 UNDERWATER ESCAPE PROGRAM: HUMAN EGRESS AND CANOPY FORCE TESTS F4D-1 AND T2V-1 COCKPIT SECTIONS ABOARD A SUBMERGED SUBMARINE
(US Naval Air Development Center, Johnsville) ASTIA 231438

ABSTRACT: Tests were conducted to determine the waterflow effect tending to close the canopy of a sinking aircraft. A single-place fighter cockpit (F4D-1) and a 2-place trainer cockpit (T2V-1) were secured alternately to the aft deck of a submarine. No water forces were experienced during the complete series of tests that would tend to hold the pilot in his cockpit. It is possible for an uninjured pilot to escape from a fighter or trainer aircraft that is sinking in either a nose down or a tail-down attitude as specifiec in this report, provided the canopy is held open or removed. The F4D-1 canopy tests show that a force of approximately 50 lb at the canopy leading edge will maintain the canopy open 25° and a force of approximately 85 lb will maintain the canopy open 35° in the tail-down sinking attitude at a sink rate of approximately 10 fps. Reclosure of the canopy in an underwater situation would seriously jeopardize pilot escape. An M3A1 cartridge initiator was employed in the F4D-1 aircraft to initiate the action of the canopy-removal system at depths of 18 ft or less. The buoyant free-ascent method, known as the blow-and-go method, is considered the safest and most desirable method of ascent to the surface from a sinking aircraft after breathing oxygen or air under pressure. The aircraft cockpit provides a shield against the onrush of water incident to either the nose-down or tail-down sinking conditions until the pilot leaves the cockpit.

439

Goldman, D. E. 1946 MECHANICAL FORCES - TABLE I. ESTIMATED TOLERANCES OF UNPROTECTED HUMAN BODY TO VARIOUS MECHANICAL FORCES.
J. Aviation Med. 17(5):426-430, Oct. 1946.

ABSTRACT: Aviation personnel, especially those in military service, are subjected to a wide variety of mechanical forces including changes in ambient pressure, acceleration, wind blast and vibration as well as the forces associated with parachute escape, crashes, explosions and missile casualties. Little is known of the actions of these forces or of means of protection against them.

Eventually it should be possible to accumulate a background of information sufficient to permit generalizations and to allow specific predictions to be made as to tolerances and requirements for protection.

A listing of complexities must be made to enable an intelligent choice to be made of methods for handling problems which must be solved.

A first step, the performance of a structural analysis of the human body, involves a study of the geometrical and physical layout and the determination of the elastic properties of the various parts and connections.

Secondly, a vibration analysis should yield considerable information of value.

Resonance measurements can be used to find natural frequencies, damping coefficients, effective masses and spring constants.

From such orderly investigations, it should be possible to learn a great deal about basic physiology and some of its practical consequences. A table of human tolerance limits of various grades and for various forces is essential for engineers concerned with the design of aircraft and of other machinery involving close human association.

440

Goldmann, Jack B. 1962 HUMAN CAPABILITIES IN THE PRONE AND SUPINE POSITIONS: AN ANNOTATED BIBLIOGRAPHY
(Lockheed Aircraft Corporation, Sunnyvale, Calif.) SP-62-14, May 1962
ASTIA AD 282 780

ABSTRACT: This literature search covers the decade, 1951-1961. It is concerned with the ability of man to perform basic operations in aircraft while relegated to a prone or supine position, and the possible application of man's performance in spacecraft under similar conditions. References to the design requirements for man are included.

441

Goldstone, N. J. 1961 LANDING SHOCK ABSORPTION
In 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D. C. (Mt. Prospect, Ill.: Institute of Environmental Sciences, P. O. Box 191) PP. 215-224.

SUMMARY: This paper provides design data obtained in a development test program for an aluminum honeycomb shock-absorption system for planetary soft landings. Test procedures are described. Data are presented from static and dynamic crushing tests of selected aluminum honeycomb specimens, and from drop tests of a full-scale model of a lunar landing craft.
Impact decelerations measured during the most critical drop, 29.3 feet per second onto a 15 degrees inclined plane, were as follows:

41.5 G extending for 0.003 second
38.2 G extending for 0.007 second
20 G minimum for 0.036 second

The predictability of test vehicle rebound behavior was demonstrated for all four of the drops. Stable behavior occurred for drops 1,2, and 3, and a low-level unbalanced overturning moment was observed in Drop 4, as predicted in the dynamic analysis of Reference 2

442

Gonsalves, J., and J. Mollick 1959 SUMMARY OF INTEGRATED FLIGHT CAPSULE: PARACHUTE RECOVERY SYSTEM PROGRAM. (Vought Aeronautics, Chance Vought Aircraft Inc., Dallas, Texas) ASTIA AD-263498, September 1, 1959

SUMMARY: This report contains a review of the work accomplished to date on the recovery system for the Integrated Flight Capsule and outlines a program that would permit concurrent development of the recovery system and the capsule. The preliminary design parameters established in previously completed feasibility studies are included for information.

443

Goodman, B. D. 1961 THE PSYCHOLOGICAL AND SOCIAL PROBLEMS OF MAN IN SPACE: A LITERATURE SURVEY (System Development Corporation, 2500 Colorado Ave., Santa Monica, Calif.) Field Note 5220; ASTIA AD-252 434; 2 March 1961

It is the purpose of this bibliography to bring together the reports, books, and periodical articles published through January 1961 in the specific area of behavioral science related to space flight, or as it is sometimes called "space psychology." This area includes social and sensory isolation, psychological assessment and training, fatigue, confinement, performance under stress, work schedules motivation, weightlessness, disorientation, emotional stability, and the day-night cycle.

Citations listed are unclassified unless otherwise noted. All titles are unclassified. To facilitate ordering items listed in the Technical Abstract Bulletin (TAB) of the Armed Services Technical Information Agency, ASTIA document (AD) numbers have been given when available. (AUTHOR)

444

Goodrich, J.W 1956 ESCAPE FROM HIGH PERFROMANCE AIRCRAFT (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TN 56-7; Jan.9, 1956; ASTIA AD 81 562

ABSTRACT: The information presented by this study may be summarized as follows for the conventional ejection seat system. The maximum linear deceleration is essentially constant for a given calibrated airspeed regardless of altitude. At constant calibrated airspeed tha rate of tumbling increases with altitude and approaches a value proportional to the inverse of the square root of the density ratio. At constant calibrated airspeed the duration of g forces is approximately proportional to the inverse of the square root of the density ratio. The maximum

linear deceleration forces increase as the 2.47 power of the velocity. The maximum linear deceleration rapidly approaches the li it of human tolerance as the speed of the aircraft at time of ejection is increased above 550 knots calibrated airspeed. The aerodynamic and physical characteristics defined by the parameter (C_DA/W) are such as to limit the usefulness of the conventional ejection seat system to the lower part of the speed range of the 'Century Series' fighter. Only by optimization of these parameters, such as may be obtained by the use of a low drag capsule, can successful escape be expected speed range capability of the 'Century Series' aircraft and beyond." (WADC)

445

Goodyear Aircraft Corp. 1960 PERSONNEL RESTRAINT DEVICES FOR ADVANCED FLIGHT VEHICLES, PART I. (Goodyear Aircraft Corp., Akron, Ohio,) June 1960.

446

Gord, Biermann 1931 WELTRAUMSCHIFFAHRT? EINE KURZE STUDIE DES PROBLEMS (SPACE TRAVEL? A BRIEF STUDY OF THE PROBLEMS) (Bremen: F. Leuwer, 1931).

ABSTRACT: Early history of the physical and technical problems of rocketry with a discussion of space travel.

447

Gordon, E. S. and S. Hori 1961 VIABILITY DATA ACQUISITION SYSTEM FOR TESTING BIOSATELLITE CAPSULES. Aerospace Medicine 32(3):231, March 196[illegible].

ABSTRACT: Under contract with the Air Force Missile Test Center, Holloman Air Force Base, a feasibility study and preliminary design have been completed for portions of a Viability Data Acquisition, Handling, Storage, Reduction, Display and Recall System (VIDAT System). The purpose of VIDAT is to test and evaluate biosatellite capsules and components, utilizing chimpanzees (and eventually humans) as test subjects. The variables initially considered were systolic and diastolic blood pressure, respiration rate and waveform, electrocardiogram, heart rate, rectal and skin temperatures, O_2 and CO_2 partial pressures withing the capsule, total pressure, dry bulb temperature, and relative humidity. Among the unique requirements and restrictions were: two week continuous test period during which access to instrumentation within capsule is prohibited; chimpanzee only partially restrained, precluding instrumentation techniques and equipment subject to chimpanzee disruption; ease, simplicity and rapidity of transducer attachment to a struggling chimpanzee; applicability of the same transducers and attachment methods to humans; tranduction by external means only (no subcutaneous electrodes or

other implantations); analog outputs for all variables, reliability of 95 per cent over two week continuous operation. Instrumentation was devised or studied for physiological data acquisition: An experimental method for chimpanzee thigh blood pressure measurement was found despite failure of the Korotkow method at this location; the feasibility of a closed-hydraulic servo controlled pressure cuff featuring small size, simplicity, and ease of automatically programming pressure was determined; a new type of EKG electrode for long term continuous use was constructed and partially tested; a highly sensitive, simple respiration waveform transducer was tested and means for its utilization determined; concepts for a chimpanzee bioelectronic harness and transducer attachment methods were formulated. Fundamental problems of physiological reaction to physical instrumentation are discussed.

448

Gottlieb, S. 1948 STATIC AND DYNAMIC TESTS OF A TYPICAL FIGHTER PILOT'S SEAT INSTALLATION FOR A 40 G CRASH CONDITION
(Naval Air Material Ctr., Aero Struc Lab.) NAM 24102, Part I, Jan. 12, 1948
ASTIA ATI 37398

ABSTRACT: Tests were conducted on a standard R4D pilot seat and reinforcements made after each failure until seat demonstrated its ability to withstand a 40 g deceleration load at the c.g. of a 200 lb. dummy in head-on-crash condition. Dynamic tests were made in the NAES drop test machine and static tests were made by applying loads to a steel plate behind the dummy acting through its d.g. Several reinforcements consisted of replacing dural parts with 4130 steel of same gage were required to enable seat to withstand 40 g when shoulder harness passed over fuselage bar. Reinforcements added 3-1/2 lbs. to original seat installation weight. Harness was found to transmit all applied load to seat in a 1:2 ratio of shoulder harness to lap harness load. Reinforced seat withstood 20 g when shoulder harness was passed over seat back to floor attachment. Recommended static loads for transport type seat under 40 g loadings are 3000 lbs. shoulder harness load and 6000 lbs. total lap harness load at 40° upward.

449

Gottlieb, S. 1948 STATIC AND DYNAMIC TEST OF A TYPICAL PILOT'S SEAT INSTALLATION FOR A 40 G CRASH CONDITION. (Naval Air Material Ctr.)
NAM 24102, Part 2, 2Sept. 1948 ASTIA AD- 51489

ABSTRACT: The A N Standard 7505 seat used in F6F single-engine fighters was tested to determine what ultimate static carry through structural strength is required to withstand the loads resulting from a 40 g deceleration of about 0.1 sec. duration at the cg of a 200 lb dummy in a head-on crash condition. The harness loads were measured and the Bureau of Standards ring dynamometer used to measure the harness loads was evaluated. It is concluded that the F6F seat

with reinforcements is structurally capable of supporting 40g dynamic loads of 7300 lbs. The general distribution of load between shoulder harness and lap harness at 40° upward is a 1 to 2 ratio. The loads determined with the BuSTds rings are consistently low. These results indicate that dynamic calibration may materially improve the accuracy of the dynamometer.

450

Gough, M. N. and A. P. Beard 1937 LIMITATIONS OF THE PILOT IN APPLYING FORCES TO AIRPLANE CONTROLS. (National Advisory Committee for Aeronautics, Washington, D. C.) NACA TN 623. Nov. 1937.

451

Gozulov, S. A. 1959 MEDICAL CONTROL OF TRAINING CATAPULTING (vrachetnyy kontrol pri trenirovochnykh katapul 'tirovaniyalth) Voyennomeditsinskiy zhurnal 5:23-29

452

Gracie, S.F. 1941 HYDROSTATIC SUITS.
(National Research Council, Canada) Report # C-2838, 30 August 1941

ABSTRACT: This report on the service trial of the Franks Flying Suit at 601 Squadron, R.A.F., Duxford, recommends its use for the protection against the effects of G.

453

Graham, H.B. 1951 QUALIFICATION TESTS OF F-89A PILOT'S AND RADAR OPERATOR'S EJECTION SEATS (Northrop Aircraft, Inc., Hawthorne, California) Rept. No. T-3/5, 8 February 1951. ASTIA ATI 109473

ABSTRACT: The pilot's seat was ejected twice and the radar operator's seat once. The tests showed that, with the seats installed and rigged in accordance with the latest drawings, the seats and related components will function satisfactorily. The theoretical clearance between the seats and tail of the airplane is given below. In making the calculations, the seat velocities determined by the ground tests were used. Flight conditions assumed were 650 mph true airspeed in level flight at an altitude of 2000 feet.

454

Gramer, J. Jr., 1946 REQUIREMENTS FOR PILOT EJECTION IN FIGHTER AIRPLANES. (Army Air Forces. Air Material Command) M.R. TSEAC11-4534-7-2, 1 May 1946. ASTIA ATI 119 794

ABSTRACT: This report presents the desing requirements for pilot ejection seat installation and summarizes the installation of the pilot ejection seat in fighter airplanes. It was found that the pilot ejection seat is the immediate answer to provide a means of escape from high-speed aircraft. Whether or not this device will be superseded by other methods, such as the use of ellipsiods, capsules, etc., will be determined by investigations involving physiological, aerodynamic, and structural considerations. The design requirements for the pilot ejection seat and installation contained in the Appendices of this report are suitable for use as a guide in the preparation of designs. These requirements are tentative and may be used until such a time as AAF Specifications are available. The reasons necessitating Army Air Forces Specifications for the pilot ejection seat are given.

455

Grandpierre, R., F. Biolette, R. Loubiere & G. Chatelier 1960 PHYSIOLOGIE DU VOL SPATIAL (PHYSIOLOGY OF SPACE FLIGHT)
Forces aeriennes francaise 14(159): 789-823, May 1960 and 14(160): 969-986, June 1960.
See also: Aerospace Med., 31(10): 873, October 1960

ABSTRACT: The following subjects are reviewed: Acceleration and deceleration tolerances, weightlessness, radiation, prolonged life in a space ca bin, oxygen regeneration, utilization of urine and collection of water vapor, and the nutritional requirements of astronauts.

456

Grant, David, N.W. 1945 CLOTHES MAKE THE SUPERMAN
Flying, Sept 1945

ABSTRACT: Blackout was encountered even by the pilots of the p anes of World War I. Far more today it has been one of the major obstacles to full utilization of the speed and strength of modern aircraft. The flying services have answered this problem with the development of a simple G-suit which now enables pilots to withstand forces of eight or nine G without blacking out. The primary cause of blackout is abrupt anemic anoxia of the brain resulting from a sudden stopping of blood through the brain. The great accomplishment of the G-suit has been to prevent this circulation stoppage and thus prevent blackout in abrupt combat maneuvers. A brief history of the G-suit is presented in this paper.

457

Gratz, C.M. 1944 BIOMECHANICS, A NEW APPROACH TO AIRPLANE SAFETY. Mech. Engng., 66:313-314

ABSTRACT: Loss of life in crash landings can be, and is being, reduced. With the recognition that the pilot is the most vulnerable portion of the cockpit, advances have been made in the application of biomechanical safety engineering to cockpit design. This is the use of data on the amount of stress that shear human tissues can tolerate. Such data have been collected by the Biomechanics committee of the Aviation division of ASME, partially in combat zones in the Pacific. The British and Russians have also been working along these lines, and much information has been obtained from Army and Navy boards investigating crashes.

458

Grave, Caswell 1960 ENVIRONMENTAL PROTECTION EQUIPMENT FOR AIR AND GROUND CREWS AND HUMAN ENGINEERING ASPECTS OF PILOT'S COCKPIT (AN EVALUATION OF F-101B AIRCRAFT)
(Air Proving Ground Center, Eglin Air Force Base, Florida) APGC-TN-60-34 APGC Project 217AY5, July 1960 ASTIA AD 240085

ABSTRACT: This report on the human factors aspects of the F-101B weapon system is concerned primarily with the personal equipment used during the Category III test. Other considerations in the report are problems encountered by a tactical squadron in environmental protection of ground crews and human engineering deficiencies noted in the pilot's cockpit.

It is concluded that the most significant deficiency in air crew protection is lack of a safe ejection capability throughout the performance envelope of the aircraft. Problem areas were found in ground crew protection and in survival kit utilization and maintenance. The standard equipment required for air crew protection was found to be available at the test site in sufficient quantity for operational use.

Recommendations include improving the ejection capability from the aircraft, revising technical publications, and correcting certain design deficiencies in the pilot's cockpit.

459

Gravendyk, J. 1949 WEBER PILOT AND CO-PILOT SEAT FOR C-124 (TEST REPORT) (Douglas Aircraft Co., Inc., Long Beach Plant, Calif.) (USAF Technical Report No. TR-010AF) ASTIA ATI 74 968

ABSTRACT: Load tests were conducted with the Weber pilot and co-pilot seat used on the C-124 cargo airplane. The features of the seat include vertical adjustment horizontal fore and aft adjustment, horizontal side adjustment, and recline adjustment. During the tests, loads were applied to the seat with hydraulic jacks and a calibrated tension ring. All ultimate loads were applied for a minimum time of one minute. No structural failures occurred during the tests.

460

Gray, F. R. & M. G. Webb, 1959 HIGH G PROTECTION.
(Paper, 1959 Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29.)

ABSTRACT: Teh principal distortions of the body of a person exposed to increased acceleration include displacement of blood within the body with undesirable secondary effects such as: (1) loss of vision, (2) loss of consciousness, (3) petechia, (4) pain, (5) heart failure. Other distortions in various parts of the body may also lead to pain. Advantages, problems and limits of older types of G protective systems are discussed. Theories are presented for methods of using liquid or form-fitting external supports for the body along with respiratory pressurization to counteract the distorting forces. Actual devices worked out to apply these theories are shown. These devices include: (1) the "Mayo tank" first used by Wood, Code, and Baldes in 1942 to test G protection by submersion in water. This has been slightly modified to bring about substantial increase in G protection in 1958; (2) the "G-capsule" and associated equipment which most thoroughly of all devices so far built, is an application of these new theories of body support; and (3) the "NASA-AMAL moulded couch" built by the National Aeronautics and Space Administration according to some of these ideas and incorporatingseveral other devices or procedures such as partial supination to avoid chest pain as indicated by Wright AFB studies. Through the use of these various devices during the past year, several new records of tolerance to centrifugal acceleration have been established, indications have been gained for improvements on these devices, and it is expected that higher levels of G tolerance will be attained. (J. Aviation Med. 50(3):185-186, March 1959.)

461

Gray, R.F. 1957 MECHANICAL SYSTEMS SUGGESTED FOR G PROTECTION
(Naval Air Development Center, Johnsville, Pa.) NADC-MA-5708; 15 July 1957
ASTIA AD 144 106

ABSTRACT: A mechanical system is proposed as a means of increasing tolerance to acceleration. The subject is assumed to be completely underwater in a suit and helmet, both capable of resisting a high pressure atmosphere transmitted through the water from the subject's chest. Analysis of the system indicates that it could protect against loss of blood from the head and consequent blackout at levels of acceleration considerably higher than 100 G units. However, distortions of organs and blood vessels within air-containing spaces of the body would tend to establish much lower tolerance levels since blood vessels within the top part of the chest would tend to collapse and cut off circulation. It is possible that circulation through the collapsed blood vessels could be restored by pumps acting to change the volume of the suit. Respiration could be provided by cycling the pressure of the air supplied to the subject. This could be under voluntary control. The suit could serve as a pressure suit for high altitude flying since pressures within the body would be exactly counterbalanced by pressures outside the body. (Author)

462

Gray, R.F., M.G. Webb, & W.H.B. Ellis 1957 TEST AND DEVELOPMENT OF ANTI-BLACKOUT EQUIPMENT; LETTER REPORT CONCERNING DEVELOPMENT OF A G-CAPSULE (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR19 March 5, 1957

ABSTRACT: A water-filled capsule is proposed as a method of increasing protection for individuals undergoing acceleration stress of high levels for relatively long durations. The capsule is essentially a method of controlling blood and gas distribution in the body and of controlling external and internal body shape. The capsule is a rigid container for the subject, including his head. All space between the subject and the suit is filled with water including the space in the helmet. A rigid cuirass is molded to the subject's chest to reduce distortion of the chest due to hydrostatic pressures. A mockup of a capsule is now being manufactured and will be tested upon completion.

463

Gray, R.F. & M.G. Webb 1958 PRELIMINARY STUDY OF G TOLERANCE OF A SUBJECT IN THE G-CAPSULE, PRONE POSITION
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR59; July 8, 1958

ABSTRACT: The G-Capsule is a deivce for testimg some theories of protection of subject against acceleration by use of complete immersion of the subject and by pressurization of his respiratory system through the water against the rigid walls of the capsule to hold his respiratory system at a constant volume. This device was tested at AMAL on the 50-foot centrifuge. The subject was seated in an upright position within the capsule facing away from the center of rotation and was exposed to constantly increasing levels of acceleration from 1 to 9 G. The subject held his breath during each period of centrifuge rotation.

464

Gray, R.F. & M.G. Webb 1959 TEST OF WATER-FILLED CAPSULE IN THE PRONE POSITION (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR82 April 13, 1959

ABSTRACT: The G-Capsule is a device to protect humans against the body distortion effects of high acceleration forces. It is a nonexpandable container designed to resist the outward expansion of the subject's body and positive pressure is used in his respiratory system to keep the body expanded against these external supports. Water is used to closely couple the outside of the person's body to the rigid container while allowing some motion. The principle new feature of this protective system is the use of pressure in the respiratory system to oppose distortion. It was tested on the centrifuge by three subjects. One subject went to 28 G, another to 26 G and a third has gone to 31 G. The pattern used brought the subjects up to peak G in 12.5 seconds where they remained for 5 seconds and then brought them down again in 12.5 seconds. This established a record for sustained high acceleration tolerance. No trouble was reported with petechiae, eye pain, or leg cramps.

465

Gray, R.F. & M.G. Webb 1960 HIGH G PROTECTION
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-5910; 12 Feb. 1960
ASTIA AD 235 338
See also: Aerospace Med. 32(5): 425-430, May 1961

ABSTRACT: Investigation of mechanical principles important in solving some problems of protection against high acceleration. Also discussed is a study of the effects of acceleration on humans in the positive g($+g_z$) position when submerged to eye level in a tank of water. Subjects are also studied in the prone position ($-g_x$) while completely submerged with respiratory pressurization

466

Gray, R. F. 1961 FULL BODY SUPPORT SYSTEMS.
(Paper, Symposium of Acceleration Stress, San Antonio, Texas)

ABSTRACT: External support systems which are used as protection against accelera tion levels that cannot be tolerated by the action of physical mechanisms only, are discussed. Results indicate that while a foam system has weight and safety advantages compared to water, it does not fit the body as well, cannot be used to support regions such as eyes, and a person within it is severely immobilized. Foam castings can give much more complete support than strap systems and can be rapidly formed around or rapidly removed from subjects. Foams seem best applied to one-shot short-term (15 minute) support applications, but some reversible foam casting support systems have been hypothesized.

467

Gray, R.F. & M.G. Webb 1961 HIGH G PROTECTION
Aerospace Medicine 32(5): 425-430, May 1961
See also: NADC-MA-5910; 12 Feb. 1960; ASTIA AD 235 338

ABSTRACT: The advantages, problems, and limits of older types of G protection systems are discussed in this report. Theories are presented for methods of using liquid or form-fitting external supports for the body along with respiratory pressurization to counteract the distorting forces. Actual devices which were worked out to apply these theories are shown. These devices include: (a) the "Mayo Tank" first used by Wood, Code, and Baldes in 1942 to test G protection by submersion in water. This tank was slightly modified to bring about a substantial increase in G protection in 1958; (b) the "G-Capsule" and associated equipment which, most thoroughly of all devices so far built, is an application of these new theories of body support; and (c) the "NASA-AMAL Moulded Couch" built by the National Aeronautics and Space Administration according to some of these ideas and incorporating several other devices or procedures such as partial supination to avoid chest pain as indicated by Wright Field studies. Through the use of these various devices during the past year, several new records of tolerance to centrifugal acceleration have been established, indications have been gained for improvements on these devices, and it is expected that higher levels of G tolerance will be attained.

468

Gray, R.F. 1962 FULL BODY SUPPORT SYSTEMS
(In: Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, pp. 265-270)

ABSTRACT: Subjects have been exposed to centrifugation when completely submerged in water and when completely cast into polyurethane foams. Both methods provide maximal support areas on the outside of the body. Some support for the interior of the gas filled spaces of the body is obtained by internal pressurization. Advantages and disadvantages of the two methods of full body support are compared.

469

Graybiel, A., R.H. Holmes, D.E. Beischer et al. 1959 AN ACCOUNT OF EXPERIMENTS IN WHICH TWO MONKEYS WERE RECOVERED UNHARMED AFTER BALLISTIC SPACE FLIGHT
Aerospace Medicine 30(12): 871-931, Dec. 1959

ABSTRACT: An account has been given of two experiments in which three monkeys were carried in Jupiter missiles 300 miles into space. In the first, a squirrel monkey survived in good condition till a mishap occurred to the vehicle re-entry. In the second, an American-born rhesus and a squirrel monkey were recovered uninjured. Details have been furnished covering the construction of the bio-capsules, the provisions for a closed life support environment, the equipment and arrangements for monitoring the responses of the monkeys, and the experimental findings.

470

Grayfer, G.R. & A.I. Bykhovskiy 1936 PROPHYLAXIS OF ANKLE INJURIES IN PARACHUTE JUMPERS
Sovetskaya khirurigiya (Moscow) 7: 115-118

471

Green, C.D., B.E. Welch et al. 1961 STUDIES OF ESCAPE FROM BALLISTIC SPACE VEHICLES. I. BIOMEDICAL EVALUATION. II. INSTRUMENTATION. (School of Aviation Medicine, Brooks Air Force Base, Tex.) Report No. 61-29, April 1961. ASTIA AD 254 065

ABSTRACT: Biomedical information on primates successfully flown through programed escape profiles was obtained in conjunction with the NASA project Little Joe. Animal response during acceleration, deceleration, re-entry,

and water impact demonstrated survivability. Also recorded and evaluated were: (a) environmental data (i.e., relative humidity, total gas pressure, 02 partial pressure, and gas temperature); (b) physiologic data (i.e., respiratory rate, pulse rate, and cardiac rhythm from ECG tracings); (c) psychomotor performance data; and (d) oculomotor movement. These experiments substantiate, under actual flight conditions, physical and biologic design criteria for biopacks, physiologic sensor response, and performance criteria during all phases of the ballistic trajectory and recovery operations from an impact area. (Author)

472

Green, M. R. & F. A. Muckler 1959 SPEED OF REACHING TO CRITICAL CONTROL AREAS IN A FIGHTER-TYPE COCKPIT (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADC-TR-58-687, June 1959

473

Greenberg, S.H. 1958 UNDERWATER ESCAPE PROGRAM. DESCRIPTION OF F86D-11 AIRPLANE 50-FOOT DROP TEST KEY WEST, FLORIDA - 25 MARCH 1958. (Naval Air Development Ctr., Johnsville, Pa.) NADC-ED-5816; Interim Rept. No. 3; 25 Aug. 1958; ASTIA AD 231 439

ABSTRACT: Tests were performed to determine (1) the effect of high-velocity vertical entry on the sinking time of aircraft in water; (2) the structural damage sustained by the aircraft on impact; and (3) the physiological shock the pilot suffers when subjected to water collisions of this nature. Damage resulting from implosion of the canopy due to depth pressure and the accompanying physiological implications are also discussed. Shock loadings sustained by the anthropometric dummy in the F86D-11 aircraft reached a peak acceleration value of 62 g, with values well above 25 g for 30 msec. This shock loading was greater than that sustained by any other part of the airframe when the complete system was subjected to the 50-ft. fall. The acceleration has a rate of onset of approximately 6000 g/sec which, at the g loading and duration of sustained shock, represents values well above the threshold of vertebral damage, signifying a high expectancy for extensive spinal injury. The opening in the canopy resulting from the implosion appeared to be large enough to permit egress of the pilot and his equipment from the cockpit. Only 19 sec were required from entry to submersion. The increase in the rate of submergence in the latter test must have been contributed by the higher entry velocity, accompanied by greater water penetration of aircraft, and by extensive impact damage which destroyed watertightness and buoyancy of the airframe. (ASTIA)

474

Greig, D. D. A. 1940 REPORT ON PRACTICAL FLYING TESTS CARRIED OUT WITH "SPECIAL FLYING SUIT" (DESIGNED BY DR. FRANKS) BETWEEN JUNE 1ST AND JUNE 5TH, 1940. (Spitfire L 1090). (Assoc. Com. Aviat. Medical Res., NRC, Canada) Rept. C-2830, 8 June 1940.

ABSTRACT: Flight tests were carried out with the special flying suits designed by Dr. Franks in a Spitfire. A pilot who normally "blackened-out" between 3 to 5 G's was able to make maneuvers going to 8 G without feeling any effect of the 'blackout'. It is felt that the principle involving the design of the suit is sound but in its present form it is not sound but its present form it is not a practical proposition. The results obtained were of such a convincing nature however, that further development is strongly recommended.

475

Grime, G., et al. 1961 CAR SEAT-BELTS AND HARNESSES (Road Research Lab., Harmondsworth, Great Britain) Research Note RN/3958/GG.RDL

476

Griswald, G.M. 1957 PARACHUTE JUMPING FROM ARMY AIRCRAFT (U-1A AIRPLANE) (Army Airborne and Electronics Board, Fort Bragg, N.C.) Proj. no. AB 2354 27 June 1957, ASTIA AD-140 955

ABSTRACT: An investigation was conducted to determine optimum exit methods, safe procedures, special equipment required, and the suitability of the Army U-1A aircraft for the parachute delivery of personnel and equipment. The equipment used in these tests included (1) a U-1A airplane, (2)T-10 personnel parachute assembly, (3) G-13 cargo parachute assembly, (4) M-1950 cotton duck case for the parachutist's individual weapons, and (6) A-7A and A-21 aerial delivery containers. Test results indicated that the U-1A aircraft is suitable for aerial delivery from the port door of a maximum of 5 parachutists wearing combat equipment. The U-1A airplane was also found suitable for consecutive aerial delivery of standard type aerial delivery containers from the door followed by parachutists with combat equipment. Procedures are outlined for making safe parachute jumps from the U-1A airplane. (Author) (See also AD-113 658)

477

Griswold, George M. 1957 FIFTH PARTIAL REPORT OF PROJECT NR AB 2354 "PARACHUTE JUMPING FROM ARMY AIRCRAFT" (U-1A AIRPLANE)
Airborne and Electronics Board, U.S. Army DA Proj. 87-03-002; RDB Tech. Obj. AL-12 ASTIA AD 140 955

ABSTRACT: The purpose of this publication is to report on a series of test to determine safe procedures for making parachute jumps from Army aircraft, except command type airplanes and reconnaissance helicopters (H-13 and H-23). It was found that the U-1A Airplane was adaptable for parachute delivery of personnel. Safe conditions for parachute delivery of personnel existed at indicated air speeds of 60 to 70 knots. Safe conditions existed for parachute delivery from the port door of a maximum of five parachutists with combat equipment utilizing procedures outlined in Appendix E. Safe conditions existed, within the weight and space limitations of the airplane, for consecutive aerial delivery of standard type aerial delivery containers dropped from the door followed by parachutists with combat equipment.

478

Gronow, D. G. C. 1954 BACKWARD FACING SEATS IN AIRCRAFT FOR INCREASED PASSENGER SAFETY. (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. 870a

479

Gronow, D. G. C. 1954 A STUDY OF THE SAFETY OF BACKWARD-FACING AND FORWARD-FACING 1 PASSENGER SEATS IN ACCIDENTS INVOLVING RAF TRANSPORT COMMAND AIRCRAFT. (RAF, Institute of Aviation Medicine, Farnborough) Rept. No. 870, TIP U72437, Mar. 1954

480

Grunzke, Marvin E. 1961 A RESTRAINT DEVICE FOR BEHAVIORAL RESEARCH WITH THE CHIMPANZEE
(Hq, 6571st Aeromedical Research Laboratory, Holloman Air Force Base, New Mexico) Technical Documentary Report No. MDC-TDR-61-37 Dec. 1961, Project No. 6893, Task No. 689301, ASTIA AD 271845

ABSTRACT: This report describes a restraint chair that can be employed in operant conditioning research with the chimpanzee. The chair is designed for easy adjustment to various sizes and when used with a suit or vest will also facilitate attachment of sensors for collection of physiological data.

481

Guilbert, E.A. 1952 BACKWARD SEATING
S.A.E. Journal 60(6): 56 June 1952

ABSTRACT: Most passenger fatalities in aircraft accidents result from impact in crash landings and not from burning, according to current medical opinion. Injuries prevent the passenger from escaping a crash fire. Also, the present safety belt is inadequate because it only restrains the lower part of the body, letting the torso act as a weighted lever driving the ten-pound human head forward and subjecting it to an impact force greater than that acting on the aircraft structure at that point. Therefore it became logical for investigators to experiment with a rear-facing seat. The general reaction to this proposal was that "people do not like to ride backwards." However, this was not borne out by investigation. The Military Air Transport Service provided for rearward facing seats in part of its Boeing C-97 fleet, using a seat designed to take a 16 g forward load based on a passenger weight of 225 pounds. With a normal passenger weight of 175 pounds, the permissible forward g load increases to approximately twenty-four. The seat can be folded against the side of the fuselage to make room for cargo. (J. of Aviation Medicine 23(5): 533. October, 1952)

482

Guilbert, E. A. 1952 MILITARY AIR TRANSPORT SERVICE - PASSENGER HANDLING TECHNIQUES (Society of Automotive Engineers, New York, N.Y.) Jan. 1952

RESTRAINT, PROTECTION, AND EMERGENCY ESCAPE SYSTEMS

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483

Haack, M. 1955 TRACTOR SEAT SUSPENSION FOR EASY RIDING.
S.A.E. Transactions, 63: 452-470

ABSTRACT: This paper describes an investigation into the best design of seat suspension for tractors having pneumatic tires with a rigid rear axle.

Test results show that some of the factors entering into a good tractor suspension include:

1. a ratio between the natural frequency of the seat and tires of 0.4 to 1.5.
2. A supplementary seat deflection 1.5 times the static seat deflection to avoid bottoming.
3. Use of suspensions having non-linear characteristics in order to hold seat deflection within practical limits.
4. Adjustable seat-spring action to compensate for varying weights of drivers.

484

Haber, F. 1952 BAILOUT AT VERY HIGH ALTITUDES
In (School of Aviation Medicine, Randolph AFB, Texas) Epitome of Space Medicine
See also J. Aviation Med. 23(4):322-329, Aug. 1952.

ABSTRACT: Flight in the border zone of space (in the "aeropause") will pose special problems with regard to bailout. At an altitude of 300,000 feet, the air is rarified to about one-millionth its density at sea level. Flight will be at very high speeds (10-20 Mach). The speeds and trajectories of bodies bailing out from moving aircraft or falling free from an altitude of 300,000 feet are discussed and presented graphically. The speed of a falling body first increases until the denser layers of the atmosphere are reached; the air resistance (wind blast) then decelerates the falling body. This deceleration, which may reach several g, is proportional to the velocity of the body. Capsules for escape from very high altitudes should, therefore, be equipped with air brakes or small parachutes. Another problem encountered in very high altitude escape is the aerodynamic heating at high speeds (e.g., at Mach 10, 5,000 to 8,000 degrees F.). After deceleration on the other hand, the body lose heat to the surrounding air.

485

Haber, F. 1952 BAILOUT AT VERY HIGH ALTITUDES
J. Aviation Med. 23(4):322-329, Aug. 1952.

ABSTRACT: This paper emphasizes the problems of bailout at speeds and altitudes unattainable by today's aircraft, but which will be a reality in the near future In the future, planes will travel in the aeropause at speeds in the range of Mach number 10 to 20 and with altitudes in the range of 200,000 to 400,000 feet. The author discusses the various problems encountered in the problem of bailout at these extreme speeds and altitudes.

486

Haber, F. 1952 ESCAPE AND SURVIVAL IN SPACE TRAVEL
American Rocket Society Paper No. 68-52

487

Haber, F. 1953 ESCAPE AND SURVIVAL AT HIGH ALTITUDE
(School of Aviation Medicine, Randolph Field, Texas) Sept. 1953
Proj. 21-1207-006 ASTIA AD 19613.

ABSTRACT: The speed of future aircraft will be limited by the temperatures caused by aerodynamic heating. Thermal considerations call for high altitudes if flying speed is increased. At the high altitudes required, windblast and dangers of escape proper will be reduced. The phase of free fall should last much longer after bailouts. High speeds attained in such falls create decelerations which could be dangerous. (Author)

488

Haber, H. 1952 GRAVITY, INERTIA, AND WEIGHT
In White, C. S., & O. O. Benson, Jr., eds., Physics and Medicine of the Upper Atmosphere (Albuquerque, N. Mex.: University of New Mexico Press, 1952) pp. 123-136.

ABSTRACT: To evaluate properly the physiological processes in flight, a new formulation of the concept of weight is required. In reversing and implementing the classical definition of weight (or the force of attraction which the earth exerts on a body, with its direction toward the center of the earth) the following definition is proposed: weight is the resultant external force exerted upon a body by a restraining agent in response to forces of gravitation and inertia. This definition makes it evident that weight of a body is not a constant nor a property of the body but depends upon the dynamic conditions to which the body is subjected (e.g. inertia, drag, or propulsion

in an aircraft). On the basis of this definition a formula is developed to determine the weight of a pilot under all conditions of propelled and unpropelled flight. The posibility of prolonged weightlessness is a factor to be counted on in future flight and is going to become an outstanding aviation medical problem. While no major disturbances in the normal physiological functions (such as digestion, breathing, etc.) are foreseen, normal orientation might be impaired.

489

Haber, H. 1955 CAN MAN SURVIVE IN SPACE
Flying Review 10: 15-16

ABSTRACT: Phenomena man will experience in space flight and his physiological reactions to them; hazards to space flight; use of space suits. Article is condensed from the author's. Man in Space (New York: Bobbs-Merrill, 1953), 629. 1388/H1141M.

490

Haber, H., & S. Hulbert, eds. 1955 ESCAPE FROM HIGH PERFORMANCE AIRCRAFT: A SYMPOSIUM (Institute of Transportation, University of California, Los Angeles, Calif., Oct. 7, 1955)

491

Hainline, B. C. 1942 PLYWOOD SEAT DESCRIPTIONS AND TESTS-MODEL PT-17. (Boeing Airplane Co., Wichita Div., Kansas) Report No. 75-6318, ASTIA ATI-115 299, 10 August 1942.

ABSTRACT: This test was conducted to determine the different strengths of an assortment of plywood pilot seats as submitted to the company by various manufacturers and to get a description of these seats. This information of these seats will be used as a reference for plywood seat information.

Four different specimens were submitted. The seats from Fletcher and Morrow Aircraft Companies and the Baldwin Piano Company were drop tested to destruction and a description taken of them. Due to the lack of proper fittings, the seat from Starr Piano Company was impossible to test. Only a description was taken of this seat.

492

Hainline, B. C. 1947 MODEL X-15 - TEST OF PILOT'S AND OBSERVER'S SEATS (Boeing Airplane Co., Wichita, Kansas) Rept. WD-10503, Feb. 14, 1947

493

Hakanson, H. G. 1947 PILOT EJECTION SEAT TESTS AT MUROC ARMY AIR FIELD - AND APPENDIXES 1-3 - MEMORANDUM REPORT (AMC, Wright-Patterson AFB, Dayton, Ohio) Serial No. TSEAC11-45341-2-3 13 Feb. 1947, ATI-119 800.

ABSTRACT: This is a report on the pilot ejection seat flight tests from an A-26C airplane at the Muroc Army Air Field from 8 October 1946 to 4 November 1946. A series of nine flight tests was conducted. An ejection seat in the invested vertical position facing to the rear, was installed in the rear bomb bay of A-26C airplane, Serial No. 44-35678. The seat was supported by an 1100-pound bomb shackle which was actuated by a switch mounted on the forward bulkhead of the rear gunner's compartment. The operator rode in the rear gunner's compartment. There was no means of ejection other than gravity. It was found that the pilot ejection seat with dummy and parachute equipment having a total weight of approximately 270 pounds, dropping out the bomb bay, will clear the lower surface of the tail by approximately 13 feet up to velocities of approximately 283 knots indicated airspeed at 10,000 feet altitude. Extrapolation of the curves for angle of seat leaving airplane versus airspeed; and tail clearance versus airspeed, shows that safe ejections using no ejection force other than gravity can be made in straight and level flight up to velocities of 320 knots.

The automatic opening devices for releasing the safety belt and dummy's parachute are not entirely satisfactory in their present stage of development.

494

Hakanson, H.G. 1948 DOWNWARD PILOT EJECTION SEAT TESTS FROM THE XA-26F AIRPLANE AT MUROC ARMY AIR FIELD
Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio) Eng. Div. Memo Rpt. No. MCREXA 72-45341-3-6 ASTIA ATI 119 798

ABSTRACT: The purpose of this report is to present the results of downward pilot ejection seat flight tests from an XA-26F airplane at the Muroc Army Air Field from 28 July 1947 to 20 September 1947. The results from the tests brought about the following conclusions: (a) The catapult cartridges used in these tests have too great an acceleration and velocity for safe downward ejection. (b) The antoropomorphic dummies require a lap to make it possible to securely fasten them in the seat for downward ejection. (c) An insufficient number of trajectories were recorded to justify a suitable angle for downward ejection. However, ejection angles of 20° and 30° aft of vertical proved very satisfactory.

495

Hale, R. 1961 GENERAL HUMAN FACTORS CONSIDERATIONS - MTSS FINAL REPORT - VOLUME III
(Aeronautical Systems Division, Wright-Patterson AFB, Ohio) Contract No. AF33(600)-42456 ASD-CR-61-14(111) ASD-TR-61-211(111) ASTIA AD 273005L

ABSTRACT: The final summary report of the military test space station study is divided into three volumes. Volume I discusses the Phase II (Gamma) vehicle design. The MTSS missions are described in Volume II. General human factors considerations are given in Volume III.

496

Haley, J.A. 1954 PILOT'S ABILITY TO ACTUATE F9F-6 EJECTION SEAT CONTROLS UNDER FLUCTUATING G CONDITIONS (Naval Air Development Center, Johnsville, Pa.) TED ADC AE 6303.1, BUAER LTR AER AE 631/56 of 19 Apr. 1954, NADC LTR MA 4 Serial 10467 of 3 Nov 1953, Ref. MA 4 9393, Sept. 1954. ASTIA AD 70757

ABSTRACT: To determine the time a pilot requires to actuate the ejection seat controls of an F9F-6 under emergency conditions, the ejection system was installed in the gondola of a centrifuge. Navy pilots were tested while being subjected to fluctuating accelerations (from 1.5 to 7.0 positive g at rate of 8.0 g per sec.) for the time required to eject when dressed in full flight gear and in minimal flight clothing. In addition, motion picture coverage of subjects was made. The data were analyzed and recommendations for ways to decrease time requirements are made.

497

Haley, J.L., and J.P. Avery 1962 PERSONNEL RESTRAINT SYSTEMS - BASIC CONCEPTS. (Aviation Crash Injury Research, Phoenix, Ariz.) TREC Tech. Rept. 62-94, AVCIR 62-12

498

Hall, A. L., & L. A. Alford 1950 MEASUREMENTS OF STRESS ON MARTIN-BAKER EJECTION SEAT FACE CURTAIN. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-4002.2.1., 23 Oct. 1950

499

Hall, A.L. et.al. 1950 SERVICE TEST OF NEW AND IMPROVED METHODS AND TECHNIQUES FOR THE PHYSIOLOGICAL ADAPTATION OF FLIGHT PERSONNEL IN THE OPERATION OF AND ESCAPE FROM AIRCRAFT. STUDY NO. 1. (NM 001 061.01) TO DETERMINE THE VARIOUS PROFILE AREAS OF A "LIGHT", "MEDIUM", AND "HEAVY" AIRMAN CLOTHED IN VARIOUS TYPES OF NAVAL FLIGHT EQUIPMENT. Final Rept. Oct. 12, 1948- Jan. 17, 1950. (Proj. TED No. PTR MED-7144; Series No. ST34-12) 8 February, 1950 ASTIA TIP U10 746
ASTIA ATI 208159

ABSTRACT: Profile areas were determined as an aid in solving the free-fall velocity problem encountered in abandoning an aircraft. Planimetric measurements were obtained from photographed shadows of airmen; profile area contour maps were made from anthropometric measurements of nude subjects. A statistical analysis was made of these areas to select combinations which would give reliable maximums and minimums and to determine which factors had little or no effect. The airmen wore summer, winter, and electrically heated equipment. Studies were also made of subjects wearing an A-13-A oxygen mask; the maximum increase in the size of the profile area was 6.08% with heavy winter-flight gear and a side view of 0^{o} tilt.

500

Hall, L. A. 1945 REPORT OF PARACHUTE JUMP FROM THE B-29. Air Surgeon's Bull. 2:242-243.

501

Hallenbeck, G.A., C.A. Maaske & E.E. Martin 1943 EVALUATION OF ANTI-G SUITS
(Wright-Patterson AFB, Ohio) Rept. No. 2; Eng-49-696-51B; 12 Dec. 1943
See also: National Research Council, Com. on Aviat. Med. Rept. No. 254

ABSTRACT: Centrifuge tests on 32 subjects at Wright Field and the Mayo Clinic show that the Berger Bros. GPS raises the "g" threshold between 1 and 2 "g". To simulate the condition found at high altitudes where the output of the vacuum pump is limited, maximum suit pressures were kept to 4 to 4.5 psi. Protection offered by the suit remained good. Protection offered by suit summates with that afforded by muscle straining maneuvers. Individuals wearing the suit have a very high threshold for unconsciousness, a valuable feature. Graphs of the performance of the Berger valve when supplied by the B-12 pump are included

502

Hallenbeck, G. A., R. MacCardle & K. E. Penrod 1944 MAGNITUDE AND DURATION OF PARACHUTE OPENING SHOCKS AT VARIOUS ALTITUDES AND AIR SPEEDS. (U.S.A.AF, Wright-Patterson AFB, Ohio) Eng. 49-696-66. 8 July 1944.

503

Hallenbeck, G. A., K. E. Penrod, & R. MacCardle 1945 MAGNITUDE AND DURATION OF OPENING PARACHUTE SHOCK. Air Surgeon's Bull. 2:35-37

504

Hallenbeck, George A. 1946 DESIGN AND USE OF ANTI-G SUITS AND THEIR ACTIVATING VALVES IN WORLD WAR II
(Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio) AF TR 5433
ASTIA ATI 25139

ABSTRACT: Several types of anti-G suits and several air-metering valves are described. The factors involved in the protection afforded by G units are discussed. The pressure source for anti-G suits in conventional airplanes is the vacuum instrument pump; in torbojet airplanes, the compressor discharge of the jet engine. These and other possible sources are discussed. Evidence is adduced to show that the protection afforded by present day anti-G suits does not of itself lead to overstressing of aircraft. Finally, recommendations are made for future research work which can profitably be carried out in the field of G protection.

505

Hamill, J.P., & F.C. Miskam 1948 STRENGTH ANALYSIS OF REVISED PILOT AND CO-PILOT SEAT INSTALLATION-MODEL C-74.
(Douglas Aircraft Co., Inc., Long Beach Plant, Calif.) Report 10310, Jan. 1948. ASTIA ATI 55431

ABSTRACT: An analysis has been prepared to substantiate the strength of the support structure of the revised pilot and co-pilot seat installation in the C-74 transport. Each seat is mounted on longitudinal and transverse rails to permit adjustment in either direction. Added platforms are used to transfer loads, which are introduced into the longitudinal rails by the seat support members, into transverse rails. Reinforced channel sections are used to carry the vertical loads to primary frame structure. Fore and aft loads are taken by the floor.

506

Hanff, G. E. 1959 INTEGRATION OF MAXIMUM COMFORT INTO THE ELECTRA PASSENGER SEATS. (American Society of Automotive Engineers) Jan. 1959

507

Hanna, T. D. and L. M. Libber 1957 DEVELOPMENT AND TEST OF PNEUMATIC SEAT CUSHIONS: EVALUATION OF PROTOTYPE SEAT CUSHIONS. (Air Crew Equipment Lab., Naval Air Material Center, Philadelphia, Pa.) Proj. TED no. NAM-AE-5225.1; Rept. no. NAMC-ACEL-321 8 Feb. 1957 ASTIA AD 221 885

ABSTRACT: To relieve fatigue encountered in prolonged flight, a project was initiated to improve seat cushions used in combat aircraft. Eight types of seat cushions were evaluated in an exploratory laboratory study and in operational squadrons. By means of a quantifiable questionnaire the operational evaluation indicated that the most beneficial seat cushion assembly was the pulsating type covered with Tri-lok. This tri-dimensional fabric was found to be most helpful in relieving thermal discomfort and in minimizing perspiration under the buttocks and thighs. Due to certain inherent disadvantages in the motor driven compressor unit used with the pulsating seat cushion it is recommended that : (1) further effort be expended to develop an improved miniaturized motor driven compressor, (2) a further attempt be made to utilize the existing air sources within the aircraft; and (3) that a redesigned static air cushion be operationally evaluated to determine its suitability as an interim seat cushion. (Author)

508

Hanna, T.D. & L.M. Libber 1958 THE PRESENT STATUS OF THE NAVY FATIGUE-RELIEVING PNEUMATIC SEAT CUSHION Jour. Aviation Med., 29(3):237., March 1958

ABSTRACT: A static air cushion and two types of pulsating air cushion covered with trilok were submitted to an operational squadron for evaluation. Results obtained from a structure questionnaire revealed the static air cushion to be the most acceptable design. considered.

509

Hannegan, E.A. 1959 TEST AND EVALUATION OF PARTIAL PRESSURE SUIT SEAT PAN REGULATOR ASSEMBLY (Naval Air Test Center, Patuxent River, Md) proj. TED no. PTR AE 5139; Serial no. ST 33-13; 29 Jan. 1959; ASTIA AD-214 716L

ABSTRACT: The partial pressure suit seat pan regulator assembly was installed in F8U-1 seat pan and flown in that airplane for evaluation. The seat pan assembly improved the suitability of the partial pressure suit by simplifying the accessories and attachments. The A12-A mask adapter, the inadequate length of the oxygen hose and the excessive height of the seat pan proved to be unacceptable features. (Author)

510

Hanselman, N. K., C. A. Metzger, & E. A. Horns 1958 OPERATION, INSPECTION AND MAINTENANCE PROCEDURES FOR CUSHION, SEAT, OXYGEN AND SURVIVAL EQUIPMENT. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TN 58 26, Feb. 1958; ASTIA AD 142 304.

ABSTRACT: This report was prepared to assist users in the operation, maintenance and inspection of the cushion, seat, oxygen and survival equipment which has become known as the rigid survival kit. The information applies mainly to kits designed for aircraft equipped with upward ejection seats.

SECOND ABSTRACT: The major components of the contractor furnished cushion, seat, oxygen and survival equipment are described; and the function of each component is outlined. Inspection procedures and necessary equipment are defined to serve as a guide for squadron and depot maintenance.

511

Hansen, O. K., P. E. Franks, & J. A. Modrick 1959 NATURE AND USE OF THE MAC-2(MALFUNCTION AND CIRCUITRY) TRAINER, (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADC-TN-59-140, May 1959, ASTIA

512

Hansen, R. and D. Y. Cornog 1958 ANNOTATED BIBLIOGRAPHY OF APPLIED PHYSICAL ANTHROPOLOGY IN HUMAN ENGINEERING
(Yoh, H. L., Co., Philadelphia, Pa.)
Contract AF 33(616)2353 WADC Tech. rept. no. 56-30
May 1958 ASTIA AD 155 622

ABSTRACT: This volume contains condensations of 121 reports in the field of Applied Physical Anthropology. A majority of the annotations are grouped

under three headings, Anthropometry, Biomechanics, and Comfort; a few are included in a General Group. Working data and important illustrations are quoted directly from the original papers in most cases. A complete index is arranged by author as well as by subject. An additional list of reports (not annotated) is included as background material. Two appendices containing relevant commentary on Seating Comfort and Anthropomorphic Dummies, are also included. (Author)

513

Hardman Tool & Engineering Co. 1950 STATIC TEST REPORT - MODEL 605 ADJUSTABLE CREW SEAT. (Hardman Tool & Engineering Co., South Gate, Calif.) Report No. 605, ASTIA ATI 70193, JAN. 1950

ABSTRACT: Model 605 Crew Seat having been tested in accordance with this report with no failures nor excessive permanent distortion, it is assumed that Model 605 Crew Seat Meets the structural requirements of specifications as set forth by Douglas Aircraft and Specification An-S-1a. Amend. 3.

514

Harper, E. D. 1956 AIRCREW RECOVERY FROM AIRBORNE MISHAPS. Canad. Aeronaut. J. (Ottawa) 2(5):151-153, May 1956

ABSTRACT: The aircrew ejection devices presently in use in Canadian aircraft are considered largely inadequate for the special conditions of high altitude, low altitude, high speed, and low speed flight. The CF-100 possesses the most advanced escape equipment, including an automatic parachute operating system timed for ejections at any altitude above 200-300 feet, a barostatic operating device which opens the parachute at a predetermined altitude, maximum available support and protective device and a stabilization parachute to prevent tumbling. The problem of air blast, violent contortion, and high acceleration during ejection at high speeds has not been solved, and may require the development of an escape capsule.

515

Harris, J.F. and W.R. Martin 1942 REPORT ON THE FRANKS SUIT. (National Research Council, Canada) Report #C-2903, 26 September 1942

ABSTRACT: This is a progress report on the service trials on operational trials of the Franks Flying Suit in the Fleet Air Arm, commenting upon certain failures of the suit and suggested modifications in design.

516

Harris, R.J. 1942 STATIC TESTS OF PILOT'S SEAT OF PLYWOOD CONSTRUCTION (Morrow Aircraft Corporation, California) Report No. 102, 29 April 1942, ASTIA ATI-98615

ABSTRACT: A pilot's seat of laminated wood and plywood construction, made by the Morrow Aircraft Corporation, was tested in accordance with specification AN-RR-S-176 and found to be satisfactory for all conditions inasmuch as there was no permanent set after proof loads, and no failure at 100% of design load.

517

Harris, R.J. 1942 STATIC TESTS OF PILOT'S SEAT OF PLYWOOD CONSTRUCTION (Rialto Corp., Morrow Aircraft Div., Calif.) Report No. 116, 4 July 1942, ASTIA ATI-98 614

ABSTRACT: These tests were conducted to test a pilot's seat Model 12, Morrow Aircraft Corporation in accordance with requirement 3, mentioned in letter to Morrow Aircraft Corporation, dated June 19, 1942, from A.A.F. Materiel Center Commanding General. The loads specified in paragraphs E-3c and E-3d should be applied to the 0.257 diameter hole used for attaching the safety belt as well as the bracket.

These tests were considered satisfactory. The seat supported load E-3c 1600# and load E-3d 1500# as specified without damage to material or finish.

518

Harris, R.J. 1942 STATIC TEST OF PILOT'S SEAT OF PLYWOOD CONSTRUCTION - SEAT MODEL 10.(Morrow Aircraft Corporation, California) Report No. 148, 12 Oct. 1942, ASTIA ATI 98 613

ABSTRACT: A pilot's seat of laminated wood and plywood construction made by Morrow Aircraft Corporation, was tested in accordance with specification AN-RR-S-176 and found to be satisfactory for all conditions inasmuch as there was no permanenet set or failure at 100% of design load.

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Hasbrook, A. H. & R. M. Petry 1951 HANDBOOK FOR AIRCRAFT ACCIDENT INVESTIGATORS (Aviation Crash Injury Research of Cornell University, New York) CIR H-2, Jan. 1951.

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Hasbrook, A. H. 1955 AvCIR EVALUATION REPORT ON THE BELL XH-40 MOCK-UP (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc. Phoenix, Arizona) Report AvCIR-4-FV-60; Dec. 1955

521

Hasbrook, A. H. 1955 DESIGNING FOR SURVIVAL OF CREW AND PASSENGERS IN SURVIVABLE AIRCRAFT ACCIDENTS. (Aviation Crash Injury Research, Cornell Univ., New York) March 1955.

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Hasbrook, A. H. 1955 SAFETY BELT (BUCKLE) SLIPPAGE, AND/OR INADVERTENT RELEASE (Aviation Crash Injury Research of Cornell University, New York) Rept. 40-0-52, May 1955.

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Hasbrook, A. H. 1956 AvCIR AERO-COMMANDER REPORT (ARMY) (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc. Phoenix, Arizona) Report AvCIR-48-0-78; Dec. 1956

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Hasbrook, A.H. 1956 DESIGN OF PASSENGER "TIE-DOWN". SOME FACTORS FOR CONSIDERATION IN THE CRASH-SURVIVAL DESIGN OF PASSENGER SEATS IN TRANSPORT AIRCRAFT. (Presented at the Third Air Navigation Conference of the International Civil Aviation Organization Montreal, Canada, Sept. 18 - Oct. 23, 1956 and presented before the Scientific Society of Aeronautics and the German Research Institute for Aeronautics at their Joint Meeting Essen, Germany, April 9-12, 1957) ASTIA AD-217 660, September 1956

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Hasbrook, A. H. 1956 GENERAL DESIGN REQUIREMENTS FOR CRASHWORTHINESS AND DELETHALIZATION OF PASSENGER TRANSPORT AIRCRAFT. (Aviation Crash Injury Research) AvCIR-0-45(67), Aug. 1956

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Hasbrook, A. H. 1956 THE HISTORICAL DEVELOPMENT OF THE CRASH-IMPACT ENGINEERING POINT OF VIEW. In A. F. De Palma, Ed., Clinical Arthopaedics, No. 8 (Philadelphia: J. B. Lippincott & Co., 1956), pp. 268-274.

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Hasbrook, A. H. 1956 PHOTO AND CAPTION RELEASE OF H-13 (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc. Phoenix, Arizona) Report AvCIR-2-PCR-74; July 1956

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Hasbrook, A. H. 1956 PHOTO AND CAPTION RELEASE OF HV HARNESS MOCK-UP (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc. Phoenix, Arizona) Report AvCIR-4-PCR-76; Nov. 1956

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Hasbrook, A. H., & J. T. Pairn 1956 AvCIR PHOTOGRAPHIC REPORT ON L-19 (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc. Phoenix, Arizona) Report AvCIR-3-PR-62; Feb. 1956

530

Hasbrook, A. H., & J. T. Pairn 1956 PHOTO AND CAPTION RELEASE OF F-11F-1 (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc. Phoenix, Arizona) Report AvCIR-1-PCR-73; Oct. 1956

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Hasbrook, A. H., & J. T. Pairn 1956 PHOTO AND CAPTION RELEASE OF T-34B (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc. Phoenix, Arizona) Report AvCIR-3-PCR-75; Nov. 1956

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Hasbrook, A. H., & J. T. Pairn 1956 PHOTO AND CAPTION RELEASE OF TWA MARTIN 404 (Aviation Crash Injury Research, A Flight Safety Foundation, Inc., Phoenix, Arizona) Report AvCIR-5-PCR-77; Dec. 1956

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Hasbrook, A. H. 1957 THE BIO-MECHANICAL ANALYSES OF SURVIVABLE-TYPE AIRCRAFT ACCIDENTS AS A FACTOR IN IMPROVING SAFETY. (Paper, 25th Annual Meeting, Aviation Crash Injury Research, 28-31 January 1957)

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Hasbrook, A. H. 1957 DESIGNING FOR SURVIVAL IN VTOL AIRCRAFT. (Paper, American Helicopter Society 13th Annual National Forum, Washington, D. C., 9 May 1957)

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Hasbrook, A. H. 1957 GENERAL DESIGN REQUIREMENTS FOR CRASHWORTHINESS AND DELETHALIZATION OF PASSENGER TRANSPORT AIRCRAFT. Inst. Aero Sci. Preprint No. 697 1957.

ABSTRACT: Presentation of data on the major factors contributing to injuries in survivable-type accidents involving transport aircraft and of the design precepts which can be used to eliminate these injury causatives.

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Hasbrook, A. H. 1957 GREATER SAFETY THROUGH CRASH INJURY ANALYSIS. Aero. Eng. Rev. 16(6):67-69, June 1957.

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Hasbrook, A.H. 1957 THE NEED FOR CRASH SAFETY DESIGN IN CREW MEMBER STATIONS IN TRANSPORT AIRCRAFT. (Cornell-Guggenheim Aviation Safety Center) AVCir 52-0-85.

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Hasbrook, A. H. 1957 PHOTO AND CAPTION RELEASE OF MARTIN 404 EASTERN AIRLINES LOUISVILLE, KENTUCKY. (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc., Phoenix, Arizona) Report AvCIR-7-PCR-84; Mar. 1957

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Hasbrook, A. H., & J. T. Pairn 1957 PHOTO AND CAPTION RELEASE OF CV 240, AMERICAN AIRLINES, TULSA, OKLAHOMA (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc., Phoenix, Arizona) Report AvCIR-6-PCR-80, Jan. 1957

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Hasbrook, A. H. 1958 CRASH SURVIVAL BY DESIGN
Arizona Engineer & Scientist, March 1958.

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Hasbrook, A. H. 1958 DESIGN OF PASSENGER TIE DOWN. Some Factors for Consideration in the Crash-Survival Design of Passenger Seats in Transport Aircraft. In Jahrbuch 1957 der Wissenschaft Lichen Gesellschaft für Luftfahrt, E. V. (Braunschweig: F. Viewig & Sohn, 1958) pp. 326-338.

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Hasbrook, A. H. 1958 MAGNITUDE, DURATION, AND RATE OF ONSET OF MEAN DECELERATIONS USTAINED BY NINE SURVIVORS OF FREE FALLS FROM HEIGHTS OF 55 TO 185 FEET. (Aviation Crash Injury Research, Phoenix, Ariz.) AvCIR Human Factors Design Data Sheet CSDM-DDS (HF)-1.

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Hasbrook, A. H. 1959 CRASH INJURY RESEARCH, A MEANS FOR GREATER SAFETY IN ACCIDENTS. In. E. Evrard, P. Bergeret & P. M. Palthe, eds., Medical Aspects of Flight Safety AGARD ograph 30. (New York: Pergamon Press, 1959), PP. 241-252.

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Hasbrook, A. H. 1959 CRASH SAFETY DESIGN CAN AFFECT YOU Insurance Counsel J. 26(4):529-541, Oct. 1959.

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Hasbrook, A. H. 1959 GREATER AIR SAFETY THROUGH CRASH SAFETY DESIGN. (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc. Phoenix, Arizona) Report AvCIR-59-0-102, April 1959

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Hasbrook, A. H. 1959 HUMAN FACTORS, THE BASIS FOR CRASH SAFETY DESIGN (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc. Phoenix, Arizona) Report AvCIR-63-0-108, Sept. 1959

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Hasbrook, A. H. 1960 CRASH-SAFE DESIGN CAN MAKE MANY ACCIDENTS SURVIVABLE Aerospace Engineering, Sept. 1960, PP 79-81, 87.

548

Hasbrook, A. H. 1962 CRASH SURVIVAL BY DESIGN Arizona Engineer & Scientist, March 1962

549

Hasbrook, A. H. & J. C. Earley 1962 FAILURE OF REARWARD FACING SEAT-BACKS AND RESULTING INJURIES IN A SURVIVABLE TRANSPORT ACCIDENT. (U. S. Civil Aeromed. Res. Inst., Oklahoma City, Oklahoma) 62-7 April, 1962.

ABSTRACT: Photographs with captions showing seat-back failures and their causes and a description of the injuries sustained in a relatively low force transport accident are presented.

550

Hasbrook, A. H., J. D. Garner & C. C. Snow 1962 EVACUATION PATTERN ANALYSIS OF A SURVIVABLE COMMERCIAL AIRCRAFT CRASH. (U.S. Civil Aeromed. Res. Inst., Oklahoma City, Okla.) 62-9, May 1962.

ABSTRACT: The evacuation pattern of 99 to 106 survivors of a jet transport crash involving a post crash fire is described, factors possibly effecting the suffocation and ultimate death of 16 passengers are listed and photographs and diagrams are presented.

551

Hass, G. 1943 AN ANALYSIS OF RELATIONS BETWEEN FORCE, AIRCRAFT STRUCTURE AND INJURIES TO PERSONNEL INVOLVED IN AIRCRAFT ACCIDENTS WITH RECOMMENDATIONS FOR SAFER PRINCIPLES IN DESIGN OF CERTAIN TYPES AIRCRAFT. (School of Aviation Medicine, Randolph Field, Texas) November 1943 ASTIA AD 131 867

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Hass, G. M. 1944 RELATIONS BETWEEN FORCE, MAJOR INJURIES AND AIRCRAFT STRUCTURE WITH SUGGESTIONS FOR SAFETY IN DESIGN OF AIRCRAFT. J. Aviation Medicine 15 (6):395-400. Dec. 1944.

SUMMARY: Personnel who have been subjected in aircraft accidents to large forces for brief times may be divided into four groups. The distribution of cases in these groups indicates that just below the range of impact which causes sudden death, there is a narrow range of impact which produces multiple internal injuries and permits survival. This is the range of over-all maximum tolerance of the body to force.

The differential diagnosis and treatment of internal injuries are major problems, but prevention of injuries is still a more important problem. The first step is the definition of parts of the aircraft which by contact with the body are unduly responsible for injuries. The second step is to determine the extent to which collapse of aircraft structure causes injuries that might have been prevented if structure had not collapsed. The third step is to analyze the problem of emergency escape from aircraft.

553

Hass, G.M. 1944 A STUDY OF FACTORS WHICH OPERATE AGAINST THE SUCCESSFUL ESCAPE OF OCCUPANTS FROM AIRCRAFT. (School of Aviation Medicine, Randolph Field, Texas) Proj. no. 249, Rept. no. 1. 5 May 1944.
Abridged in Air Surgeon's Bull. 1:6-7, Oct. 1944.

ABSTRACT: Twelve reasons why occupants of falling aircraft often do not use the parachute are given. Three case reports which illustrate one reason for failure to use the parachute, namely, immobilization of occupants in the aircraft by force generated by spinning of the airplane during its fall to the ground, are given. The force generated in each case was directed from "head-to-seat" and was of sufficient magnitude not only to physically transfix each occupant but also to produce "blackout" or "near blackout" in two cases in which the long axis of the body was oriented in the direction of the force. In the third case a prone position was assumed and there was no "blackout." (Author)

554

Hass, G.M. 1944 UNSUCCESSFUL USE OF PARACHUTES AND CASES RESULTING FROM FORCES GENERATED BY AIRCRAFT SPINS. Air Surgeon's Bulletin 1(10):6-7, Oct. 1944. (Abridgement of School of Av. Med., Res. Proj. No. 249, Rept no.1, 5 May, 1944)

ABSTRACT: Fliers should be informed that if they are immobilized by a force of sufficient magnitude to cause blackout on standing they should crawl to the nearest exit keeping the trunk and head parallel to the long axis of the fuselage.

Among the causes of nonuse of parachutes may be (1) limitations of speed and accuracy of physiologic reactions, such as slow perception or reaction to stimulus of a stall abnormal attitude or direction of spin; acute disorientation or vertigo; (2) improper spatial relations between occupants and avenues or facilities of escape; (3) inadequate spatial relations between the aircraft and the occupant or his opening parachute after the occupant has jumped from the aircraft.

555

Hass, G.M. 1945 THE PROBLEM OF ESCAPE BY PARACHUTE IN ACUTE AERIAL EMERGENCIES IN FLYING TRAINING. (U.S. AAF, School of Aviation Medicine, Randolph Field, Texas) Project No. 417, Rept. No. 1, Sept. 1945.

ABSTRACT: Acute aerial emergencies lead to accidents which cause most fatalities in flying training. An analysis of the problem of escape in 250 escape in 250 acute aerial emergencies resulting in aircraft accidents which involved 468 personnel in flying training is reported. Attempts to escape by parachute and the success of these attempts increased in direct proportion to the altitude at which control was lost. When control was lost at altitudes below 500 feet only one (0.8%) of 126 personnel successfully escaped by parachute. When control lost at altitudes between 500 and 2000 feet, 7(8.3%) out of 84 personnel successfully escaped by parachute. When control was lost at altitudes above 2000 feet principally 2000 to 7000 feet in this series) 48(18.6%) of 238 personnel escaped successfully by parachute.

556

Haas, G.M. 1945 RESULTS OF DUAL ATTEMPTS AT CONSECUTIVE ESCAPE BY PARACHUTE FROM UNCONTROLLED TWO-SEATED AIRCRAFT. (U.S. AAF, School of Aviation Medicine, Randolph Field, Texas) Project 328, Report No. 1, 12 February 1945.

ABSTRACT: Twenty-two cases in which at least one of two occupants was able to escape by parachute from uncontrolled spinning or diving aircraft are reported.

Forty-four personnel were involved, two in each aircraft. Twenty-six escaped successfully by parachute. The remainder wore fatally injured.

Among the twenty-six who escaped, twenty-two were first in the one-two sequence in jumping.

It is apparent that momentary delay caused by following a one-two sequence in escape by parachute was an important factor in the high fatality rate among those who are seated in the sequence.

One basic attack upon this and similar problems involving human reactions in critical emergencies created by sudden loss of control of aircraft could be made by development of efficient mechanical devices for ejection of personnel.

557

Havron, M. Dean & Leslie P. Butler 1957 EVALUATION OF TRAINING EFFECTIVENESS OF THE 2FH-2 HELICOPTER FLIGHT TRAINER RESEARCH TOOL (Naval Training Device Center, Port Washington, L.I., N.Y.) Technical Report -- NAVTRADEVCEN 1915-00-1 Contract Nonr 1915(00) ASTIA AD 125 465

ABSTRACT: This is the report of an evaluation of Device 2-FH-2, Helicopter hovering research tool. Device 2-FH-2 was constructed by the Bell Aircraft Corporation, Buffalo, New York under contract to the U.S. Naval Training Device Center. The device was developed as an engineering prototype to determine the feasibility of a non-programmed visual display for training in hovering and other maneuvers performed near the ground. Later, its capabilities were extended to permit simulation of high altitude maneuvers without extensive modification of the flight computer system. All instructors recommended further investigation of the operational capabilities of the device. This is a report of the methods used and the results obtained on the recommended investigation. The evaluation was conducted by the steps summarized below and described in detail: (1) Collection and integration of content (2) Development of a training syllabus (3) Development of a flight criterion (4) Administration of training syllabus and flight criterion (5) Analysis of data (6) Report of results. Results from the tests indicate that: (1) Training in the 2-HF-2

led to no apparent improvement in flight performance in the aircraft. (2) Training in the 2-HF-2 produced sickness somewhat similar to motion sickness among most participating instructors and students. (3) Flight characteristics of the device that specify display-control relationships lack fidelity in a number of important respects. It is probably that these faults contribute to sickness. There is some evidence of negative transfer because of them.

558

Hawkes, J.E. 1948 GROUND SEAT EJECTION TESTS ON TF-80C AIRPLANE. (Lockheed Aircraft Corp., Burbank, California) ASTIA ATI-46462, October 13, 1948

ABSTRACT: Ground seat ejection tests were conducted on the rear seat of a modified TF-80C turbojet airplane. A total of three ground ejection tests were completed. During the ground ejection tests the airplane was in the configuration specified in the contract. In addition Mitchell 35 mm and Western Electric (ultra high speed) motion picture cameras were used to take photographs of the ejection. It was concluded from these ground ejection tests that provided the head rest is firmly bolted to the seat the test configuration was satisfactory for additional air ejection tests.

559

Hawkes, R. 1956 AEROMEDICINE REINFORCES FRAIL MAN
Aviation Week 65(6): 360-361, 363-365, 6 Aug. 1956

ABSTRACT: An overall view is presented of the basic and applied research carried out by branches of the Aero Medical Laboratory. The current ideas in research and design of oxygen systems, pressure breathing devices, and pressure suits are noted. Studies of the effects of acceleration and deceleration have culminated in the requirement of an escape capsule in all designs capable of supersonic speeds or high-altitude flight. Further, studies in aviation psychology, bioacoustics, vision in an empty visual field, and flight feeding are mentioned.

560

Hawkes, R. 1956 AIR CRASH DEATH OR INJURY MAY BE PREVENTED BY SOUND DETAIL DESIGN. Aviation Week 65(19):61-64, 67-70, 73, 77, 79, Nov. 5, 1956

ABSTRACT: The concepts of crash survival design are based on the fact that the human body is capable of withstanding impacts greater than those which can be transmitted through the structure of a current airplane. The basic principles are centered around designing the tiedown of passengers and loose equipment up to the ultimate load factor of the aircraft frame. The study of forward-facing seats versus backward facing seats is used to illustrate the fallacy of drawing conclusions from incomplete evidence.

561

Hawkes, R. 1956 NAVY INTEGRATING FLIGHT SYSTEM IN PILOT CAPSULE Aviation Week 64(18):54-59, Apr. 30, 1956

ABSTRACT: The overall design concept is outlined for an interchangeable nose section ejection capsule which would contain the pilot and the sensing, interpreting, and communicating organs of a new integrated flight-control system. Some of the background work that culminated in the man-machine bearing capsule is related.

562

Hawkes, R. Feb. 1957 HUMAN FACTORS APPROACHING MATURITY Aviation Week 66(8):201-202

563

Hawthorne, R. 1953 ARE AFT FACING SEATS SAFER? Aviation Age, Oct. 1953

564

Hawthorne, R. 1959 "ENERGY ABSORPTION" APPLIED TO SEAT DESIGN. Space Aeronautics (Oct. 1959): 70-74, 76, 77.

ABSTRACT: How can the seat anchorage be kept from failing in survivable aircraft crashes? By designing to the energy absorption principle, answers Aerotherm, which has done just that with the seats for Pan Am's 707s.

565

Hays, E.L. 1948 EVALUATION OF THE MARINE CORPS SEAT RELEASE COMPOSITE QUICK DISCONNECT ASSEMBLY (Aeronautical Medical Equipment Laboratory, Naval Air Experimental Station, Naval Air Material Center, Philadelphia, Penn.) TED NO NAM AE 519059.1, 27 July 1948, ATI 76256

ABSTRACT: The Marine Corps Seat Release Composite Quick Disconnect Assembly has been subjected to leakage, pressure drop, general operational and ejection seat tests at this station. In general, the performance of the Seat Release is good but it is considered unsatisfactory for use in Naval Aircraft because of failure of the springs in the electrically heated suit circuit and minor mechanical difficulties. This type disconnect can be installed in Naval Aircraft for use with Ejection Seats if the seat is equipped with a member that maintains the same relative position to the aircraft throughout all seat adjestments to which the "seat side" of the disconnect can be fastened. This type Seat Release Disconnect can be installed with the NAMC Ejection Seat because the above requirements are fulfilled in the design of the seat. In order to use this disconnect with other type ejection seats, it would be necessary to equip the "airplane side" with a linkage which would allow this side to retain the same relative position to the seat throughout all seat adjustments

566

Hecht, K. F. 1953 GROUND TESTS OF A PILOT EJECTION SEAT EJECTED THROUGH MONOLITHIC-, REINFORCED-MONOLITHIC-, AND LAMINATED-TYPE CANOPIES. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 53-361, Oct. 1953

ABSTRACT: Five tests were conducted by the Aircraft Laboratory, Wright Air Development Center, Wright-Patterson Air Force Base during the latter half of 1951 to determine the feasibility of ejecting pilots through canopies in the event of a canopy release failure. For 3 of the tests the ejection seat and dummy were fired through a monolithic-type canopy used on the F-86A aircraft; the remaining 2 tests were through an F-84 reinforced monolithic-type canopy and a B-47 laminated-type canopy. Ejections were accomplished by duplicating the mechanisms involved in actual flight. Motion picture cameras and metering devices record the data.

The results of the tests indicate that the trajectory of the seat and pilot after ejection through the canopy is not seriously affected, and adequate tail clearance will still be attained. (DACO)

567

Hecht, K.F. 1953 GROUND AND FLIGHT TESTS OF AN AUTOMATIC-OPENING LAP BELT FOR EJECTION SEATS (Aircraft Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC Technical rept. no. 53-365; Dec. 1953; ASTIA AD-76-428

ABSTRACT: These tests were performed in order to develop a system which would permit automatic separation between a man and his seat after ejection from an

aircraft. Test results are presented, and the conclusion is drawn that automatic separation, immediate or time-delay, is feasible from an engineering viewpoint. Test results further indicated that a time-delay system is more desirable than an immediate separation system. (WADC abstract)

568

Hecht, K. F. 1953 UPWARD EJECTION SEAT FLIGHT TESTS UTILIZING THE M4 CATAPULT (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TN 53-364; Dec. 1953

569

Hecht, K. F., E. G. Sperry, and F. J. Beaupre 1953 DOWNWARD CREW EJECTION SEAT TESTS FROM THE B-47B AIRPLANE. (USAF, Wright-Pat. AFB, Ohio). WADC TR 53-433. Nov. 1953; ASTIA AD-63 501

ABSTRACT: Flight test ejections of the downward ejection seat from a B-47B airplane are described. A total of twenty-three ejections were accomplished; sixteen dummy subject tests were conducted at Wright-Patterson AFB from 17 July 1953 to 29 September 1953, and seven human subject tests were conducted at Eglin Air Force Base from 7 October 1953 to 21 October 1953.

Test results obtained by analysis of motion picture records and subjective reactions of the human subjects are presented. It is concluded that the downward ejection seat is acceptable as an escape device for use in the B-47 airplane if provisions for automatic separation and parachute deployment are included for the crewman.
It is recommended that further studies be made of the firing control method utilized for downward ejection seats to improve the ability of the crewman to retain his grip. It is further recommended that design consideration be given to the mechanical retention of the limbs during very high airspeed ejections

570

Hecht, K. F. and E. G. Sperry 1957 DOWNWARD EJECTION FLIGHT TESTS OF A SHOCK-ABSORBING SEAT FIRING CONTROL SYSTEM
(Aircraft Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TEch. note no. 55-239
Feb. 1957 ASTIA AD 118 053

ABSTRACT: The report covers the 28 flight test ejections of a downward ejection seat conducted from a B-47B airplane between the dates of 1 April

1954 and 3 August 1954. Eighteen of these tests were accomplished at Wright-Patterson Air Force Base, Ohio, utilizing dummy subjects; the remaining ten tests were performed with human subject at Eglin Air Force Base, Florida. Measurements of the forces encountered in the wrists when utilizing a D-ring type of firing control during downward ejection are presented. Other test results, including those from two high altitude human subject ejections, obtained from motion picture records and subjective reactions of the human subjects, are reported. It is concluded that the downward ejection seat as modified for the human subject phase is a satisfactory escape device throughout the speed and altitude range tested. (Author)

571

Hegenwald, J.F., Jr. 1956 HIGH PERFORMANCE EJECTION SEAT. PHASE I. PRELIMINARY INVESTIGATION. (North American Aviation, Inc.) Rept no. NA 56-3770 , Sept. 1956.

572

Hegenwald, J.F. & W.V. Blockley 1956 SURVIVABLE SUPERSONIC EJECTION. A CASE STUDY TO CORRELATE ANALYTICAL, EXPERIMENTAL, AND MEDICAL DATA BY RECONSTRUCTION OF AN INCIDENT. AN INTERIM REPORT PRESENTED ON APRIL 17, 1956, AT THE 27th ANNUAL MEETING OF THE AERO MEDICAL ASSOCIATION, CHICAGO, ILLINOIS. (North American Aviation, Inc., Los Angeles, Calif.) Rept. NA 56 452, April 1956 ASTIA AD 138 762

ABSTRACT: An anthropomorphic dummy was ejected 4 times from a simulated F-100 airplane cockpit at 533 to 677 kn. The objective was to obtain information which could be used to prevent the recurrence of injuries which were sustained by a pilot who was ejected from an F-100A airplane over the Pacific Ocean. The M-5 catapult with an ejected weight of about 350 lb. was used. The standard F-100 ejection seat configuration was employed, except for the incorporation of the drag parachute in later runs. In addition to the photographic coverage, continuous acceleration data were provided by means of a telemetering transmitter mounted within the dummy's torso. The pilot was believed to experience, at the head (1) a maximal period of 290 msec with an acceleration greater than 20 g, (2) a period of 120 msec at an acceleration above 35 g, (3) a peak acceleration of 64 g, and (4) a rate of onset of the peak of 700 g/sec.; the direction of application was predominantly negative. At the lower torso, the pilot was

believed to experience (1) a maximal period of 140 msec with the acceleration greater than 20 g, (2) a period of 45 msec at an acceleration above 35 g, (3) a peak acceleration of 50 g, (4) and a rate of onset of 1300 g/sec.; the direction of application was chest to back. The imposition of a single properly directed force vector upon the seat-man unit would benefit ejection seat escape in 3 main aspects: (1) orientation of the seat attitude to produce accelerative forces in physiologically favorable directions; (2) attentuation of acceleration magnitude at the seat occupant's extremities and (3) improvement of aerodynamic lift characteristics.

573

Hegenwald, J. F. and E. A. Murphy 1957 SLED TESTING THE EMERGENCY ESCAPE SYSTEM: THE HUMAN FACTOR (Presented at the ARS Spring Meeting, Washington, D.C.).

ABSTRACT: During escape from high-performance airplanes, the aircrew may be subjected to hazards of bodily accelerations, windblast, noise, pressure gradients, and equipment disintegration. Rocket-propelled sleds on the experimental track provide a ready medium for determination of the physiological, mechanical, and structural effects of escape unit ejection at all airspeeds. A primary design objective is aerodynamic control of the escape unit's actions after separation from the airplane; pitch-retarding and stabilization devices are investigated in the current program of North American Aviation to attenuate aircrew accelerations during ejection. The reactions of helmets, oxygen masks, parachutes and ejection seats are studied. Methods of securing and recording data are reviewed.

574

Hegenwald, J.F., Jr. & E.A. Murphy, Jr. 1957 SLED TESTING THE EMERGENCY ESCAPE SYSTEM: THE HUMAN FACTOR.
Jet Propulsion 27(9): 1025-1028, Sept. 1957

ABSTRACT: Tests were made to assess single items of ejection equipment and also, using instrumented dummies, to determine the forces on the human frame. The test vehicle was designed for 16 standard 2.2 ks solid propellant rocket motors and was run on the Edwards Air Force Base high-speed track.

575

Hegenwald, J.F., Jr., J.F. Madden & P.R. Penrod 1959 X-15 RESEARCH AIRCRAFT EMERGENCY ESCAPE SYSTEM
Paper, Joint Meeting of the Flight Test Panel and the Aeromedical Panel of the Advisory Group for Aeronautical Research and Development, Athens, Greece. 11-15 May 1959 (AGARD Rept. No. 243) ASTIA AD 256 386

ABSTRACT: An extensive survey of alternate escape system types was made. The results indicate conclusively that an open ejection seat in conjunction with a full pressure protective garment best satisfy X-15 emergency escape requirements. An evaluation of available ejection seats which had demonstrated a supersonic capability revealed that modifications required to meet the specific requirements of cockpit compatibility, acceptance of the pressure suit, and use at very high Mach numbers, would be equivalent to complete redesign. A seat tailored to the X-15 offered the most acceptable solution. The completed test program has demonstrated that the aerodynamic, mechanical, structural, propulsive, and survival aspects of X-15 emergency escape system similar in concept to that incorporated in the X-15 will best satisfy escape requirements for currently projected manned orbital vehicles. (Author)

576

Hegenwald, J. F., Jr. & D. W. Brown 1960 EMERGENCY AND ESCAPE PROCEDURES. (Paper, Physiological Training Officer Symposium School of Aviation Medicine, Brooks AFB, Texas, 13-17 June 1960) (North American Aviation, Inc., Los Angeles, Calif.) Report No. NA 60-814. ASTIA Doc. No. AD-268510

ABSTRACT: Methods are discussed by which escape devices designed fifteen or more years ago, may be considerably improved. Then, the ejection seat-pressure suit combination of a research aircraft is described, followed by a report concerning the encapsulated seat of a Mach 3 air vehicle and brief examination of the aspects of escape from space vehicles. (Author)

577

Hegenwald, J.F., Jr., & P.R. Penrod 1960 AEROSPACE EMERGENCY AND ESCAPE PROCEDURES. In Lectures in Aerospace Medicine, 11-15 January 1960, (School of Aviation Medicine, Brooks AFB. Texas)

ABSTRACT: Successful penetration of this new frontier will depend on space ship duplication of the natural habitat of man. The use of a mechanical substitute for natural provision of requirements for sustaining life will inevitably generate the necessity for minimal standby equipment to assure a safe emergency environment.

578

Hegenwald, J.F. and P.R. Penrod 1960 AEROSPACE EMERGENCY AND ESCAPE PROCEDURES. (North American Aviation, Inc., Los Angeles) Rept. no. NA-59-1867, ASTIA AD-256 387, January 6, 1960

ABSTRACT: Successful penetration of the space frontier will depend on space ship duplication, or at least approximation, of the natural habitat of man. For early probing missions of relatively short duration and in the immediate vicinity of the earth, extension of current techniques will best satisfy the requirements of emergency and escape procedures.

Intra-atmospheric emergencies occurring during launch, boost, re-entry, and recovery will essentially parallel those attendant to super-performance aircraft such as the X-15 and B-70, whose development is already solving space age problems and producing much technology of direct applicability to putting man safely in space. The exact escape procedure and system configuration will be dependent on vehicle type, varying from total vehicle separation and recovery for a wingless craft to a fly-down or minimum-mass ejection for the winged craft

Inter-planetary operations with extended mission duration should be planned on a parallel vehicle approach. The ultimate conclusion is that from a standpoint of ethics, the philosophy of democracy and ordinary realism, a man or crew on an exploration will not be sent into space by our nation without a high probability of a safe journey and safe recovery.

579

Hegenwald, J. F. 1961 ENVIRONMENTAL ASPECTS OF THE B-70 MACH 3 ESCAPE CAPSULE.
Aerospace Medicine 32(3):234, March 1961.

ABSTRACT: The aircrew emergency escape system of the B-70 air vehicle provides safe egress at performance levels as high as Mach 3.0 above 70,000 feet and as low as 90 knots at zero altitude. The capsule's influence upon normal and emergency flight operations is discussed. Oxygen and pressurization provisions, as well as crew positioning and restraint devices are described. The acceleration environment through all escape phases is presented in conjunction with unique communications and survival features.

580

Hegenwald, J.F., Jr. 1962 ENVIRONMENTAL ASPECTS OF THE B-70 MACH 3 ESCAPE CAPSULE
Aerospace Medicine 33(8): 951-957, Aug. 1962.

ABSTRACT: The first encapsulated seat to demonstrate safe ejection throughout the speed spectrum from 90 knots to supersonic, including ground-level escape

at these speeds, the B-70 capsule is entering the qualification phase of the test program. Suitable aerodynamically for very high Mach numbers, the capsule is capable of providing emergency pressure protection for space vehicle crews as well as furnishing intra-atmospheric escape for winged reentry spacecraft.

The aircrew emergency escape system of the B-70 air vehicle provides safe egress at performance levels as high as Mach 3.0 above 70,000 feet and as low as 90 knots at zero altitude. The capsule's influence upon normal and emergency flight operations is discussed. Oxygen and pressurization provisions, as well as crew positioning and restraint devices, are described. The acceleration environment through all escape phases is presented in conjunction with unique communications and survival features.

581

Heidner, R. L. 1962 DEVELOPMENT OF PERSONNEL PROTECTIVE SYSTEMS FOR SPACE FLIGHT AND EXPLORATION MISSIONS
(B. F. Goodrich Aerospace and Defense Products, Akron, Ohio)
13th Monthly Engineering Report, 18 May 1962 - 17 June 1962 ASTIA AD-293 057.

ABSTRACT: A physical testing program has been initiated to evaluate the tensile, elongation and seam strengths of the glass-rayon fabrics. Design work and parts procurement is underway for the XH-38 headpiece. The basic hardshell for the intermediate size headpiece required reinforcement to control distortion. The XGD-37 full pressure suit has demonstrated walking, waist bending, and knee bending capabilities. Mobilities studies are progressing utilizing one-way stretch fabric in the knee and elbow joint areas

582

Heidner, R.L. 1962 DEVELOPMENT OF PERSONNEL PROTECTIVE SYSTEMS FOR SPACE FLIGHT AND EXPLORATION MISSIONS
(B.F. Goodrich Aerospace and Defense Products, Akron, Ohio) Contract NOw 61--554-c Covering Period June 18 thru July 17, 1962 Fourteenth Monthly Engineering Report ASTIA AD 284 169

ABSTRACT: An instrument is being designed to reliably measure absolute reflectance. HR-1 yarn is undergoing evaluation as a possible base for producing fabric of improved thermal radiation resistance and reflectance capabilities. Efforts are continuing towards creating a satisfactory glass-rayon type fabric. The XH-32, XH-40, XH-41 headpieces and XGD-37 full pressure suit have been delivered to A.C.E.L. for testing and evaluation. The design features have been established for the XGD-38 full pressure suit. Design work has been completed and components ordered for the XH-38 headpiece. A method has been devised for providing the stretch fabric convoluted knee section with circumferential sizing without any sacrifice in mobility

583

Heinecke 1943 CATAPULT SEAT WITH GUNPOWDER PROPULSION (Messerschmitt AG., Projektbuero, Augsburg) April 1943; ASTIA ATI 32382

ABSTRACT: An incestigation is conducted to see if the weight of a jettisonable seat with compressed air propulsion could be decreased by using gunpowder for propulsion. Calculations were made to determine the powder loading, force, speed and acceleration. Results of these computations are shown in a pressure diagram and schematic drawings. Tests were made with the Heinkel air-pressure-propulsed catapult seat weighing 19 kg. It was possible, using gun powder for propulsion, to reduce this weight to 5 kg.

584

Heinrich, H.G.; & Berndt, Rudi 1948 PARACHUTE, GUIDE SURFACE 40" DIA., EJECTION SEAT STABILIZATION, TESTS OF" (Eng. Div., USAF, Wright-Patterson AFB, Ohio) No. 143, MCREXE-672-22K, 3 Sept. 1948 ASTIA ATI 179 497

ABSTRACT: The tests reported in this publication were conducted for the following purposes: (1) To determine the maximum force applied to the ejection seat during opening of the 40" Guide Surface Stabilization Parachute at various airspeeds. (2) To check the stability of the ejection seat with 40" Guide Surface Parachute. (3) To determine velocity, trajectory inclination angle and vertical fall of the parachute stabilized ejection seat for the first fifteen seconds of free flight at various altitudes.

When the tests were completed, it was found that the trajectory calculations show that with an ejection speed of 650 MPH at sea level, the seat will have decelerated to 340 MPH at the time of opening of the stabilization parachute. It was also found that the maximum force of the 40" Guide Surface Stabilization Parachute for the ejection seat does not exceed the limits calculated in Memorandum Report No. MCREXE-672-22H at sea level and at speeds up to 350 MPH. These limits seem to be within the tolerance of the human body as established by Aero Medical Laboratory. The stability of the ejection seat with the subject parachute is adequate.

585

Heinrich, Helmut G. and Shukry Ibrahim 1959 A TRANSDUCER FOR THE MEASUREMENT OF SMALL PRESSURE DIFFERENTIALS ON PARACHUTE CANOPIES (Wright Air Development Center, Wright-Patterson Air Force Base, Ohio) WADC TR 59-115, Contract No. AF 33(616)-6372, Project 6065-60252, November 1959, ASTIA AD 232 039

ABSTRACT: A Pressure Transducer for the measurement of pressure distribution on parachute canopies in subsonic flow has been developed and tested in wind tunnel experiments. The transducer which has a pressure range of 0.5 psi differential is to be fastened to the canopy structure. It employs SR-4

Strain gages manufactured by Baldwin-Lima-Hamilton Corporation, which are bonded to light steel beams. The beams are deflected by the differential pressure by means of a diaphragm. The strain gages are electrically connected in a 4-arm bridge arrangement providing means of compensation for temperature and inertia effects. A suitable method to lead the local pressure to the transducer is proposed.

The transducers originally developed to be used in connection with parachutes may advantageously be applied for other purposes where high sensitivity, high natural frequency, low temperature drift and low dynamic response are required.

586

Heinrich, Helmut G. and L. Albert Scipio 1959 PERFORMANCE CHARACTERISTICS OF EXTENDED SKIRT PARACHUTES
(Wright Air Development Center, Wright-Patterson Air Force Base, Ohio) Contract No. AF 33(616)-6372, Project 6065-60252, WADC TR 59-562, October 1959 ASTIA AD 232 149

ABSTRACT: Extended skirt parachutes represent a particularly shaped, very efficient and widely used type of parachute. In the aerodynamic sense, extended skirt parachutes are statically unstable over a certain range of angle of attack and, therefore, they descend either in a gliding or oscillating or combined motion.

A consequence of this range of uncertainty is a considerable variation of the average rate of vertical descent and a corresponding spread of effective drag per unit of surface area, and unit of parachute weight or volume.

The prime objective of this project is to collect and analyze all available performance data and to reduce them to average values by the methods of statistical analysis. The establishment of characteristic values for the various types of extended skirt parachutes and the establishment of trends in the relationship between effective drag and size as well as canopy loading and the registration of reported opening forces and opening times, also under consideration of the types, were secondary objectives

587

Heinrich, H.G. 1961 SOME RESEARCH EFFORTS RELATED TO PROBLEMS OF AERODYNAMIC DECELERATION
(Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TN 60-276; November 1961; ASTIA AD 272 404

ABSTRACT: The status of research efforts designed to explain physical phenomena associated with the operation of aerodynamic decelerators, in particular textile type parachutes, is presented. A theoretical approach to calculate the velocity

and pressure distribution in the turbulent wake of basic bodies or revolution is outlined and compared to actual test results. The concept of the effective porosity of textile materials is developed, and its influence upon the aerodynamic and opening characteristics of conventional textile parachute canopies is discussed. The results of research efforts to reduce parachute inflation time with a minor increase of opening force are presented. (Author)

588

Hendler, E. and Poppen, J. R. 1948 PROTECTIVE HELMET FOR PILOTS OF HIGH-SPEED AIRCRAFT. J. Aviation Med. 19(6):420-425, 455.

SUMMARY: A protective helmet has been described which was designed to afford protection to aviators from the buffeting action encountered in high-speed aircraft. This helmet has been designated the H-1 Protective. The smaller size, lighter weight, greater stability and protective features incorporated in this helmet have been discussed. Problems of increased ventilation and sizing have been presented. Comments of jet pilots who have worn this protective helmet during flight have been shown to be generally favorable.

589

Hendler, E. and R. G. Evans 1954 EVALUATION OF COLLAPSIBLE TYPE DITCHING SEAT
(Aeronautical Medical Equipment Lab., Naval Air Experimental Station, Philadelphia, Pa.)
Rept. TED no. NAM AE-6316 15 Nov. 1954 ASTIA AD 50 046

ABSTRACT: "Three types of aft-facing collapsible ditching seats, differing mainly in materials used in their construction, were statically and dynamically tested to determine their ditching and crash protective properties. Dynamic tests were made using the HG-1 catapult and an anthropomorphic dummy. Average accelerations applied to the catapult car, upon which the test load was mounted, ranged from about 10 to 38G, lasted from about 0.22 to 0.12 seconds and were approximately square wave in shape. Over shoot of acceleration measured in the dummy reached values more than twice that applied to the catapult car. Tensions measured in each lower seat suspension strap were as high as 1.5 times the total load computed as the product of mass and applied acceleration, while in each upper seat suspension strap, tensions as high as the total load, computed as above, were measured. With certain modifications to the basic structure, it is concluded that a nylon mesh and strap collapsible ditching seat would provide adequate protection for personnel against forces engendered during aircraft ditching and crashes. It is therefore recommended that this type of modified seat be accepted for use in multi-place long range type aircraft." (AMEL abstract)

590

Hendler, E., et al. 1954 TEST AND EVALUATION OF MODEL R 3Y DITCHING SEAT (Naval Air Material Ctr., Philadelphia, Pa.) Rept. TED No. NAM EA AE-6302 27 May 1954

591

Hendler, E. 1955 EVALUATION OF AIR ASSOCIATES, INCORPORATED SINGLE STRAP SHOULDER HARNESS AND LAP BELT. (Naval Air Material Ctr., Philadelphia, Pa.) Rept. NAM EA 6314, 17 March 1955

592

Hendler, E., and E. M. Wurzel, 1956. THE DESIGN AND EVALUATION OF AVIATION PROTECTIVE HELMETS. J. Aviation Med. 27(1):64-70.

ABSTRACT: Most present-day crash helmets are based not upon scientific theory but upon established lines which have resulted from misinterpretation of the mechanism of head injury. When the physics of head injury are studied, it is immediately clear that a theoretically sound helmet is neither difficult to design nor necessarily expensive to manufacture. Although the shape and details of a properly designed crash helmet may vary with the purpose for which it is intended, its basic properties will always be the same-resistance to penetration, resistance to deformation, reduction of accelerations, and absorption of kinetic energy.

593

Hendler, E. 1961 COMPENDIUM OF ABSTRACTS OF PAPERS PRESENTED AT THE SYMPOSIUM ON BIOMECHANICS OF BODY RESTRAINT AND HEAD PROTECTION, June 14-15, 1961. (Office of Naval Research, Bureau of Naval Weapons, and Aircrew Equipment Lab., Naval Air Material Ctr., Philadelphia, Pa.)

ABSTRACT: The objectives of the Symposium were to (1) review and bring up-to-date the theoretical biological knowledge on acceleration injuries, (2) review and bring up-to-date engineering progress in the design of protective devices, and (3) foster the interchange of ideas between the two disciplines with the hope of eventually developing better protection against linear acceleration.

This Compendium contains a copy of the program, those abstracts of papers which were submitted for inclusion herein, and a complete list of attendees.

594

Hendler, Edwin 1961 PROBLEMS RELATED TO HEAD PROTECTION.
(Paper, Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Material Center, Philadelphia, Penn. June 14-15, 1961)

ABSTRACT: In spite of some excellent work elucidating the mechanism of head injury, a great deal more must be known before adequate criteria are available for those who design and evaluate protective helmets. A beginning is being made in establishing educational curricula which are designed to produce scientists trained in biomedical engineering. A review is given of the various devices utilized by the Air Crew Equipment Laboratory over the past 15 years for the evaluation of protective helmets. The importance of incorporating velocity changes equivalent to those occurring in survivable aircraft crashes in helmet test procedures is pointed out. A rebound test tower is described which allows velocity changes up to 80 feet per second to be produced. Other features of this tower also make it more suitable for evaluating protective helmets than more conventional devices.

595

Henley, F. S. 1947 SEAT FAILURE IN AIRCRAFT.
(Letter, from Field Office of The Air Inspector, Hq AAF, Langley Field, Va., to The Air Inspector, The Air Surgeon, AC/AS-1(in turn) 11 July 1947)

596

Henry, J.P., W.G. Clark et al 1944 DETERMINATION OF THE EFFECT OF TIME OF INFLATION ON THE "G" PROTECTION GAINED FROM THE CLARK G-4 SUIT
(National Research Council, Committee on Aviation Medicine, Washington, D.C.)
CAM Rept. No. 398; 1 Dec. 1944

ABSTRACT: A quantitative measure in terms of "g" units has been made in the course of over 700 centrifuge runs of the protection afforded by a Clark G-4 coverall when rapidly inflated (in less than 0.1 sec) by 5 psi at various times relative to the onset of an acceleration cycle of constant pattern. The pressure could be applied any time less than two minutes before the attainment of maximum "g" without involving the loss of more than 20 percent of maximum protection. With the acceleration pattern used, the optimum time of rapid inflation lay between the start of acceleration and the attainment of 3 "g".

597

Henry, J.P. 1945 A METHOD FOR THE ASSESSMENT OF SEAT COMFORT WITH A DESCRIPTION OF SOME RESULTS OBTAINED WITH THE PILOT'S SEAT OF THE DOUGLAS BT2D BOMBER. (Com. Aviat. M. U.S. Res. Counc., Wash.)

598

Henry, J. P., W. G. Clark, P. O. Greeley, and D. R. Drury 1946 NOTES ON OBTAINING COMFORT IN THE PRONE POSITION WHEN FORWARD VISION IS MAINTAINED FOR LONG PERIODS. (National Research Council acting for Committee on Medical Research) CAM Rept. No. 498, 23 Jan. 1946.

599

Henry, J.P., P.J. Maher et al. 1948 PROTECTION AGAINST THE EFFECTS OF NEGATIVE ACCELERATION BY USE OF A PRESSURIZED HELMET (Wright-Patterson AFB, Ohio) MCREXD-689-3

600

Henry, J. P. 1954 FLIGHT ABOVE 50,000 FEET - A PROBLEM IN CONTROL OF THE ENVIRONMENT. Astronautics 1:12

601

Henry, J. P. 1952 PROBLEMS OF ESCAPE DURING FLIGHTS ABOVE 50,000 FEET. In White, S., & O. O. Benson, eds., Physics and Medicine of the Upper Atmosphere. (Albuquerque, N. Mex.: University of N. Mex. Press, 1952) p. 516.

ABSTRACT: Physiological problems arising from cabin pressure failure at high altitudes are discussed. On the basis of present findings, no deleterious effect from cosmic radiation may be expected evenat prolonged flying (25 hours a week) up to altitudes of 60,000 feet. Below this altitude, normal oxygenation can be sustained with the aid of a special helmet and an elastic vest protecting the trunk. Elastic resitance of the vest may be overcome by the use of an intermittent breathing valve. However, even with this device, pressure breathing can only be maintained for a few minutes before unconsciousness sets in because of the pooling of blood in the extended limb veins. The adoption for a full pressure suit would overcome most of the difficulties encountered in the helmet and vast protection method. Unfortunately, however, such suits, at the present stage of development, are extremely cumbersome to wear, and the problem of internal ventilation has not yet been entirely solved.

602

Herbert, D. C. 1960 INJURY REDUCTION BY THE USE OF SAFETY BELTS IN MOTOR CARS. (Snowy Mountains Hydro-Electric Authority, Scientific Service Div. New South Wales, Australia) Aug. 1960, Rept. No. S.M. 1252

603

Hermann, F. von 1952 PRONE FLYING Sailplane and Glider (London), 20(6): 5-6 1952.

ABSTRACT: Reports of various German pilots regarding their personal experience while piloting a plane in the prone position, reveal that in no case major discomfort was encountered. A position between kneeling and lying prone, with the upper part of the body inclined at 30 degrees to the horizontal proved to be the best posture. No fatigue was experienced even after flights lasting 6 to 10 hours. The range of vision was found to be considerably wider than in the sitting position. Only one pilot stated that the location of the head far in front of the center of gravity of the aircraft, involved angular accelerations which were felt unpleasantly in acrobatic flying.

604

Herrick, R.M. 1959 ANIMAL BEHAVIOR EQUIPMENT FOR BIOSATELLITE (U.S. Naval Air Development Canter, Johnsville, Pa.) NADC-MA-LR76 Feb. 17, 1959

ABSTRACT: This report describes equipment that was developed under the AMAL biosatellite project. The equipment, which was designed for use with rats, consists of the following: a prototype rat performance capsule, a restraining vest, electrodes for skin implanation, an instrument that will both deliver an electrical shock to a rat and transmit the rat's electrocardiogram to suitable recording devices.

605

Herrington, L. P., H. Lamport, & E. C. Hoff 1942 ANALYTIC STUDIES OF PRESSURE TRANSMISSION FACTORS IN ANTI-"G" SUITS. (Yale) CAM No. 129; 10 Dec. 1942

ABSTRACT: (a) Directly underneath pressurizing air bladders, the pressure is the same as in the bladder, irrespective of the surface curvature and friction.
(b) At points removed from the air bladder, skin pressure is proportional to the curvature of the surface.
(c) When the air bladder is pressurized through a range of pressures to a peak (acceleration) and returned to the starting point, ascending and descending

pressure curves at skin not beneath bladder are different.
(d) This difference is greater as distance from bladder increases.
(e) The difference is greater in proportion to the curvature of the skin.
(f) The greater the friction between cloth and skin, the greater these discrepancies should become.

This is "Capstan" type of pressure. Analysis of these factors should permit design of suits which would depend less on bladder and more on cloth pressure. Limiting factors would be inequalities of pressure permissable to give proper physiological effect.

606

Herron, R.D. and T.W. Binion, Jr. 1961 TEST OF THE KAMAN KRC-6M ROTOCHUTE AT TRANSONIC SPEEDS. (Arnold Engineering Development Center, Arnold Air Force Station, Tenn.) AEDC TN 61-60, ASTIA AD-256 779, May 1961

ABSTRACT: Force and moment data, govenrning loads, and deployment characteristics were obtained on the Kaman KRC-6M Rotochute. Limited data were obtained to determine the effect of rotor geometry. Data were taken at Mach numbers of 0.5 to 1.5 and altitudes of 39,000 ft for rotor tip velocities to 530 feet per second. The Rotochute was satisfactorily deployed within three seconds under simulated flight conditions. Governing action was positive both during deployment and at steady-state test conditions. (Author)

607

Hersey, I. 1959 SOVIET BIOLOGICAL EXPERIMENTS Astonautics, 4(2):31, 80-81 Feb., 1959.
See also J. Aviation Med., 29:781-84, 1958.

ABSTRACT: A discussion is presented of Russian biological experimentation in space flight since 1949, reported at the Third European Congress of Aviation Medicine, Louvain, Belguim, in September 1958. In the initial phase, animals encapsulated in hermetically sealed cabins were rocket-flown to heights of 100-210 km. and then ejected for return to earth by parachute. In the second phase, the capsule was eliminated, and the animal (in a special high-altitude suit) was separated by catapult from the descending rocket (at heights of 75-85 km. and of 39-46 km.) and parachuted to earth. The third phase of the experiments culminated in animal-rocket launchings to a height of 473 km. No major physiologic changes that could be regarded as resulting from acceleration, catapult launching, or parachute descent from any of the altitudes studied were observed in the animals. A biological experiment which met all the conditions of space flight was realized with the launching of Sputnik II carrying the dog, Laika. During the crucial period between launching and the time the satellite was placed in orbit, the animal was in such a position as to sustain transverse acceleration. Data about the condition and behavior of the animal were successfully transmitted and

received. Included was information on the effects of acceleration upon the frequency of heart contractions; the effects of zero-G conditions and weightlessness; the position of the dog's body in space; changes in the functional state of the nervous system; and changes in blood circulation and breathing. No physiologic manifestations of the effects of cosmic radiation on the animal were discovered.

608

Hertzberg, H. T. E., & J. W. Colgan 1948 A PRONE POSITION BED FOR PILOTS. (USAF AMC Engineering Div., Wright-Patterson AFB, Ohio) Memo Rept. No. MCREXD-695-71D, 25 June 1948. ASTIA ATI 34088.

ABSTRACT: A prone position bed has been described which in the opinion of the pilots testing it provides greater comfort for longer periods of time than present conventional airplane seats. (DACO)

609

Hertzberg, H.T.E. 1949 COMFORT TESTS OF THE PULSATING SEAT CUSHION AND LUMBAR PAD - AND APPENDIXES I-III (Engineering Division, Air Materiel Command, AMC, Wright-Patterson AFB, Dayton, Ohio) April 1949, ATI 70599

ABSTRACT: Twenty-one persons were employed in comfort tests made on the pulsating seat cushion and lumbar pad. The assembly was adjusted for individual comfort. Group I sat on the cushion assembly until fatigue was experienced, at which time cushion was made to pulsate. Pulsations were maintained throughout the test for Group II. The subject was asked periodically during the test the degree of discomfort which he experienced, and, at the conclusion of the test, his evaluation of the cushion. All subjects suffered some discomfort during the test. The cushion was considered by 14 persons to be an improvement over existing accomoda tions. Four thought it was fairly good, but not sufficiently helpful to install in an airplane. The remaining three believed it had no value. It is concluded that the cushion assembly does help to relieve discomfort, but does not eliminate it.

610

Hertzberg, H.T.E. & Gilbert S. Daniels 1949 HAMMOCK FOR THE B-36 AIRPLANE (Aero Medical Laboratory, Headquarters Air Materiel Command, Wright-Patterson Air Force Base, Ohio) Serial No. MCREXD-720-143 October 27, 1949

ABSTRACT: This is a report on a sleeping hammock for intermittent use of the stand-by crew in the forward compartment of the B-36 airplane. Experiments using the hammock were conducted and it was found that it is possible to construct and install two hammocks for the B-36 airplane which will provide comfort while retaining rapid demountability and small bulk when stowed

611

Hertzberg, H.T.E., Daniels, G.S., and Churchill, E. 1954 ANTHROPOMETRY OF FLYING PERSONNEL. (Wright-Patterson AFB, Ohio) WADC- TN Rept. 52-321, September 1954

ABSTRACT: Body size data for 132 measurements of over 4,000 AF flying personnel are presented. Organization of the survey is briefly discussed and the techniques of measurement are illustrated by photographs for the benefit of other anthropologists. Both diametral and surface measurements are included. Dimensions are given in both centimeters and inches. A Glossary and Bibliography are included.

612

Hertzberg, H. T. E., Emanuel, I. and M. Alexander 1956 THE ANTHROPOMETRY OF WORKING POSITIONS. I. A PRELIMINARY STUDY. (Wright Air Development Division, Wright-Patterson AFB, Ohio) Rept. No. WADC TR 54-520, ASTIA AD 39 439, August 1956.

ABSTRACT: Measurements taken on forty adult males to ascertain new body-size data for various representative working positions. The positions include standing, kneeling, crawling, and prone positions.

613

Hertzberg, H.T.E., C.W. Dupertuis and I. Emanuel 1958 STEREOPHOTOGRAMMETRY AS AN ANTHROPOMETRIC TOOL. (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC Technical Report 68-67, ASTIA AD-150964, February 1958

ABSTRACT: This paper briefly reviews previous biological applications of sterophotogrammetry, and outlines with illustrations the present procedures used to draw human body contours at 1/2 inch intervals. It compares the dimensions derived from plotted profiles with those taken by hand on the subjects themselves. It discusses the utility of stero data for special anthropometric purposes, and mentions further applications for other biological sciences

614

Hertzberg, H.T. 1959 THE ANTHROPOMETRIC SURVEY: ITS MILITARY AND COMMERCIAL POTENTIALS. (Committee on Anthropometry, AGARD, NATO.) November 1959

ABSTRACT: The design range of a population cannot be adequately known without sound anthropometric data on that population. Design from anything less becomes guesswork. This is the major reason for taking a large number of body dimensions in an anthropometric survey; the resulting knowledge of overall ' body proportions, both standing and sitting, makes it possible to design general items for either type of endproduct, thus greatly increasing the value of the survey.

615

Hertzberg, H. T. E. 1960 DYNAMIC ANTHROPOMETRY OF WORKING POSITIONS. (Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson AFB, Ohio) Proj. 7222; ASD TR 61-90; ASTIA AD-263 715
See also Reprint Human Factors Pp. 147-155, Aug. 1960

ABSTRACT: This paper provides a review of the principles and procedures of workspace design for engineers. It emphasizes that human body size, anthropometry, and muscle force capability, biomechanics, are both essential for the efficient sizing of equipment. The proper method of workspace design, the 'design limits concept', is described and the fallacy of the 'average man' concept is demonstrated General methods of gathering body size, strength data are outlined, and major information sources noted. The author's ideas on human muscle strength in the weightless state are included. (AUTHOR)

616

Hertzberg, H. T. E. 1961 NYLON NET SEAT FOR A MODIFIED RB-57 AIRCRAFT. (USAF Behavioral Sciences Lab., Wright-Patterson AFB, Ohio) Proj. 7222, Task 71749, ASD TR 61 206, Dec. 1961.

ABSTRACT: "A light-weight, adjustable, easily demountable net seat for persons who must operate in cramped quarters is described. Tests lasting for more than a year in a modified RB-57 have shown the seat to be fully satisfactory. Design drawings and photographs of the method of installation are included." (Tufts)

617

Hess, J. L. 1956 THE APPROXIMATION OF THE RESPONSE OF THE HUMAN TORSO TO LARGE RAPIDLY APPLIED UPWARD ACCELERATIONS BY THAT OF AN ELASTIC ROD AND COMPARISON WITH EJECTION SEAT DATA. (Douglas Aircraft Co., Inc., El Segundo, Calif.) Rept. No. ES 26472; ASTIA AD-125 558; 26 Nov. 1956

ABSTRACT: It has been noticed that when the human body is subjected to very rapidly applied accelerations, the accelerations at points of the body can be considerably larger than the maximum value of the applied acceleration. This paper considers the case when the acceleration is applied along the line of the spine from seat to head as in ejection from aircraft and attempts to approximate the motion of the human torso under these conditions by that of an idealized, one-dimensional, visco-elastic structure. The simple case of a homogeneous elastic rod is discussed in detail and its predictions compared with ejection seat data. The extensions to more complicated visco-elastic structures are discussed. It is concluded that the elastic rod is a fairly good first approximation, but that it is not sufficiently exact to be used in making quantitative predictions. It is also concluded that more complicate structures will require more and better data for their evaluation. (AUTHOR)

618

Hessberg, R. R., Jr. 1961 ESCAPE FROM HIGH PERFORMANCE AIRCRAFT. (In Gauer, O. H. and G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine) (Boston: Little, Brown, and Co., 1961). Pp. 160-164.

619

Hetharington, A.W. RECENT STUDIES OF HUMAN REQUIREMENTS IN HYPERSONIC ESCAPE. (Directorate of Life Sciences Hdq., Air Research and Development Command, Andrews AFB, Washington, D.C.)

620

Hetzar, W. 1939 DIE TRAUMATISCHEN SCHÄDIGUNGEN DER BANDSCHEIBENNAHEN WIRBELKÖRPERABSCHNITTE (The Traumatic Injuries of the Intervertebral Discs of the Vertebra Body Section)
Deutsche Zeitschrift für Chirurgie (Berlin) 252-396

621

Heymans, R.J. & R.M. Stanley 1956 CREW SURVIVAL IN THE JET AGE.
S.A.E. Preprint no. 750 9-12-April 1956

ABSTRACT: Mere escape from a disabled aircraft does not necessarily quarantee survival. Of the many factors influencing crew survival in military aircraft, this discussion will limit itself to the problem of survival during the following abandonment of distressed jet aircraft. The assumption is made, in keeping with this nation*s tradition, that the life of the crew is worth saving, irrespective of cost.
The problem of survival following abandonment of the aircraft is two-fold. First, there is the problem of physical escape; secondly, there is the problem of prolonging life until complete rescue can be effected. The problems of modern war are global in nature, and in many instances our problem of survival following successful escape is as great or greater than the escape itself. To look at the problem of crew escape without concerning ourselves with the chances of ultimate survival would manifestly be a narrow viewpoint.
In each of the following fields the designer of the escape device can materially influence the crewman's chances of survival and restoration to useful duty.
A. Incapacitation
B. Separation from aircraft
C. Air Blast effects: 1) physical injury, 2) loss of equipment
D. Linear and angular accelerations
E. Avoidance of the Aircraft. (Tail, Landing Gear, etc.)
F. Oxygen and pressure supply
G. Avoidance of enemy action
H. Parachute opening
I. Impact with earth's surface
J. Drowning
K. Exposure, Hunger, Thirst
L. Communications

622

Hicks, W. E. 1951 SAFER SEATING
Aeronautics 24(4):36-37, May 1951
also, J. Aviation Med. 23(1):94.

ABSTRACT: In a typical severe plane crash, complete crumpling of the fuselage extends roughly halfway back along the inhabited portion. The only occupants who can escape without more than minor injuries are those in the intact part of the fuselage. If they are stowed immovably, the only question is if they can endure the shock of deceleration. Properly supported, they can stand brief deceleration up to 40 g, the force achieved by a moderate-sized airliner moving 205 mph at time of impact. The fore part of the fuselage cushions the shock to the rear part, so that occupants (if adequately supported) have a good chance of survival.

In a crash a person held by a lap strap simply folds up like a jack-knife--if nothing is in the way. From a sample of men and women passengers it was computed that for complete haed clearance of the seat in front of the passenger, 40" separation between seats is necessary. The path of the head in swinging forward and down is not a circular arc about the hip joints but a spiral curling inwards, due to flexure of the spine. At the same time, as the trunk swings forward there is a powerful force tending to straighten it. It would be wise to allow another inch for this and for any forward sliding of the body in spite of the lap strap. No allowance has been made for the upward swing of the legs (about 12" allowance needed). At least, there should be no sharp bottom edge of the seat-back.

With a backward-facing seat, the lap strap is not essential but would help prevent side-slipping in a "cartwheel" crash. The headrest should be adequately padded. In a 40 g crash, the headrest must yield at least as great a distance as the initial separation between it and the head (60 cm. if the passenger is leaning well forward). A carefully designed seat could be made to give this much but would weigh much more than any present-day seat. To realize its full worth, the backward-facing seat requires some simple shoulder or body harness; with it, there need be only a few inches of give in the headrest. Nothing elaborate or of great strength is necessary.

Air line operators have fought shy of backward-facing seats because they fear public disapproval. Al evidence points, however, to public indifference on the subject. And they are hardly likely to be frightened by anything that will increase the probability of survival in case of an accident. (Journal of Aviation Medicine 23(1):94, Feb. 1952)

623

Hill, G. T. R. 1952 ADVANCES IN AIRCRAFT STRUCTURAL DESIGN. (Presented at The Third Anglo-American Aeronautical Conf., Sept. 1951) (London: The Royal Aeronautical Society, 1952)

624

Hill, J.H. 1957 EVALUATION OF THE TORSO-HEAD RESTRAINT SYSTEM AND THE INTEGRATED HARNESS RESTRAINT SYSTEM UNDER CONDITIONS OF ACCELERATION (U.S. Naval Air Dev. Ctr., Johnsville, Pa.) Letter Rept. TED-ADC-AE-5209; Serial 2621; 2 April 1959

625

Hill, J. H. and J. L. Brown 1958 COMPARATIVE EVALUATION OF A STANDARD FACE CURTAIN AND AN EXPERIMENTAL D-RING LOCATED ON THE SEAT FRONT AS MODES OF ACTUATING EJECTION DURING EXPOSURE TO ACCELERATION: LETTER REPORT CONCERNING
(Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.)
Proj. TED ADC AE-5205 Rept. no. MA-3-3585 5 May 1958 ASTIA AD 257 519

ABSTRACT: A comparative evaluation is presented of a standard face curtain and an experimental D-ring located on the seat front as modes of actuating ejection during exposure to acceleration. The results are presented graphically in two forms. The time measures for both the successful and the unsuccessful attempts to eject are considered together in one distribution. The harmonic mean reaction time (the time required to initiate the ejection procedure) and the harmonic mean action time (the time required to perform the ejection procedure) are presented for the two ejection controls under each orientation as a function of the G level. The action times, however, are consistently shorter for the D-ring for all the orientations of acceleration. It may be concluded that for ease of access during exposure to sustained accelerations in the orientations which were investigated, an ejection control located on the front of the ejection seat is superior to the standard face curtain. (ASTIA)

626

Hill, J.H. and J.L. Brown 1958 A COMPARATIVE EVALUATION OF TWO EJECTION CONTROLS: THE STANDARD FACE CURTAIN VS. A "D-RING" LOCATED ON THE FRONT OF THE EJECTION SEAT Jour. Aviation Med., 29(3):238, March 1958

ABSTRACT: The ability of 5 subjects to perform the ejection procedure with either the face curtain or an experimental D-ring ejection control was tested in a cockpit mockup mounted on a human centrifuge. The ejection procedure was performed during positive accelerations of up to 6 g, transverse back-to-chest accelerations to 5 g, and transverse chest-to-back accelerations to 6 g. The results showed that an ejection control located on the front of the ejection seat is superior to the standard face curtain.

627

Hill, J.H. & M.G. Webb 1959 PILOT'S ABILITY TO ACTUATE EJECTION CONTROLS; FINAL REPORT CONCERNING
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR 75 Feb. 5, 1959 ASTIA AD 257 520

ABSTRACT: The purpose of this study was first to determine the effect of acceleration on a pilot's ability to actuate the ejection controls of two makes of

ejection seats, the McDonnell-Stanley seat equipped with an experimental torso-head restraint system and the Martin-Baker G-5 seat with the integrated harness restraint system. It was also an objective of the study to determine the degree to which the Mark V exposure flight suit and Mark IV (Goodrich) and the AX-83 (Arrowhead) lightweight full pressure flight suit impeded a pilot in the actuation of the ejection controls whem compared to his performance while wearing the summer flight suit. The results indicate that a pilot, under conditions of acceleration, may not be able to reach either the face curtain or the D-ring. Any encumberances such as an exposure suit or a full pressure suit will decrease the probability of his successful ejection. Failure of the canopy to jettison upon operation of ejection control and the subsequent requirement for use of the emergency actuation control will further decrease this probability if he is wearing an inflated full pressure suit.

628

Hill, J.H. 1959 EVALUATION OF THE TORSO-HEAD RESTRAINT SYSTEM AND THE INTEGRATED HARNESS RESTRAINT SYSTEM UNDER CONDITIONS OF ACCELERATION; final letter report concerning (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR80, April 2, 1959. ASTIA AD 257 375.

ABSTRACT: A model F4H-1 aircraft ejection seat equipped with the torso-head restraint system was installed on the 50-foot centrifuge and an investigation was carried out to determine its ability to restrain the pilot under conditions of sustained and fluctuating patterns of acceleration to simulate emergency conditions. For sustained acceleration, the play in the head restraint system would be excessive in in-flight emergency with a lateral acceleration of 4 G. For the fluctuating acceleration runs made, the restraint was adequate but the acceleration levels were below in-flight emergency levels. The Martin-Baker G-5 seat integrated harness restraint system was tested in a similar manner except that no fluctuating patterns were used. It proved to be adequate for the positive and transverse chest-to-back runs made but totally inadequate for transverse back-to-chest and lateral runs made.

629

Hill, J.H. & M.G. Webb 1959 TORSO-HEAD RESTRAINT SYSTEM FOR THE MODEL F4H-1 AIRPLANE; final report concerning
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR77 Feb. 20, 1959 ASTIA AD 257 374

ABSTRACT: A study was conducted to evaluate an experimental torso-head restraint system to be used in the flight tests of the Model F4H-1 airplane. This study was concerned with the adequacy of the restraint offered by the system with

respect to protection of the pilot during exposure to acceleration. Three specific acceleration patterns representing extreme conditions which might occur during the course of the flight tests were investigated. Also determined in the course of the study was the ability of subjects to operate the stick and rudder pedals, the aircraft drogue chute, and both ejection controls under these conditions of acceleration while using the torso-head restraint. Results indicated that, to the degree that the conditions of flight of the F4H-1 were simulated in this study, the pilot will be adequately restrained by this seat and restraint system and will be able to operate the stick control, rudder pedals, drogue chute control, and the ejection controls under actual flight conditions.

630

Hitchcock, F. A. 1947 PHYSIOLOGY OF SAFETY BELTS AND HARNESSES (Ohio State University) 9 Oct. 1947

631

Hodell, C.K. & A.H. Rosner 1957 EJECTION SEAT TESTS CONDUCTED ON THE 10,000 FOOT AERODYNAMIC RESEARCH TRACK AT EDWARDS AIR FORCE BASE (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 52 63; Nov. 1957. ASTIA AD 142 103

ABSTRACT: Eight ejection seat tests were conducted on the 10,000 ft. track from Dec. 1949 to July 1950 to analyze the resultant trajectories of the ejection seat and the acceleration forces imposed upon a dummy subject. The cockpit mockup was designed to simulate the forward cockpit opening of the XF-89 airplane with canopy removed. Instrumentation in the test carriage consisted of a complete telemetering recording system which transmitted intelligence via a mobile transmitter to receiving and recording equipment at a fixed station and a carriage motion recording system from which carriage velocity was obtained. Results indicate that ejection accelerations were not accurately determined because acceleration rocket burnout occurred at or near station of seat ejection, and the test vehicle porpoised because of clearance between vehicle slippers and railhead. The elastic structure of ejection seat and test vehicle, and stretching of harness assembly which held dummy in ejection seat also prevented accurate measurements. The deceleration forces imposed on the vehicle and seat were of such high magnitudes that in-flight seat trajectories could not be simulated. The seat should be ejected in a state of zero acceleration.

632

Hodgson, V.R., L.M. Patrick, and H.R. Lissner 1963 EXPERIMENTAL RESPONSE OF THE SEATED HUMAN CADAVER TO ACCELERATION AND JERK WITH AND WITHOUT SEAT CUSHIONS. (Biomechanics Research Center, Wayne State University) June 1963

ABSTRACT: This paper describes tests conducted on three cadavers in the seated position and accelerated in the caudocephalid direction, with 18 G jerk acceleration and jerk amplitudes to 2600 G's per second. Spring seats were used to observe effect of cushions. Experiments were conducted on a 120' vertical accelerator mounted in an elevator shaft. Strain gages were mounted on various vertebrae and accelerometers attached to the seat, and on crest of ilium, sternum and head. Each cadaver was restrained with head, arm, leg, shoulder and seat belts. The objective was to determine the effect of a jerk and cushion noticed on the response of a cadaver at various levels of acceleration, on the response of the human cadaver as a spring mass system, and on strain in the vertebral column. A number of conclusions were made; among these that no cushion is better than any cushion; jerk causes overshoot of strain or acceleration of increase almost linearly up to a maximum value dependent upon the mean acceleration, the degree of overshoot of acceleration on the body increases in seventy with distance from the seat, and this overshoot is most severe and critical in some locations in the posterior parts of the vertebrae due to process interference during caudocephalid loading of the vertebral column. (CARI)

633

Hoerner, S.F., H.L. Anderson, O.J. Ritland 1949 TRAJECTORY OF EJECTION SEAT- and APPENDIXES I-III (MEMORANDUM REPORT) (Air Materiel Command, Engineering Div., Dayton, Ohio) Oct. 1949, ATI 72212

ABSTRACT: A study was made to determine the causes for the discrepancy between the seat trajectories observed in flight tests and those predicted by published methods. An examination of two published methods indicate that the results agree essentially, but that neither takes into account the aerodynamic lift of the seat. The theory is extended to include the effect of this lift. Using the TF-83 fighter, a number of secondary factors were investigated as to their effect on the clearance between the seat and the airplane. The variation of clearance against speed, angle of flight path, altitude, angle of the ejection rails, weight of the seat, catapult speed, drag coefficient, lift coefficient and size of the airplane were considered. The discrepancy between the TF-80 flight tests and simple theory can be attributed in a large part to the neglect of the lift force acting on the seat.

634

Hoffman, D.H. 1961 TRI-AXIAL AIRLINE SEAT LIMITS ACCELERATION
Aviation Week July 24, 1961. Pp. 95-100.

ABSTRACT: New airline transport seat that responds like a shock absorber to ground impacts has been designed to protect passengers from injury or death in survivable accidents. The "tri-axial acceleration seat" uses controlled

movement to dampen the peak g forces imposed on a passenger during sudden stops. The rearward facing seat, contoured to furnish protection on three sides, also would distribute impact g forces over a passenger's entire body, sparing skeletal joints and vital organs from unendurable pressures.

To obtain such resistance, the new seat would: (1) Automatically place reclining passengers in a more upright position to boost their acceleration tolerance. (2) Move with respect to the fuselage so as to absorb peak accelerations. (3) Consist of a metal shell foundation suspended from the cabin ceiling and attached to the cabin floor.

635

Hoffman, E. 1948 TRIGGER MECHANISM - PILOT'S JETTISON SEAT - P-84 - LOAD TEST (Republic Aviation Corporation Farmingdale, New York, Engineering Research Section)ERMR-775, 20 July 1948, ASTIA ATI No. 45176

ABSTRACT: A series of load tests were conducted to determine the handle force required to operate the jettison seat catapult trigger in a F-84 fighter. The mechanisms tests were mostly installed on a production seat modified in the Engineering Research Laboratory. It was found that the cable installation in one of the installations was unsatisfactory because of the excessive handle loads required in operation. On the other hand, the installations SK-30-8434 and 8431 were satisfactory in operation. All linkage mechanisms tests yielded satisfactory results. A curve of handle force vs trigger load for the seat trigger mechanism is plotted, and a photo shows an alternate cable routing, which proved unsatisfactory

636

Hoffmann, E. 1948 SEAT-PILOT'S JETTISON F-84 EJECTION TESTS (Republic Aviation Corp., Farmingdale, N. Y.) July 1948, ATI 45303.

ABSTRACT: Operational tests were made on a modified pilot's jettison seat assembly ejected from an F-84 fighter by means of a T4E1 catapult. Upon ejection, the seat was propelled upward and, when clear of its tracks and the extended catapult, began to rotate forward about its center of gravity. While rotating rapidly, the seat rose approximately 35-ft in the air and passed over the tail. The seat landed approximately 10-ft behind, and in line with the tail. Rotation of the seat was caused by the moment arm between the CG of the loaded seat and the point of attachment of the catapult to the seat. No apparent structual damage was incurred by either the seat or the cockpit. Motion pictures show that the seat suffered no interference as it left the airplane. It is recommended that action be taken to reduce the excessive load required to operate the pilot's release handle.

637

Holcomb, G.A. 1959 THE APPLICATION OF BASIC HUMAN ENGINEERING PRINCIPLES TO A COCKPIT DESIGN. (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: Basic human engineering data have been available many years which would have enabled the designer-engineer to achieve marked improvement in cockpit layout and composition. A fundamental requirement is the placement of a cockpit design control in the hands of one authority, trained in basic human engineering practices. Engineering personnel are required of this authority in order to maintain these standards in terms of practical mechanical consideration. A second requirement is relaxation of dated specification which may lag from 3 to 5 years behind the needs of that particular weapon system. The third requirement is the ability to establish cockpit design under the Weapons System concept. Engineering and product design personnel, with no formal training in experimental or engineering psychology, made radical departures from existing cockpit design practices, in the design of the A3J cockpit. This was accomplished essentially using previously qualified components and making full use of existing data compiled by recognized experimentalists. Design was then given to the engineering psychologist for refinement. Final alterations in control placement resulted from the continuing application of task and link analysis techniques. Design was proven for full pressure suit operation by live evaluation. Slides and motion pictures of the new cockpit will be shown. (J. Aviation Med. 30(3):188, March 1959)

638

Holcomb, G. A. 1960 THE DEVELOPMENT OF AN AUTO-ADJUSTING AND POSITIONING SINGLE DISCONNECT UPPER TORSO RESTRAINT HARNESS FOR THE B-58 ESCAPE CAPSULE (Paper, 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960)

ABSTRACT: The requirements for harnessing air crewmen in long range bomber aircraft utilizing escape capsules differ greatly from the requirements of shorter range aircraft using open ejection seats. In long range aircraft, the harness must not introduce excessive fatigue and must not require excessive time to adjust and don. Escape capsules must have superior restraint capabilities since there is no wind blast to assist in distributing the deceleration load on the torso. All of the upper torso deceleration must be restrained by the harness. The harness is engaged by a single connect point. All sizes airmen between 5 percentile and 95 percentile may use the same harness without adjustment. This prevents misadjustment of the harness, which might cause localized loading on torso areas incapable of withstanding these loads. When used in conjunction with the inertia reel, to protect the airman from sudden deceleration of the aircraft, it automatically positions itself on the upper torso. When used as a torso positioning device for escape in conjunction with the powered portion of the inertia

reel it also automatically positions itself on the upper torso. The harness provides superior lateral restraint and together with the lap belt provides approximately 35 per cent more bearing area on the torso than present operational harnesses. Approximately seventy-five operational Air Force crewmen have been classified as to anthropometric types and have demonstrated emergency procedures wearing the harness.

639

Hooton, E.A. 1945 A SURVEY IN SEATING.
(Boston: Heywood-Wakefield Co., Harvard Univ., 1945)
See also USAF Tech. Report 5501.

ABSTRACT: Includes three sections: Survey of body measurements relative to dimensions of seats; notes on variations of the curves of the spine in standing and sitting; and a survey on the curves of the spine in the sitting position. Eight measurements were taken on each of 3,867 (1908 females, 1959 males) between ages 17 and 89, stated to be representative of the U.S. population. A description of the measuring chair, the contour sand mold chair, and recommended seating dimensions are given.

640

Holcomb, Galen A. 1961 B-58 CAPSULE DROP TESTS TO DETERMINE LOAD FACTORS PRODUCED ON VARIOUS SOILS
(Stanley Aviat.Corp., Denver, Colorado) Rept. No. 1318; June 1961.

641

Holcomb, G.A. 1961 INVESTIGATIONS TO DETERMINE HUMAN TOLERANCE TO ABRUPT ACCELERATION IN CAPSULE SYSTEMS
Paper, 32nd Annual Meeting, Aerospace Medical Association, 24-27 April 1961, Chicago, Ill.

ABSTRACT: Landing impact effects are one of the major physiological problems of capsule systems in general, whether they by atmospheric or space vehicles. Published human tolerance allowables are basically unuseable when evaluating the accelerations produced by impact with the earth's surface, since the accelerations measured on a human subject, in most cases, are of shorter duration and higher rates-of-onset than the allowables describe. Approximately 150 human experiments were undertaken to determine tolerability. Subjects were dropped on concrete, dirt and sand from heights ranging from 9'9" to 12'0" at drift velocities up to 23 mph, while strapped in a production type escape capsule. Accelerations up to 83 G's were recorded on the subject's sternum.
Aerospace Medicine 32(3): 234-235, March 1961)

642

Holcomb, G.A. 1962 B-58 CAPSULE DROP TESTS FROM STANLEY MONORAIL (Stanley Aviation Corp., Denver, Colo.) No. 1376; 10 May 1962.

643

Holcomb, G., et al. 1962 CAPSULE ESCAPE AND SURVIVAL SYSTEMS. (Paper, NATO Hqs., AGARD 12 General Assembly, Paris, France, 11-12 July 1962)

644

Holmoqvist, N.B. 1959 CONSTRUCTION PRINCIPLES FOR EJECTION SEATS Medd. Flyg Navalmed Namnd 8(2):7-12

645

Homans, J. 1954 THROMBOSIS OF DEEP LEG VEINS DUE TO PROLONGED SITTING. New Eng. J. Med. 250:148

646

Hopkins, Charles O., Donald K. Bauerschmidt, M.J. Anderson 1960 DISPLAY AND CONTROL REQUIREMENTS FOR MANNED SPACE FLIGHT
WADD TR 60-197 Contract No. AF 33(616)-6033 ASTIA AD 242 572

ABSTRACT: A study was made of the display and control requirements for a manned orbital vehicle of the "space-ferry" type. The mission included ground launch, rendezvous with a satellite station already in orbit, re-entry into the earth's atmosphere, and landing at a selected base on earth. Display and control requirements were determined for vehicle attitude control while in orbit, orbital plane change, minimum energy transfer between circular orbits at different altitudes, and de-orbit for re-entry into the earth's atmosphere. Displays, controls, and control panels were designed to meet these requirements. Representations of these displays and controls were constructed and incorporated into full-scale mockups of cockpits for two alternate display and control systems

647

Horowitz, M. W., and C. F. Wells 1958 ANALYSIS OF COCKPIT MOTIONS NEEDED FOR OPERATIONAL FLIGHT TRAINERS (Educational Research Corporation, Port Washington, New York, 1958) Report No. 20-OS-51.

648

Hovgard, P.E. 1944 COMMENT ON BIOMECHANICS - A NEW APPROACH TO AIRPLANE SAFETY. Mech. Engng. 66:613-614.

ABSTRACT: It would be a fallacy not to recognize the importance of this subject. Flying requires absolute coordination of mind and body, and aircraft must be designed to protect this coordination. The airplanes are built to withstand stresses and strains; the human body is not so designed and must be protected in every possible way.

The author suggests changing passenger seating so that the person faces the tail of the plane. This would protect him in case of sudden jolts. Moreover, it may be that the trouble with the poorly designed instrument panels now in use is that the engineer has failed to recognize the normal sight paths. In everything it is necessary to recognize the limitations of the human figure and to compensate for them.

649

Howard, J.R. 1949 ANALYSIS OF THE FREE-FLIGHT CHARACTERISTICS OF THE F-86A (Fighter) Pilot and Pilot's Seat Combination (North American Aviation, Inc., Los Angeles, Calif.) NA-49-1158, Dec. 1949, ATI 73 631

ABSTRACT: The stability of the pilot and pilot's seat combination after ejection from the F-86A fighter was studied. The data used were obtained from low-speed wind tunnel force tests of a 1/2-Scale model of the pilot and pilot's seat combination. Results indicate that with a headrest drag-flap installation the pilot-seat combination oscillates about a position with the pilot's back parallel to the relative wind at all speeds. Without the headrest flaps, the seat and the pilot tumbled forward at about 2 revolutions per sec at all speeds up to approx Mach No. 0.08, after which the seat oscillates in a similar manner to that of the flapped seat configuration. Adequate clearance of the vertical tail was obtained for all conditions calculated.

650

Haight, E.C. 1949 STRUCTURAL PROOF TEST OF SEAT, GAS TANK AND BATTERY INSTALLATIONS. (Bell Aircraft Corp., Buffalo, N.Y.) Rept. no. 47-929-167 ASTIA ATI 100 359, 17 February 1949

ABSTRACT: This test was conducted to aid in the C.A.A. certification of the Model 47D-1 helicopter. The helicopter was lifted clear of the floor and leveled for base deflection readings. An increment of load was applied and the helicopter releveled for deflection readings. Balancing was obtained by adding sand bags

at the extreme end of the tail boom. Deflection readings were taken after each increment of loading. Limit load was removed to obtain set readings. Ultimate load was then applied. After the test, it was concluded that the Model 47D-1 seat, gas tank and battery rack installations carried the ultimate design loads satisfactorily. The fuselage carried the loads imposed on it by the seat, gas tank, and battery satisfactorily. The seat installation and fuselage was also structurally satisfactory for passenger weights of 200 pounds each.

651

Hubach, J.C. 1932 GEVAREN VAN HET VLIEGEN MET SNELLE VLIEGTUIGEN (Dangers of Flying in Fast Airplanes from Medical Viewpoint)
Geneesk. Tijdschr. Ned. -Ind. (Jakarta) 72: 98-105

652

Huettl, G. 1961 COCKPIT RETENTION AND PARACHUTE SUSPENSION GARMENT (Dept. of Navy, Bureau of Naval Weapons, Airborne Equipment Div.) Contract NOw 60-0053, Final Engr. Rept., Oct 27, 1961 ASTIA AD 269 824

ABSTRACT: Cockpit retnetion and parachute suspension flight clothing which can distribute high acceleration forces over large areas of the body was studied to reduce injuries occurring in present day high performance aircraft. It was found that a flexible, inelastic nylon-netting garment could be utilized in distributing acceleration loads over the body torso. By crossing the fibers of a material over each other and biasing them at 45 degrees to the external load, a Chinese finger grip containment action can be developed. This containment action (axial compression load) is applied when acceleration forces are applied to the cockpit seat or the risers. Several restraint garments were constructed for evaluation. Hip and shoulder restraint straps were integrated into the netting pattern for attachment to the risers and cockpit seat. The final garment had a cover and liner for additional comfort and ease of donning and doffing. (Author)

653

Hull, W.E. and G.C. Knowlton 1945 INDOCTRINATION OF 14TH AIR FORCE PERSONNEL IN G-TYPE EQUIPMENT. (War Dept., Air Forces) TSELA-3-696-511, 12 April 1945

654

Hull, Wayland E. & Victor Buillemin, Jr. 1946 EJECTION SEAT DISPLACEMENT TIMER (Air Materiel Command, Engineering Div., Dayton, Ohio) Serial No. TSEAA-695-66B ASTIA ATI 119 945

ABSTRACT: A device has been designed and constructed by the Aero Medical Laboratory of the Engineering Division which is used to record photographically the data necessary to calculate velocity of ejection of the experimental ejection seat. This device has the following characteristics: (a) A photographic record is made of the linear travel of the seat by the method described in Appendix I. (b) A time scale is recorded alongside the displacement record. (c) Velocity of seat travel is determined from these records, i.e., distance of seat travel per unit time. (d) The system is capable of determining velocities with an accuracy of ± two per cent to 100 feet per second. The device was found to be simple, rugged, and adequate for the purpose.

655

Hunsicker, Paul A. 1955 ARM STRENGTH AT SELECTED DEGREES OF ELBOW FLEXION (Aero Medical Laboratory) Contract No. AF 18(600)-43 Project No. 7214 WADC TR 54-548 ASTIA AD 81792

ABSTRACT: A selected summary of the strength testing literature forms the first part of this study. This is followed by a listing of the modifications that had to be made on the Kinematic Muscle Study machine as a result of exploratory testing. The major portion of the investigation is concerned with the results of testing 55 young men on 60 arm strength tests in the sitting position and 60 in the prone position. Percentile tables and figures depicting arm strength in relation to degrees of elbow flexion are included. Recommendations for further use of the Kinematic Muscle Study machine are offered.

656

Hunsicker, Paul A. 1957 A STUDY OF MUSCLE FORCES AND FATIGUE (Wright Air Development Center, Wright-Patterson Air Force Base, Ohio) WADC Technical Report 57-586 Contract No. AF 33(616)-3461 Project 7214; Task 71727 December 1957 ASTIA AD 131 087

ABSTRACT: The first phase of the research deals with the strength test results taken on 30 subjects covering 120 strength tests. The subjects were seated in a simulated pilot-seat and six movements were tested. The results are presented in percentile tables and graphic form. The next part of the study involves data on 25 subjects who were tested to determine the amount of strength possible in wrist pronation and wrist supination. The final phase of the research gives information on the strength-decrement over a 42-hour period in which the subjects were tested hourly. Several recommendations are offered.

657

Hunter, H. N. 1947 EVALUATION OF MARTIN-BAKER AND AAF T-2 PERSONNEL CATAPULTS (U. S. Naval Air Development Center, Johnsville, Pa.) Rept. TED NAM 256005, pt. 2.

658

Hunter, H.N. & D.T. Watts 1947 THE EFFECT OF TEMPERATURE ON THE PERFORMANCE OF THE MARTIN-BAKER MULTIPLE CHARGE EJECTOR SEAT CATAPULT. (Naval Air Exp. Station) Rept. No. TED NAM 256005, pt. 3, 14 March 1947. ASTIA ATI 43077.

ABSTRACT: The effect of temperature on the performance of the Martin-Baker multiple charge ejection seat catapult was investigated. The Martin-Baker aircraft charges were fired on the ground on a test rig at temperatures of -60 to +40°C. Decreasing ejection velocity must be considered in selecting a catapult for a given airplane. Performance of the charges at -60 to +40 C is considered satisfactory from a physiological standpoint.

659

Hunter, H.N. & M. Weiss 1953 PILOT'S ABILITY TO SIMULATE AN EMERGENCY ESCAPE WITH VARIOUS TYPES OF EJECTION SEATS WHILE SUBJECTED TO A FLUCTUATING ACCELERATION (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR1, Nov. 3, 1953 Proj. No. TED ADC AE 6303. ASTIA AD 54 281

ABSTRACT: To determine some of the difficulties a pilot experiences in operating an ejection seat under emergency conditions, three types of ejection seats, i.e., Air Force "arm rest" upward, Air Force "D-Ring" downward, and Navy "face curtain" upward were installed, respectively, in the AMAL centrifuge and tests were conducted wherein pilots were requested to execute ejection procedures under fluctuating G conditions. To simulate an aircraft in an uncontrolled condition, positive G was varied from 1.5 to 6.5 G at a rate of 8 G per second while the subject pitched and/or rolled through a maximum angle of 36°. One of the major faults found in all seats was the difficulty subjects had in retracting their feet into the stirrups. Other problems encountered were the failure to properly operate the face curtain, fouling of the arm rest, and the straining to reach the "D-Ring." Factors affecting the efficient use of the equipment were the clothing worn and training and practice effects.

660

Hunter, H. 1954 EVALUATION OF ANTI-BLACKOUT SUIT WITH PARACHUTE/SAFETY HARNESS AS INTEGRAL PART; REPORT OF (Naval Air Development Ctr., Johnsville, Pa.) Letter Rept. NADC-MA ser. 2262 of 9 Mar. 1954; TED ADC AE 5202

661

Hunter, H.N. & H.S. Weiss 1954 PILOT'S ABILITY TO ACTUATE F9F-6 EJECTION SEAT CONTROLS UNDER FLUCTUATING G CONDITIONS
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR3 Sept. 16, 1954 ASTIA AD 70 757

ABSTRACT: The pilots were requested to execute the maneuvers required in an F9F-6 ejection sequence upon receipt of a signal during an acceleration stress pattern. All parts of the seat that were involved with the ejection sequence and the pre-ejection lever were fitted with microswitches and wired to recoders so that the time required to complete all maneuvers could be determined. The acceleration pattern fluctuated the positive G from 1.5 to 7.0 at 5 G/sec while the subject pitched or rolled to a maximum of 70°. The maximum acceleration rate of change of roll was 5.8 rad/sec^2 and the maximum acceleration rate of change of pitch was 4.5 rad/sec^2. The average time for each maneuver under conditions which included all test conditions of an emergency escape were: 3.22 sec-feet retraction; 1.77 sec pre-ejection movement, and 1.71 sec face curtain actuation.

662

Hunter, H.N. 1955 ANTI-BLACKOUT EQUIPMENT VALVES AND FILTERS; EVALUATION OF ARO EQUIPMENT CO. USAF TYPE M-8 ANTI-G VALVE
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR7 Feb. 23, 1955 CONFIDENTIAL

663

Hunter, H. 1955 ANTI-BLACKOUT EQUIPMENT, COMPARATIVE TEST AND EVALUATION. (Naval Air Development Ctr., Johnsville, Pa.) Project TED ADC AE-5201.1; 31 Dec. 1955

ABSTRACT: Both types of suits give the same G protection. However, the Air Force suit is made of two ply cotton and one ply nylon while the Navy suit is made only of nylon. Even though the Air Force uses a fire retardent to treat the cotton, the cotton nylon combination is more flammable than nylon alone. Due to the additional fire hazards associated with carrier operations, it was recommended by this laboratory that the Navy continue the use of nylon and not change to a cotton nylon combination.

664

Hunter, H. 1955 CONVENTIONAL AND NEW TYPE FLIGHT RESTRAINT EQUIPMENT, EVALUATION OF (Naval Air Development Ctr., Johnsville, Pa.) Project TED ADC AE-6301; 31 Dec. 1955

ABSTRACT: The limitation of restraint equipment in present use was determined during "Jostle Runs" on the human centrifuge, Project TED ADC AE 6303.1. Pilots were exposed to fluctuating G forces of from 1.5 to 7 G at rates of changes of G up to 8 G/sec. while rolling and pitching 72 degrees. This simulated uncontrolled flight resulted in jostling so severe that bodily injury was inflicted and thus exposures above this level appeared to be too hazardous to conduct with the present lap belt and shoulder harness restraint

665

Hunter, H.N. 1955 DEFECTIVE ANTI-BLACKOUT EQUIPMENT; FINAL REPORT ON INVESTIGATION AND TEST OF.
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR6 Feb. 18, 1955

ABSTRACT: A malfunction of the David Clark model JP-9 anti-blackout valve, serial 20441, was reported and it was examined at AMAL. The valve was disassembled at some time between its removal from the aircraft and its delivery to AMAL; therefore, a true test to determine the cause of the malfunction could not be made. The valve was reassembled and tested with the addition of a spring and piston from a new valve. No operational malfunction was noted during the test of this reassembled valve

666

Hunter, H.N. 1955 DEVELOPMENT OF SUPINE SEAT AND RELATED COMPONENTS
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR13; 30 Nov. 1955

ABSTRACT: It had previously been reported that pilots could control an F7F-2N aircraft through turns and dives while supinated 85° from the vertical. The supine position of 65° was investigated using the human centrifuge with the head upright to increase forward visibility. With 65° supination, straining and a Z-2 anti-blackout suit, the tolerance for all pilots tested (regardless of unprotected G tolerance) can be raised to acceleration stress conditions up to 7 G for 30 seconds.

667

Hunter, H. 1955 ESTABLISHMENT OF A QUALIFIED PRODUCTS LIST FOR TYPE Z3 (CUTAWAY) ANTI-BLACKOUT SUIT, CONFORMING TO SPECIFICATION MIL-S-3085 (AER) (Naval Air Development Ctr., Johnsville, Pa.) Project TED ADC AE-5203; 31 Dec. 1955

ABSTRACT: The companies listed have been contacted as possible suppliers for Z-3 (cutaway) anti-blackout suits. However, they cannot submit samples until AMEL standardizes the patterns for the four different sizes of suits.
David Clark Co., Worchester, Mass.
Berger Brothers, New Haven, Conn.
Switlik Co., Trenton, N. J.
Seymour Wallace Co., St. Louis, Mo.

668

Hunter, H. 1955 PILOT'S ABILITY TO ACTUATE COCKPIT CONTROLS UNDER G CONDITIONS (Naval Air Development Ctr., Johnsville, Pa.) Letter Rept. TED ADC AE-6303.1; Serial 9341; 24 Aug. 1955

669

Hunter, H. 1955 PILOT'S ABILITY TO ACTUATE COCKPIT CONTROLS UNDER G CONDITIONS (U.S. Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-LR11 Aug. 24, 1955

ABSTRACT: Tests were conducted at AMAL to ascertain the relative accessability of controls in a fighter plane's cockpit when the pilot is under acceleration stress. As a result of these tests, the ejection seat controls of the F9F-6 were found to be easily accessable to the pilot wearing full flight gear and under fluctuating acceleration stress (1.5 to 7 G). Flight clothing required for operation over cold water increases the time of actuation of controls from 10 to 99 percent, depending on the type of maneuver executed.

670

Hunter, H. 1955 PILOT'S ABILITY TO ACTUATE F9F-6 EJECTION SEAT CONTROLS UNDER FLUCTUATING G CONDITIONS. (Naval Air Development Ctr., Johnsville, Pa.) Project TED ADC AE-6303.1; 31 Dec. 1955

ABSTRACT: All available ejection systems (Navy, face curtain, upward; Air Force, arm rest, upward; and Air Force, "D" ring, downward) were evaluated by exposing Air Force and Navy pilots in full flight gear to fluctuating G. For upward ejections both the arm rests and face curtains were accessible to the pilot and

the time required to actuate each under simulated uncontrolled flight conditions was approximately the same. In each system the most time-consuming maneuver was placing the feet on the stirrups. For down ward ejections the "D" ring was easily accessible. However, the supports to hold the feet down during ejection never operated properly.

.671

Hunter, H. & C.F. Gell 1955 INFLIGHT PHYSIOLOGICAL AND PSYCHOLOGICAL REACTIONS TO THE SUPINE POSITION. PHASE II.
(Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 300; TED ADC AE-6300; 31 December 1955

ABSTRACT: It was determined that 65 degrees supination is the maximum angle which can be provided in a fighter cockpit without sacrificing the single control system, pilot vision and escape possibility. At this angle, all subjects tested requiring protection withstood 7 G for 30 seconds with the aid of a Z-2 anti-blackout suit plus straining. This acceleration stress was withstood without peripheral light loss and with little or no discomfort.

672

Hunter, H.N. 1956 ANTI-BLACKOUT EQUIPMENT, DETERMINATION OF LIMITATIONS OF EQUIPMENT AND PERSONNEL
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR14 Feb. 3, 1956

ABSTRACT: Investigations were carried out using the AMAL centrifuge to determine the maximum anti-blackout protection provided by the Z-2, Z-3, and AF-N anti-blackout suits, the full pressure half suit, and the supine positions with the upper limit of acceleration stress being 6 G for 30 seconds. The results indicated that the Z-2 and Z-3 suits and proposed AF-N suits are approximately equal in efficiency. The full pressure half suit caused such discomfort in the range of 5 to 7 psi that the subjects ended the runs even though peripheral lights were still visible. The supine position alone does not offer any more protection than that of either the Z-2 suit plus straining or the full pressure half suit until the angle of supination is at least 77°.

673

Hunter, S. 1958 CORRELATION OF HEART-BRAIN DISTANCE AND OF SITTING HEIGHT AGAINST POSITIVE ACCELERATION THRESHOLDS. (Institute of Aviation Medicine, RAF, Farnborough) FPRC No. 1048; ASTIA AD-201 165; April 1958

ABSTRACT: It is generally accepted that the hydrostatic pressure exerted by the arterial column of blood between the heart and the brain is proportional to its length measured in the direction of the applied force. For brevity, this length has been called the heart-brain distance. The purpose of this pilot experiment was to find out if any simple relationship existed under positive acceleration (g) between (1) the heart-brain distance and the black-out threshold, and (2) the sitting height and the black-out threshold. Accordingly, 10 unprotected experienced subjects from the Institute of Aviation Medicine carried out a total of 674 runs on the human centrifuge at Farnborough. The correlation coefficient for the heart-brain distance against the positive g threshold value was found to be -0.77. This leads to the deduction that, with a 99 percentage of certainty, the heart-brain distance is inversely related to the threshold. When the sitting height was correlated against positive threshold, the coefficient was +0.01. No simple functional relationship seems to exist between these two variables. (AUTHOR)

674

Huntington, J.M. 1959 SELECTED BIBLIOGRAPHY OF HUMAN FACTORS REPORTS. (Minneapolis-Honeywell Regulator Company, Aeronautical Div., Minneapolis, Minnesota) MH Aero Document U-ED 6147, Nov. 25, 1959.

675

Hyde, A. S. 1961 THE PHYSIOLOGICAL EFFECTS OF ACCELERATION ON RESPIRATION AND PROTECTIVE MEASURES. In Bergeret, P., ed., Bio-Assay Techniques for Human Centrifuges and Physiological Effects of Acceleration. (London, New York, Paris: Pergamon Press, 1961.) AGARDograph 48. Pp. 101-106.

ABSTRACT: Recent, current, and near future experiments defining respiratory physiology during forward ($+a_x$) acceleration are presented and reviewed. Areas where more work is needed have been noted.

RESTRAINT, PROTECTION, AND EMERGENCY ESCAPE SYSTEMS

I

675

Idomir, K. 1960 TM-76 MACE LANDING MAT DESIGN
J. Aero/Space Engineering pp. 28-33, Feb. 1960

ABSTRACT: A parachute recovery kit with landing mats for shock absorbers is described for the TM-76 Mace missile.
Two landing mats (pneumatic shock absorbers), one installed forward and the other aft, reduce the descent velocity of the missile from parachute rate of descent to zero, without exceeding the design limitations of the missile. During final descent, the landing mat fairings are released by explosive bolts and the landings mats are exposed and automatically inflated to a predetermined pressure by air stowed in high-pressure pneumatic cylinders. Shear pin-type orifices are installed in the landing mats to control impact loading. The reliability of the recovery kit has been demonstrated and it is now in production by the Air Force.

677

Ignasiak, B. J. 1947 STRESS ANALYSIS AND CRITERIA FOR REAR SEAT OF BELL MODEL 48. (Bell Aircraft Corp., Buffalo, N. Y.) Rept. No. 48-050-001, 20 Feb. 1947
ASTIA ATI 111 037

ABSTRACT: Bell Model 48 (XR-12) helicopter has provisions for three passengers Individual seats are provided for each passenger and are located behind the pilot and co-pilot. The seats are designed by Bell and consist of two parts seat bottom and seat back, which are permanently attached to the adjacent structure.
The seat pan is of conventional design and the seat back is an .032 reinforced, stiffened sheet which is attached to the forward firewall bulkhead (48-312-001) with Dzus fasteners.
The design criteria for the seats and supporting structure is given in this report.

678

Ingham, John S. 1947 SEAT EJECTION TEST IN THE MASSIS MEMORIAL WIND TUNNEL, TEST NO. 55
(Air Technical Service Command, Army Air Forces) Memo. Report Serial No. TSEAC14-45341-3-3 Dec. 1, 1947 ASTIA ATI 186 677

ABSTRACT: The purpose of these tests was to investigate the reactions and effects on the human body during ejection in a free stream of air. Due to the large time

element involved in raising and lowering the subject into the free stream, it was agreed that the apparatus did not duplicate accurately actual ejection during flight. However, the test did give indications that a blast of air at higher speeds would be great enough to separate the legs.

679

MOTION PICTURE

Institute of Transportation and Traffic Engineering 1960 SAFETY THROUGH SEAT BELTS. (16 mm documentary film, Department of Visual Communication, Univ. Extension, Univ. of California, Los Angeles 24, California)

680

Ioan, C.S. 1963 PARACHUTING AT SUPERSONIC SPEEDS
(Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio) Trans. No. FTD-TT-62-1307; 20 February 1963; ASTIA AD 298 777
Original Source: Stiinta Si Technica (Rumania) 1: 14-16, 1962

ABSTRACT: Under conditions encountered while traveling at supersonic speeds, the need to ensure that the pilot and the entire crew will be rescued if an accident should occur during a flight at supersonic speed, i.e., the development of new methods and devices for ejection and parachuting at high speeds and altitudes, has become one of the most important problems to be solved by the builders of new supersonic airplanes. The main obstacles which had to be surmounted in designing ejection devices were acceleration, shock waves, and aerodynamic heating. The newest ejection methods and devices used at supersonic speeds are the "encapsulated seats" or ejectable "hermetically-sealed cabins." Another new type of ejection method is the sectional plane

681

Isreeli, J., & G. T. Allen 1956 PRESSURE-CONTROL APPARATUS FOR ANTI-G SUITS. U. S. Patent 2,748,786, 5 June 1956

ABSTRACT: A pressure-control apparatus is described and illustrated for anti-g protective suits to be used in aircraft by personnel subjected to high values of g. This suit consists essentially of a double-walled bag formed of rubber or the like which surrounds the passenger closely. If air pressure is introduced into the bag the passenger is subjected to a compressive force which assists him to overcome the ill effects of high g values

682

Jackson, K.F. 1957 PREFERRED LOADS FOR A FIRING HANDLE
(RAF, Institute of Aviation Medicine, Farnborough) FPRC Memo 87, July 1957. ASTIA AD 209 984.

ABSTRACT: Six male subjects were tested in order to find suitable loads for restraining a firing handle. Such loads must conform to requirements common to a certain class of safety device. A range of usable loads has been found.

683

Jackson, K.F. 1958 PERFORMANCE IN A SIMULATED HIGH ALTITUDE EMERGENCY.
FPRC 1058. Dec. 1958.

684

Jager, M. 1956 BEI 2400 KM/ST: AUSSTEIGEN...? (AT 2400 KM./HR.: EXIT....?)
Flug-Revue (Stuttgart) (12):18-20, Dec. 22, 1956.

ABSTRACT: American research and experiences with ejection at high altitudes and supersonic speeds are briefly described. It is recognized that the progressively increasing speeds and higher altitudes exceed the protection offered by further development of the ejection seat. Instead, the new safety design concept consists of a completely enclosed ejection capsule encompassing the pilot and the cockpit.

685

Jailer, Robert W., Gerald Freilich and Monroe L. Norden 1960 ANALYSIS OF HEAVY-DUTY PARACHUTE RELIABILITY
(Wright Air Development Division, Wright-Patterson Air Force Base, Ohio)
WADD TR 60-200, Contract No. AF33(616)-6544, Project No. 8151, Task No. 61052, June 1960 ASTIA AD 246 490

ABSTRACT: This report presents a model for the computation of heavy-duty parachute system reliability based on the reliability of the individual components and sub-components of the system and the operational reliability

of the system as a whole. The model is applicable to the estimation of system reliability in field use; it can be applied at any desired phase in the development of the system.

Methods of selecting the applicable terms for the model for a specific parachute system, and the details of computation of component reliability values from various types of field use, laboratory test, and engineering data to a preselected confidence coefficient are presented. A worked example of a reliability analysis of a hypothetical parachute system is used to illustrate the application of the method.

Numerical results of reliability analyses of parachute packing, reefing line cutter performance, and some solid fabric canopies, and data on parachute materials strength tests usable in the analysis are included. The mathematical derivation of the reliability methodology is presented in an appendix.

686

Jean, J. V. 1955 CREW COMFORT TEST OF THE STANLEY PROTOTYPE TILTABLE UPWARD EJECTION SEAT. (Human Factors Oper. Eng., Hq. 6th Air Div., MacDill AFB, Fla.) Rept. No. 13. Jan. 1955.

687

Jennings, D. L., & R. G. Peterson 1959 STUDY AND DEVELOPMENT OF PARACHUTES AND SYSTEMS FOR IN-FLIGHT AND LANDING DECELERATION OF AIRCRAFT. PART I. THE APPLICATION OF PARACHUTES. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 57-566, Pt. 1; ASTIA AD-234 008; Jan. 1959

ABSTRACT: The text of the aerodynamics study and analysis shows the theoretical development of performance equations for airplanes trailing drag parachutes. Insofar as is possible, the development is made general. Where generality is best presented by study of specific airplanes, four aircraft are used to typify all current classes of aircraft. The installation proposals show the general application of various size parachutes to each class of aircraft as pertaining to basic flight maneuvers. The simplest parachute installations and operating systems are exemplified which would provide maximum utilization of the airplanes. It is concluded that it is possible and practical to install and operate the correct size parachute for aircraft deceleration both for in-flight maneuvers and ground roll deceleration. Additional study, development, design and in-flight testing are indicated. (AUTHOR)

688

Jewell, J. 1959 ESCAPE FROM MILITARY JET AIRCRAFT. J. Roy. Aeronaut. Soc 63:320.

689

Jez, J. 1960 PRZYCZYNY I MECHANIZM URAZÓW W CZASIE SKOKÓW ZE SPADOCHRONEM (CAUSES AND MECHANISM OF INJURIES DURING PARACHUTE JUMPING) Lekarz Wojskowy (Warszawa) 36(10): 992-999. (In Polish, with French summary)

690

Johnson, C. T. 1960 INVESTIGATION OF THE CHARACTERISTICS OF 6-FOOT DROGUE-STABILIZATION RIBBON PARACHUTES AT HIGH ALTITUDES AND LOW SUPERSONIC SPEEDS. NASA TM X-448, 1960.

691

Johnson, L. F., Jr. 1961 AUTOMATIC ESCAPE SYSTEMS OF CURRENT USAF FIGHTER AIRCRAFT
(USAF School of Aerospace Medicine, Brooks AFB, Tex.)
Rep. 9-61 Aug. 1961

ABSTRACT: An automatic escape system is one that, once activated, will eject a pilot from his aircraft, separate him from his seat, and activate his parachute. Characteristics of the different sections of systems of current USAF fighter aircraft are described: ejection seats, catapults, lapbelt initiators, parachute timers, and parachutes. A time comparison of two escape systems is presented. (Tufts)

692

Johnson, L. F., Jr. 1961 AUTOMATIC ESCAPE SYSTEMS OF CURRENT USAF FIGHTER AIRCRAFT (School of Aerospace Medicine, Brooks AFB, Texas) Report 9-61; Aug. 1961; ASTIA AD-268 797

ABSTRACT: Characteristics of the different sections of automatic escape systems are compared. It is seen that in using a fast system (i.e., the M-12 lapbelt initiator, zero lanyard, and the B-4, C-9 parachute) there is a considerable time advantage over using a slower system. This time advantage can be meaningfully transposed into altitude and shows that a fast system will allow successful escape at a lower altitude than will a slower system. (AUTHOR)

693

Johnson, L. F. 1961 ESCAPE SYSTEMS OF CURRENT USAF FIGHTER AIRCRAFT (Paper, 32nd Annual Meeting of the Aerospace Medical Association, Palmer House, Chicago, Illinois, April 24-27, 1961)

ABSTRACT: The escape systems of current USAF fighter aircraft are considered in their component sections if initiators, catapults, seatbelt initiators, parachute

timers and parachute types. These component sections are analyzed as to their sequential operation, operating characteristics and operating times. Time and altitude comparisons are made between two combinations of functional components to demonstrate how shorter time characteristics can be meaningfully transposed into altitude. (Aerospace Med. 32(3):236, March 1961)

694

Johnston, Richard S. 1960 MERCURY LIFE SUPPORT SYSTEMS
In: Life Support Systems for Space Vehicles (Inst. Aero. Sci.)
S.M.F. Fund Paper No. FF-25, Jan. 1960

695

Jones, C.E., Kobrick, J.L., Gaydos, H.F. 1958 ANTHROPOMETRIC AND BIOMECHANICAL CHARACTERISTICS OF THE HAND. (US Army Quartermaster Research and Engineering Center, Natick, Mass.) AD-204867, Sept., 1958

ABSTRACT: Descriptive data are presented on the structural and functional characteristics of the human hand which are of interest to engineers concerned with the design of handwear and manually-operated equipment.

The 1st section deals with the anthropometric dimensions of the hand, and shows the centile distribution of component hand sizes and in several military population samples. The 2nd section reviews data on the biomechanics of the hand involved in typical functional movements. (Author)

696

Jones, W. L. 1951 STUDY OF BAILOUTS FOR A FIVE-YEAR PERIOD IN THE U. S. NAVY. J. Aviation Med. 22:123

ABSTRACT: Factors involved in 850 emergency bailouts in the U. S. Navy have been presented. Most of these bailouts were made from fighter and attack type aircraft. Roughly, 85 per cent of the bailouts were successful—lives were saved; and almost 50 per cent were not injured at all. It is noteworthy that most of this population had little choice but to abandon their aircraft. The difficulties encountered have been enumerated. The attitude, speed, and altitude of the plane at time of exit, reasons for bailout, and the extent and cause of injuries have been discussed. The need for bailout training is emphasized.

697

Jones, W. L. 1952 THE VALUE OF PROTECTIVE HELMETS IN AIRCRAFT CRASHES
J. of Aviation Medicine 23(3):263-270, June 1952

ABSTRACT: This paper consists of a brief history of the development of the protective helmet worn by pilots. Many examples are given of the helmet protection to the pilot during airplane crashes. The ideal helmet must be a compromise between protection and comfort in day-to-day wear.

698

Jones, W. L. 1962 ANTHROPOMETRY OF U.S. NAVY PILOTS
Aerospace Medicine 33(11):1298-1303, Nov. 1962

ABSTRACT: The results of any anthropometric survey are only applicable to the population on which that survey was taken. In the past, the Navy has had to violate this principle because of the lack of anthropometric data on its pilots. Other surveys have included data on pilots, but the data was combined with that on non-pilots. It is believed that the present survey is the only one which contains a fairly large and representative sample and is the only one which has been conducted exclusively on Navy pilots. (AUTHOR)

699

Jones, W.L. & W.F. Madden [illegible] EJECTION SEAT ACCELERATIONS AND INJURIES
(Paper, 34 th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April [illegible])

ABSTRACT: A review of accelerations [illegible] on ejection seat catapult tests, over the past four years, indicates a much wider range of values than was originally believed. This explains, in part, the occasional injury where no injury occurred in an almost similar set of circumstances. To reduce these values and obtain more performance capability a Rocket Assisted Propulsion Ejection Catapult (RAPEC) was developed by the Naval Ordnance Test Station, China Lake. This system is completely interchangeable size-wise with the present catapults resulting in much lower accelerations with increased trajectory. A review of the back injuries is given along with clinical management and results.

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700

Kalogeris, J. G. 1956 PILOT EMERGENCY ESCAPE UPPER TORSO HARNESS SUPPORT DEVELOPMENT TEST MODEL F 106A. (General Dynamics Division, Convair Aircraft Corp.) Convair Rept. No. 9999, Aug. 1956. ASTIA AD-144 950

ABSTRACT: An upper torso harness was developed to relieve a share of the forces resulting from accelerations above 20 g. The harness was fabricated from standard CVAC FAB 375 (nylon cloth), CVAC WEB 217 (1 3/4- x 1/8- in. nylon webbing) and standard parachute hardware. Initial seat drop tests were conducted with a fully anthropomorphic test dummy without the upper torso harness to determine the various loads the torso is subjected to under varying g forces. The harness was then secured to the body in a manner which simulated the instant prior to actual ejection. Drop tests were then conducted with the torso harness from 5 to 28 g's. About 10 human drops at accelerations up to 11 g's were conducted with and without the harness. Satisfactory seat and spinal lead relief (about 50% of the loads were relieved) was realized with the harness. About 70% of the spinal and pelvic loads were relieved with the harness and proportional load system combination. The harness maintained its effectiveness when worn over several combinations of flight clothing. No physical discomforts were reported during the drop tests. (ASTIA)

701

Kalogeris, J. G. 1956 PILOT EMERGENCY ESCAPE SYSTEM: UPPER TORSO HARNESS WORN OVER PRESSURE SUIT; BREATHING TEST OF (Convair, San Diego, Calif.) Rept. No. 9999-1; ASTIA AD-144 951; 11 Sept. 1956

ABSTRACT: The effects on breathing were determined when the Convair torso harness (cinched-up) was worn by a live subject, over a pressure suit inflated to 10 psi. The torso harness was put over the subject's pressure suit. The harness was then tightened in a manner simulating the instant prior to ejection. The pressure suit capstans were then inflated to 10 psi, with the MB-5 pressure helmet at 100 mm of Hg. During the breathing period, the subject was questioned to determine discomfort. At the end of 10 min, the subject's skin was examined. Results indicated that the harness over a pressure suit causes no additional discomfort and does not restrict the normal operation of the pressure suit or of the pilot.

702

Kalogeris, J. G. 1957 TORSO HARNESS SOLVES EJECTION PROBLEMS. Aviation Age 27(3):66-69. March 1957.

703

Kalogeris, J. G. 1958 INDUSTRY (ICESC) SUPERSONIC UPWARD EJECTION PILOT'S ESCAPE SYSTEM: Part I, Development Phase Sled Tests. Convair Report 57-100F-1; USAF Contract AF 33(600) 30169 May 1958.

ABSTRACT: Two basic seat configurations were under consideration during the early development phase of the upward ejection supersonic pilot's escape system. Seat configuration "A" was a conventional upward ejection type incorporating an aerodynamically clean contour and a mechanism for launching the seat from a supine position (head aft) above the cockpit. Prior to launching, the seat is raised and rotated to the supineposition. This position provides minimum drag and maximum windblast protection for the "B" seat configuration.

Wind tunnel and free-flight model tests conducted on both configurations demonstrated that the "B" seat had the better stability and drag characteristics. Further "A" seat development was discontinued in favor of the "B" seat.

704

Kanowski, M. B. 1959 ULTRA-FAST OPENING PARACHUTE (Air Force Flight Test Center, Naval Auxiliary Air Station, El Centro, Calif. AFFTC TN 59-9; ASTIA AD-205 771; June 1959

ABSTRACT: Tests were conducted to determine the operational suitability and performance limitations of the Ultra-Fast Opening Parachute assembly, XMP-2, back style. The parachute was designed for use by personnel operating individual lift platforms. The parachute canopy was projected from the wearer's back and ejected radially by explosive charges. Six ground and 21 aerial tests were conducted. During all aerial tests the portion of the canopy toward the line of flight tended to collapse. During aerial tests when the canopy was projected horizontally in the direction of flight, the dummy descended below the level of the canopy before full inflation occurred. The base of the dummy's skull was damaged by the carrier frame during several tests. The Ultra-Fast opening Parachute assemblies tested were unsuitable for personnel use. (AUTHOR)

705

Karlsen, Asbjorn (Karl) 1959 HERE'S HOW TECO PULLS THE "STOP" ON HIGH G'S! (Teco Aircraft Seats, Burbank, Calif.)

706

Karnes, C. H., J. W. Turnbow, et al. 1959 HIGH-VELOCITY IMPACT CUSHIONING, PART V, ENERGY-ABSORPTION CHARACTERISTICS OF PAPER HONEYCOMB. (Structural Mechanics Research Lab., Texas University, Austin, Texas) Contract No. DA 19-129-qm-150; ASTIA AD-225 216; 25 May 1959

707

Karstens, A.I., & H.J. Jacobs 1948 PHYSIOLOGICAL EVALUATION OF THE PARTIAL PRESSURE SUIT, REPORT NO. 1. Memo Rept. No. MCREXD-696-104J, 9 Sept. 1948.

708

Kearney, A. P., B. J. Mills & R. S. Huey. 1959 EMERGENCY ESCAPE CAPSULE STUDIES. PHASE I: PRELIMINARY LABORATORY FLOTATION STUDIES. WADC Tech Rept 59-247 (1) ASTIA AD 226 055;

ABSTRACT: Preliminary studies using aircraft canopy escape-type capsules are described. Design of capsule clothing, donning of clothing in confined space, stowage of emergency survival items, air exchange requirements, flotation, inhabitation and communication studies were conducted as individual facets of the program. The studies were culminated with a test in which a human subject remained in a closed capsule for 72 hours. Findings from these preliminary studies are presented. The capsule with an air exchange system successfully served as a temporary shelter while floating in a test pool for a period of 72 hours. Throughout the test, the hatch was closed to simulate a situation which might be necessary operationally only as a result of the most severe environmental conditions.

709

Karstens, A.I. 1959 ESCAPE AND SURVIVAL DURING MANNED BALLISTIC FLIGHT. Proceedings of AGARD Meeting, Athens, Greece, May 1959.

710

Karstens, A.I., and H.J. Jacobs 1948 PHYSIOLOGICAL EVALUATION OF THE PARTIAL PRESSURE SUIT, REPORT NO. 1. (United States Air Force, Air Materiel Command) Technical Report No. 5953, July 1950

711

Keating, C.E. 1954 40-G DITCHING SEATS (Century Eng., Inc.) Rept. No. 664; 26 April 1954

712

Keating, D.A. & R.W. Roundy 1961 CLOSED ECOLOGY (Life Support Systems Lab., Aerospace Medical Lab., Wright Air Development Division Air Research and Development Command, USAF, Wright-Patterson AFB, Ohio) WADD technical report 61-129, Proj. no. 6373, Task No. 63120, March 1961; ASTIA AD-255 976

ABSTRACT: The concepts of closed ecology as well as the design requirements for three degrees of closure in closed ecological systems have been presented in a fundamental manner basic to the reader's understanding of such aerospace life support systems.

The degree of ecological system closure is dependent upon reliability, weight, bulk, energy input, and mission duration.

The basic closed ecological system concepts are presented fully with the understanding that the design of such systems is dependent upon future research Design philosophy has therefore been presented in place of actual design.

713

Kearney, A. P., B. J. Mills, & R. S. Huey 1959 EMERGENCY ESCAPE CAPSULE STUDIES: PHASE I: PRELIMINARY LABORATORY FLOTATION STUDIES. (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TR 59-247 (1); ASTIA AD-226 055; June 1959

ABSTRACT: Preliminary studies using aircraft canopy escape-type capsules are described. Design of capsule clothing, donning of clothing in confined space, stowage of emergency survival items, air exchange requirements, flotation, inha-

bitation and communication studies were conducted as individual facets of the program. The studies were culminated with a test in which a human subject remained in a closed capsule for 72 hrs. Findings from these preliminary studies are presented. The capsule with an air exchange system successfully served as a temporary shelter while floating in a test pool for a period of 72 hrs. Throughout the test, the hatch was closed to simulate a situation which might be necessary operationally only as a result of the most severe environmental conditions. (AUTHOR)

714

Keegan, J. J. 1953 ALTERATIONS OF THE LUMBAR CURVE RELATED TO POSTURE AND SEATING. Journal of Bone and Joint Surgery, July 1953.

715

Kellaway, C.H. 1941 NOTES ON THE ANTI-"G" DEVICE FROM DR. COTTON, SIDNEY UNIVERSITY, TRANSMITTED BY COL. C.H. KELLAWAY OF FPRC, AUSTRALIA
(National Research Council, Committee on Aviation Medicine, Washington, D.C.) CAM Rept. No. 27; 21 October 1941

ABSTRACT: Photographs of the centrifuge at Sydney. Cotton suit consists of air-filled bladders pressurized by a hydrostatic resevoir. Weight of the suit is 30 pounds. Suit protects against 9.3 "g" for 19 ± 1 seconds with no visual symptoms, minimum discomfort.

716

Kelley, R.E. & R.F. Stauffer 1950 A DEVICE FOR THE AUTOMATIC CONTROL BY G FORCE OF THE POSITION OF THE CONTROLLABLE SUPINE SEAT. SDC PROJECT 9-U-37a
(Naval School of Aviation Medicine, Pensacola, Fla.) Project No. NM 001 059. 02.05; 31 March 1950; ASTIA ATI 79 310

ABSTRACT: Herein is described a device which controls the back rest position of the controllable supine seat: SDC Project 9-U-37a. This device is operated by G. When the G-level exceeds a given amount, the back rest rotates, on an axis about its lower end, backward to a horizontal position. When the G-level falls below a given amount, the horizontal rest rotates upward to its original

position. An individual seated therein is then automatically changed from a seated position to a supine position, or vice versa, at specific G-levels. The G-level at which operation occurs is controlled by a 17-position switch which provides automatic supination control at levels from 1.0-6.0 G. The supination and recovery levels are dependent upon each other, and the recovery level is slightly below that of supination. The difference between these levels at any particular setting increases with the G - being 0.8 G at 2.5 G for supination and 1.6 G at 6.0 G for supination.

Such a device should be of practical value in aircraft equipped with such movable seats, as automatic protection can then be provided for air personnel exposed to positive and negative radial acceleration. (DACO)

717

Kelley, R. E., & F. R. Stauffer 1950 A SYSTEM OF CONTINUOUS INDICATION AND RECORDING OF THE BACK REST POSITION OF THE CONTROLLABLE SUPINE SEAT: SDC PROJECT 9-U-37a. (Naval School of Aviation Medicine, Pensacola, Fla.) Research Project MR 005.15-0001.1.3., 3 March 1950; ATI-76 470

ABSTRACT: (1) A system has been described to provide for continuous indication and for recording of the back rest position of the controllable supine seat: SDC Project 9-U-37a. (2) The need for such a system both from the standpoint of the interpretation of physiological responses in subjects undergoing positional changes during radial acceleration and from the standpoint of safety to the subject has been mentioned. (3) As described the system applies only to movements of the back rest. It would seem desirable, however, that if any future adjustable seats are constructed for experimental work they should incorporate a similar system for all significant movable parts. (AUTHOR)

718

Kelly, H. B.,Jr. 1956 FLIGHT TEST OF INTEGRATED HARNESS SYSTEM EQUIPMENT. (US Naval Air Test Center) TED PTR AE-5205, 24 Oct 1956

719

Kelly, R. E., & F. R. Stauffer 1950 A DEVICE FOR THE AUROMATIC CONTROL BY G FORCE OF THE POSITION OF THE CONTROLLABLE SUPINE SEAT. (Naval School of Aviation Medicine, Pensacola, Fla.) SDC Project 9-U-37a., MR005.15-0001.1.5 3/31/50. ASTIA ATI 79310.

ABSTRACT: A device which controls the back rest position of the controllable supine seat is described. This device is operated by G. When the G-level exceeds a given amount, the back rest rotates, on an axis about its lower end, backward to a horizontal position. When the G-level falls below a given amount, the horizontal rest rotates upward to its original position An individual seated therein is, then, automatically changed from a seated to supine position, or vice versa, at specific G-levels. The G-level at which operation occurs is controlled by a 17 position switch which provides automatic supination control at levels from 1.0-6.0 G. The supination and recovery levels are dependent upon each other, and the recovery level is slightly below that of supination. The difference between these levels at any particular setting increases with the G, being 0.8 G at 2.5 G for supination and 1.6 G at 6.0 G for supination.

Such a device should be of practical value in aircraft equipped with such movable seats, as automatic protection can then be provided for air personnel exposed to positive and negative radial acceleration.

720

Kendall, S.K. 1942 OPERATIONAL USE OF THE FRANKS FLYING SUIT. (National Research Council, Canada) Report #C-2847, November 24, 1942

ABSTRACT: Reports are included of the operational use of the Franks Flying suit in the 807 Squadron by F/O Martin and pilots reports of their experiences while wearing the FFS operationally and a short extract of a report of the operations from the Commanding Officer, 807 Squadron. It is noted that the pilots reactions to the FFS were almost universally very favourable.

721

Kendricks, E.J. 1952 AEROMEDICINE: THE DOMINANT SCIENCE Aero Digest 64(1): 72-80, 82, 90. Jan. 1952

ABSTRACT: The physiological problems resulting from the advances of modern aviation in high-altitude and high-speed flying are briefly discussed. New methods and techniques in meeting problems such as temperature and pressure changes, anoxia, bio-acoustic effects, bailing out from high altitudes, and instrument control (human engineering) are summarized. In conclusion, the requirements for and the functions and duties of the flight surgeon are outlined.

722

Kennedy, W.P. EXTRACTS FROM GERMAN LITERATURE. PERVITIN. BLOOD PROCUREMENT. GAS. EYE INJURIES DUE TO AIRPLANE BOMBS. DISCOMFORT FROM MILITARY BELTS. CARDIOVASCULAR EFFECTS OF ANOXIA AND ACCELERATION. PSYCHIC SHOCK AND CRASHES.
(Flying Personnel Research Committee, Farnborough) FPRC Rept. #321 and 321-C (WAM-153-1) ASTIA ATI 206 431

723

Kenney, John F. 1950 STATIC TEST OF SEAT ASSEMBLY #72451
(Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio) USAF Technical Report No. TR-029AF ASTIA ATI 82 456

ABSTRACT: Static-load tests were conducted on the crew member seat assembly No. 72451 to demonstrate its compliance with USAF structural requirements. The seat is essentially the same as the previously tested seat assembly No. 71349, but the arm rests are removed. Loads were applied to the seat with calibrated hydraulic jacks and a calibrated tension ring. An ultimate load of 1600 lbs. was applied to the seat-belt mountings, and an ultimate load of 1700 lbs. was applied in a uniform manner over the bottom of the seat. The loads were held at ultimate for a period of one minute or more without failure occurring in the seat structure.

724

Kenney, J.F. 1950 STATIC TEST OF CREW SEAT NO. 72244 (Aircraft Division, Weber Showcase & Fixture Co., Inc. 2001 Belgrave Ave., Huntington Park, Calif.) Contract No. AF 33-038-9345, 9 Nov. 1950, ASTIA ATI-95 617

ABSTRACT: The seat operated after each and all limit loads. After ultimate loading there was little outward sign of yielding. The seat would swivel and travel fore and aft, but bound when moved vertically which was due to some bending in the sliding tubes.

This seat is an exact duplicate of the approved USAF SEAT; AIRCREW, ADJUSTABLE, SWIVEL, TYPE E-1, Spec. #45009, dtd 24 January 1949, except for arm rests and will naturally sustain the same loads. It is, therefore, acceptable as complying with USAF Spec. #45009.

725

Kent, S. J., & A. E. White 1961 DEVELOPMENT AND QUALIFICATION OF THRUSTER, CARTRIDGE ACTUATED, T30. (Aeronautical Systems Division, Wright-Patterson AFB, Ohio) ASD TR 61-454; FA Report R-1601; ASTIA AD-271 390; Oct. 1961

ABSTRACT: Frankford Arsenal was requested by the Air Force to design, develop and qualify a thruster which would operate the integrated harness release mechanism used by aircraft personnel. The thruster was to provide an automatic means of releasing the harness from the pilot or crew member during an emergency escape, thereby eliminating the possibility of human error. The thruster would be mechanically initiated by a lanyard during the emergency escape cycle. The project was divided into two phases, namely development and qualification. During the development phase, several models of a thruster, designated the T30 thruster, were fabricated and tested and the resultant test data analyzed. Modifications in the interest of better performance, simplicity, and interchangeability were made. When a satisfactory level of performance was achieved, the qualification phase of the project was initiated. The qualification phase consisted of various operational tests which established that the final model of the T30 thruster satisfied all performance requirements, and that its operational characteristics were reproducible. (AUTHOR)

726

Keraney, A. P., B J. Mills and R. S. Huey 1959 EMERGENCY ESCAPE CAPSULE STUDIES. PHASE I. PRELIMINARY LABORATORY FLOTATION STUDIES.
WADC Tech Rept. 59-247 (1) 2 Oct 59 AD-226 055

Summary: Preliminary studies using aircraft canopy escape-type capsules are described. Design of capsule clothing, donning of clothing in confined space, stowage of emergency survival items, air exchange requirements, flotation, inhabitation and communication studies were conducted as individual facets of the program. The studies were culminated with a test in which a human subject remained in a closed capsule for 72 hours. Findings from these preliminary studies are presented. The capsule with an air exchange system successfully served as a temporary shelter while floating in a test pool for a period of 72 hours. Throughout the test, the hatch was closed to simulate a situation which might be necessary operationally only as a result of the most severe environmental conditions. (author)

727

Kerr, C. E., W. K. Stewart, & J. R. Tobin 1942 NOTE ON PRONE POSITION IN AIRCRAFT. (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept.500

ABSTRACT: Reclining in a prone position as a protection against "g" has been abandoned by the RAF because: (1) Visual difficulties are apparently insuperable; the blind area above the pilot is too large although the visual field behind him is not affected and the field below him is improved. (2) The position is extremely uncomfortable and produces much fatigue. The Germans report that a prone position raises the "g" threshold to 14 to 17 "g" on the centrifuge. A Heinkel has been reported to have been equipped with reclining seats.

728

Kerr, T.H. 1952 PILOT ESCAPE FROM SPINNING AIRCRAFT. (Royal Aircraft Establishment, Farnborough) ATI 199859, December 1952

ABSTRACT: A series of pilot escape tests from models of elementary and advanced trainers, and fighter aircraft in the spin are presented. Escapes were made from varying points relative to the wing chord, on the inboard and outboard sides of the spin. The analyzed results show that if the pilot requir to bail out from a spinning aircraft, it is best to leave on the outboard side of the craft and in the crouching attitude. In this condition it is most probable that he will clear the aircraft cleanly and be outside the spiral flight path within a half turn of the spin. If he bails out on the inboard side, his flight path will probably be through or very near the propeller disc and it will probably take at least two turns of the spin for him to clear the helical flight path of the aircraft.

729

Khromushkin, A.I. 1944 PARASHIUTNYE PRYZHKI IZ STRATOSFERY (Parachute Jumps From the Stratosphere)
Tekhnika vozdoshnogo flota No. 8-9, P. 18-21

730

Khromushkin, A. I., ed., M. N. Rabinovich 1949 PRESSURIZED SUITS AND OXYGEN-RESCUE EQUIPMENT FOR HIGH-ALTITUDE FLIGHTS. (SKAFANDRY I KISLORODNO-SPASATEL'NAYA APPARATURA DLYA VYSOTNYKH POLETOV) (State Publishing House of the Defense Industry, 1949) A. I. D. Library of Congress No. AID 455-I

ABSTRACT: This work deals with the theory and construction of pressurized suits and oxygen-rescue equipment. The author has summarized in one book various separate data on devices securing the safety of high-altitude flights. He asserts that this is the first attempt to gather such information scattered in Soviet and foreign literatures. Since the knowledge of some physiological and hygienic problems is important for designing pressurized suits and oxygen-rescue devices, a chapter on physiology is included. The book is concerned with flights over 12, 000 m when oxygen equipment for the emergency rescue of the crew is essential, and with flights over 14, 000 m when pressure cabins and strato suits are absolutely necessary. Full explanations of the construction and application of these devices are given, with illustrations, tables and diagrams. (CARI)

731

Kiehl, P.F. 1960 GUIDE TO AIRCREW PERSONAL AND AIRCRAFT INSTALLED EQUIPMENT. (Directorate of Systems Engineering, Wright Air Development Div. Wright-Patterson AFB, Ohio) WADD Technical Note 60-230 (Supersedes WADC TN 58-259) Sept. 1960. ASTIA AD 246 659.

ABSTRACT: A catalog format has been used in this technical note to describe and illustrate both personal equipment for aircrews and the equipment installed in aircraft that is of special interest to aircrews. The document includes information on special high altitude and long range flight clothing, personal and aircraft-installed oxygen equipment, survival kits, life rafts and preservers, parachutes, in-flight feeding systems, survival food packets, and aircraft-installed food service equipment. Brief descriptions of 128 items are included along with photographs illustrating the items.

This technical note is intended as a supplement to Air Force Supply catalogs and Air Force Manual 64-4, "Handbook For Survival Training and Personal Equipment Personnel."

732

King, B. G. et al 1948 SHOULDER HARNESS AND THE PILOT'S TASK IN OPERATING CONTROLS IN TRANSPORT TYPE AIRCRAFT. Civil Aeronautics Administration, Prepublication Release, 4 May 1948.

ABSTRACT: The Working Group of the CAA-CAB Subcommittee has recently reviewed reports received from members of the Air Transport Association in answer to a questionnaire on the use of shoulder harness by the pilot and co-pilot of transport type aircraft. A number of the replies raised the question as to whether the pilot and co-pilot could reach and operate the aircraft controls while wearing shoulder harness. Accordingly, the members of the group made a survey of five transport type aircraft to answer this question. The results of these studies constitute the subject matter of this report.

The results of the surveys of the various aircraft demonstrated that the present standard extension allowance of 18 inches will permit pilots to reach forward or to the side and allow sufficient freedom to grasp and operate all controls in the transport aircraft studied.

733

King, B. G. 1951 TIMES AVAILABLE FOR PROTECTIVE MEASURES IN EMERGENCIES AT HIGH ALTITUDE.
(Civil Aeronautics Administration, Washington, D.C.)

ABSTRACT: In explosive or extremely rapid decompression, some of the stresses may act upon man so rapidly as to preclude the possibility of applying remedial or protective measures, while others allow a brief or a relatively extended period for appropriate action. The rapid or "instantaneous" stresses include airblast and gas explosion. The delayed stresses include anoxia, aeroembolism, and cold.

734

King, B. G. 1951 AIRCRAFT EMERGENCY EVACUATION. A METHOD FOR EVALUATING DEVICES, PROCEDURES AND EXIT PROVISIONS. (US Department of Commerce, Civil Aeronautics Administration, Office of Aviation Safety) April 1951.

735

King, Barry G. 1959 PROTECTION IN AIRCRAFT ACCIDENTS
Medical Annals of the District of Columbia, October 1959

ABSTRACT: While both theoretically and in practive shoulder harnesses and reverse seating afford greater protection than do seat belts, the very real benefit of the belts in crash injury protection should not be underestimated. Further, the likelihood of the seat belt per se being responsible for a fatal or serious accident is so small as to be statistically negligible. Shoulder harnesses will provide even greater protection and should be unequivocally recommended for pilots of private, commercial and transport planes, and for passengers in private planes who fly repeatedly and are well informed on aviation matters. Shoulder harnesses are, however, quite impractical for the air transport passengers. Reverse seating, with lap belts, holds promise for increased safety for the future, provided practicable engineering design solutions are developed to insure adequate strength of the seat and its attachment at a reasonable weight and there is public acceptance and demand for the greater crash injury protection afforded by this arrangement.

736

King. R.L. 1945 REQUIREMENTS FOR PILOT EJECTION IN FIGHTER AIRPLANES
(Air Materiel Command, Army Air Forces) Report DC-356, Supplement No. 1
Serial No. TSEAL2-4534-7-2 ASTIA ATI 186 680

ABSTRACT: The purpose of this study was to develop and engineer a satisfactory pilot ejection type seat for incorporation in all production and service P-80 airplanes and in all future production and experimental P-84 aircraft. The basic design requirements for the ejection seat and the ejector gun are given in this memorandum and it is recommended that this information be furnished to designers and manufacturers of fighter airplanes.

737

Kuntz, W.H. 1948 THE DORNIER-335 PILOT EJECTION SEAT.
(AMC, Wright-Patterson AFB, Dayton, Ohio) Technical Report F-TR-1191-ND,
Aug. 1949. ASTIA ATI 27204

ABSTRACT: The Dornier-335 Ejection Seat was developed by the Germans, during the latter part of World War II, to provide a means of escape from high-speed aircraft. The seat is ejected from the airplane by a piston-type catapult,

utilizing compressed air stored in three steel bottles of two liters capacity each, pressure of 1707 pounds per square inch. The system produced an ejection velocity of approximately 57.4 feet per second at maximum accelerations of approximately 25 "G". The seat has a total vertical adjustment of 2-7/16 inches. The seat back is parallel to the ejection angle, which is 13° from vertical.

738

King, R.L. 1945 DEVELOPMENT OF PILOT EJECTION GUN AND ITS EXPLOSIVE CHARGE FOR USE WITH P-80 P-84 AND P-86 AIRPLANES (Engineering Division, Army Air Force) TSEAL2-4534-7-1, 8 October 1945, ASTIA ATI-172503

ABSTRACT: This is a report made by the author to Frankford Arsenal, Philadelphia, Pennsylvania, to assist in the design and development of a suitable pilot ejection gun and its explosive charge for use in P-80, P-84, and P-86. airplanes. A detailed Technical Report on the development work undertaken by Frankford Arsenal will be presented by Aviation Ordnance Section at a later date. As a result of the tests, it is recommended that this ejector gun be installed in a P-61 airplane for the purpose of conducting extensive flight tests to insure its satisfactory operation and to procure data on velocities, trajectories, rotation, etc. Also, upon completion of satisfactory operational tests of the ejection gun, it be installed in P-80 radio controlled airplane for high speed ejection flight tests. Upon completion of satisfactory high speed operational tests of the ejector gun, it should be installed in all service P-80, P-84, and P-86 airplanes.

739

Kirchner, O.E. 1958 CRASH FORCES AND SEATING
(Paper, Eleventh Annual International Air Safety Seminar, Atlantic City, New Jersey, November 11, 1958)

740

Kirchner, O.E 1960 "NOTES" COVERING THE 13TH ANNUAL INTERNATIONAL AIR SAFETY SEMINAR OF THE FLIGHT SAFETY FOUNDATION.
(Boeing Airplane Company, Transport Division, Renton, Washington)

ABSTRACT: The objective in preparation of these "notes" is to provide a reader in one sitting with just enough information to cover the main thoughts expressed by the author or authors. Those with a more direct interest in a particular subject are referred to the original paper and where desired to the author direct. All papers presented at the Seminar are not included in these "notes" since some fall into the category of being "off-the-record".

741

Kittinger, J.W. 1959 A SUGGESTED PROGRAM DESIGNED TO REDUCE THE NUMBER OF FATALITIES OCCURRING DURING EJECTIONS AND BAILOUTS. (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: Sufficient emphasis is placed on parachute and ejection training during the aviation cadet program; however, once the pilot or aircrew member is in an operational outfit this training is not pursued. Regulations require continual refresher training in the use of oxygen equipment, but there is no requirement placed on refresher training on the use of parachutes and escape systems. This lack of familiarity with the escape equipment might cause air crew members to delay that fatal second when the situation demands immediate action. Several solutions in getting a better aircrew member "psychology of escape" are discussed. (J. Aviation Med. 30(3):190, March 1959.)

742

Kitts, W.W., A. Nakai, S.M. Prather, & J.H. Best 1960 INTERIM REPORT ON PARACHUTE RECOVERY AND IMPACT SYSTEMS (Chance Vought Aircraft) 29 February 1960 ASTIA AD 263 499

ABSTRACT: This interim report contains information on the parachute recovery system for the Integrated Flight Capsule Program flight test vehicle. The various energy absorption systems investigated for the landing impact conditions are also discussed.

743

Kitzes, G. 1959 OCCUPATIONAL HEALTH PROBLEMS IN SPACE FLIGHT: IMPORTANT HEALTH PROBLEMS IN THE MAN-IN-SPACE STUDIES AT THE AERO MEDICAL LABORATORY Military Medicine 124 (10): 717-719, Oct. 1959

ABSTRACT: Problems related to man's survival in space are briefly reviewed and categorized. The primary objectives of space-medical research are to provide an environment, workspace, and sustenance for the space traveller that will allow him to carry out his mission with maximum efficiency and protect him from irreversible injurious body changes. Basic requirements -- physiologic (metabolic, environmental), psychologic (isolation, weightlessness, workspace, reduced sensory environment), and requirements pertaining to protection (from radiation, toxic chemicals and odors, noise and vibration, acceleration, natural infection, disorientation) are outlined.

744

Klemin, A. 1933 CORSETS FOR AVIATORS.
Scientific American, 149:80, Aug. 1933

ABSTRACT: Concerns acceleration and deceleration forces on pilots and protection devices to increase g tolerance.

745

Knacke, T. 1946 ABSTRACT FROM INFORMATION REPORT CONCERNING THE INVESTIGATIONS DEVELOPMENTS OF THE PARACHUTE DIVISION OF THE FORSCHUNG-SANSTALT GRAF ZEPPELIN, DATED 14 JULY 1945.
(War Dept., Air Forces) TSEAA-660-99, Appendix C, Feb. 1946.

746

Knacke, T. 1947 NOTES ON DECELERATION AT BAIL-OUT OF AIRCRAFT
(U.S. AAF-AMC) Memorandum Report TSETE-672-22, April 10, 1947

747

Knacke, T. W. 1952 HIGH-ALTITUDE PARACHUTE RECOVERY
In White, C. S., & O. O. Benson, Jr., eds., Physics and Medicine of the Upper Atmosphere, A Study of the Aeropause (Albuquerque, N. Mex.: Univ. of New Mexico Press, 1952) pp. 447-456

748

Knacke, T.W. and L.I. Dimmick 1962 DESIGN ANALYSIS OF FINAL RECOVERY PARACHUTES B-70 ENCAPSULATED SEAT AND THE USD-5 DRONE (Space Recovery Systems, Inc., El Segundo, Calif.) Contract AF 33(616)8371, Proj. 6065, ASD TDR 62-75, 1 May-31 Dec 61, ASTIA AD-277 424

ABSTRACT: A performance analysis was conducted on two parachute recovery systems developed for the B-70 encapsulated seat and the USD-5 surveillance

drone. Optimization of aerodynamic and textile design, controlled deployment and opening, and use of a cluster of two independently deployed parachutes for the USD-5 drone resulted in a highly predictable performance, in the highest known drag area per weight ratio for the USD-5 system, and a high velocity capability for the B-70 system. Equations were developed through data analysis for the opening process and the drag area increase versus time during parachute opening for extended skirt parachutes. These equations permitted a computer analysis of the total parachute acceleration process with computer results showing less than 10% deviation from actual test data. The developed computer method may well be suitable for performance analysis of recovery processes using ribbon, ring slot, and other solid material type parachutes. (Author)

749

Knerr, W.C. 1959 UNDERWATER ESCAPE PROGRAM: Description of High and Low-Level Test Drops Using F-9F and F86 Airplanes; and a 50-Foot Dummy Head Drop Test. (Naval Air Development Center, Johnsville, Pa.) Report No. 7, Proj. TED No. ADC AE-6307, NADC ED-5841, ASTIA AD 219 106

ABSTRACT: The results and analysis of aircraft water-crash tests simulating the 50-foot fall from an aircraft carrier deck are presented in this report. Important pilot survival parameters such as water-impact forces, accelerations, canopy implosion characteristics, and aircraft rate of sink are fully discussed These tests were conducted at Key West, Florida from April through July 1958 on completely instrumented F9F-series straight wing aircraft and F86 swept-wing aircraft. (Author)

750

Knerr, W. C. and S. S. Kress 1959 PRELIMINARY PROPOSED MILITARY SPECIFICATION CANOPY, AIRPLANE, DESIGN FOR UNDERWATER REMOVAL. (Naval Air Development Center, Johnsville, Pa.) Proj. TED no. ADC-AE-6307, Report no. NADC ED-5928; AD 231 395.

ABSTRACT: This specification contains the requirements for the design, performance and testing of hinged or sliding airplane canopies with capabilities for underwater removal or opening to permit underwater egress on VF, VA, and VT type aircraft.

751

Knowles, W. R. 1957 A REVIEW OF CRASHWORTHY DESIGN IN LIGHT AIRCRAFT (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc., Phoenix, Arizona) Report AvCIR-53-0-87, June 1957

752

Knowles, W. R. 1959 THE IMPORTANCE OF DESIGNING FOR CRASH SAFETY IN ROTARY-WING AIRCRAFT (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc., Phoenix, Arizona) Report AvCIR-60-0-103, May 1959

753

Konecci, E.B. 1957 PHYSICAL AND PHYSIOLOGICAL FACTORS IN MAJOR AIRCRAFT ACCIDENTS
(Directorate of Flight Safety Research, USAF, Norton AFB, California)
AFCFS-G-2, M-4-57, 13 February 1957.

754

Koehling, E.F. 1960 INTEGRATED FLIGHT CAPSULE ENVIRONMENTAL CONTROL SYSTEM STUDY (Chance Vought Aircraft, Inc., Dallas, Texas) 23 March 1960.

755

Knowles, W.R. 1958 "Crash Design from Crash Injury Research." U.S. Army Aviation Digest 4:12-15

756

Konecci, E. B. 1958 HUMAN FACTORS AND SPACE CABINS
Astronautics 3(1):42, 43, 71, Jan. 1958

ABSTRACT: A look at the engineering and technological problems associated with keeping living components operating at peak efficiency in space, and how R & D work in this area is helping in the solution of such problems. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space Medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903; ASTIA AD-227 817; Feb. 1959)

757

Konecci, E.B. 1957 PHYSIOLOGICAL FACTORS IN USAF AIRCRAFT ACCIDENTS (Paper, 28th Annual Meeting of Aero Medical Association, Denver, Colo., May 6-8, 1957) See also J. Aviation Med. 28(6):553-558.

CONCLUSIONS: In conclusion, we can say that factors affecting the normal physiologic state of the pilot (or crew) are contributing causes rather than primary causes of major aircraft accidents. A few physiologic conditions like hypoxia and vertigo/disorientation were primary causes. Fatigue appeared as a contributing factor in a number of accidents but the incidence appears to be decreasing i.e., thirty-four cases in 1955 to thirteen in 1956. G forces and vibrations appeared as contributing factors in a large number of accidents; however, their significance could not be fully evaluated from the available data. The adversities of decompression, physical disturbances, hyperventilation, hypoglycemia, carbon monoxide poisoning, and air sickness do not seem to be primary problem areas.

758

Konecci, E. B. 1958 DECOMPRESSION EVENTS IN BIO-SATELLITES (Paper, ARS Semi-Annual Meeting of the American Rocket Society, Los Angeles, California, June 8-12, 1958)

ABSTRACT: Safety aspects in accidental decompression include: (a) structural techniques like Whipple's meteor bumper wall, multiple construction and thicker wall construction; (b) self sealing techniques; (c) detection of leaks; (d) warning the human occupants; (e) reserve high pressure gases to delay the decompression; (f) use of full pressure suits; (g) personnel training for emergency conditions; and (h) other devices like compartmentation, recompression chamber, pressurized bunks or seat capsule, pressure bag and repair kit for sealing leaks. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space Medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903; ASTIA AD-227 817; Feb. 1959)

759

Konecci, E. B. 1958 SPECIFIC FACTORS IN SPACE CABIN DESIGN - PROBLEMS OF RESPIRATION AND DECOMPOSITION WITH SEALED-CABINS. (Paper, Society of Automotive Engineers National Aeronautic Meeting, Los Angeles, Calif., Sept. 29 - Oct. 4, 1958)

ABSTRACT: For short duration space flights, attaining and maintaining an adequate atmosphere should be possible with conventional oxygen systems, and chemical carbon dioxide absorbers. However, for long duration flights lasting weeks, months or years, regenerative systems, (e.g. biological photosynthesis via algae,

photolysis of carbon dioxide with production of oxygen) will be required since payloads will be restricted in cubage and weight.
In vivo and in vitro photosynthesis experiments should be encouraged and supported to obtain a practical biological or photochemical closed ecological system. In addition, experiments involving photolysis of carbon dioxide with ultraviolet light and return of oxygen for re-use in the cabin should be exploited since there is an abundance of free UV light in space.
A hermetically sealed-cabin is a mandatory requirement for extended space flight operations. Leaks through structures and seals may prove to be more important than meteoroid penetrations. If, for some reason hermetic sealing is not possible on the first space cabins, then leaks rates will have to be precisely calculated so that adequate oxygen reserves are carried on board. The longer the exposure of the cabin in space the greater the probability of a penstrating hit by a meteoroid. In general, the expected meteoroid holes will be very small. However, to prevent excessive loss of oxygen, these leaks will have to be rapidly detected and sealed. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space Medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903; ASTIA AD-227 817; Feb. 1959)

760

Konecci, E. B. 1959 HAZARDS OF SEALED CABINS, Astronautics, 4 (2): 40-41: 48-51 Feb 1959

Summary: Sealed cabin systems in space flight are exposed to certain physical conditions which may affect the physiologic and psychologic well-being of their occupants. The more obvious hazards are high acceleration at the launching and during ascent; weightlessness accompanied by circulatory, nervous, and digestive disturbances during orbital flight; temperature and humidity changes within the cabin, which may exceed the limits of human tolerance, and on the outer surface, which may affect the surface coating of the capsule and further disrupt the thermal balance; radiation storms such as those encountered by the Explorer satellites; and collisions with meteoroids or leaks through structures and seals, which might result in decompression. To remain alive in space, man will require an artificial environment defined by his physiology, and he must rely upon the spaceship, especially the complex sealed-cabin system, to fulfill and maintain this requirement. Environmental control is necessary, particularly with regard to carbon dioxide, carbon monoxide from smoking, overheating of equipment and fires, ammonia from urine, methane and hydrogen from flatus, evaporation of sweat and glandular excretions of the skin, and indole, skatole, H_2S, phenol, and various amines from the feces. This may necessitate the conservation of materials by conversion and recycling.

761

Konecci, E.B. and A.J. Carah, and S. Deutsch 1960 HUMAN FACTORS IN MISSILES AND SPACE SYSTEMS DESIGN
(American Rocket Society ARS Anatomy of Manned Space Operations Conference, October 10-12, 1960)

ABSTRACT: Couglas Aircraft Company, Inc. looks upon human factors and life sciences activities as an integral and necessary part of the design processes of missile and space systems, and its hardware. Such activity has become accepted as useful and necessary by the designers, primarily as a result of positive benefits already demonstrated.

762

Konikoff, J. J. 1961 SPACE FLIGHT ECOLOGIES
(Space Sciences Laboratory, General Electric, Missile & Space Vehicle Dept.) Report R61SD200; ASTIA AD-268 509; Dec. 1961

CONCLUSIONS: Two systems have been described in this paper for the support of human life in sealed space vehicles. The first system, a partially closed ecology, has a number of important advantages: 1) It is composed of subsystems which have been found to be feasible by experimental methods. 2) As a result of this feasibility and the regeneration and recovery of man's metabolic waste materials, large weight savings can be effected over a finite flight time. 3) Since the subsystems comprise known reactions and to a great extent known yields from these reactions, the so-called lead time in assembling such a complete life support system should be relatively short. In fact, it is estimated that within perhaps one to two years a system of the type described could be assembled and tested. This latter point is of great importance when it is remembered that multi-manned cis-lunar flight experiments are currently being planned for the immediate future.
The second ecological system presented is a much more ambitious one and requires a considerable amount of research and development. Not only is research necessary with respect to the metabolism of algae, but appropriate equipment must be designed for such things as equilibrium maintenance, waste management and food processing. In addition, the very considerable problem concerning the utilization of light by the cell and the source of this light is of prime importance. The search should continue to find better strains of micro-organisms or to optimize those strains that are now being used. The system described appears to offer the greatest promise for the indefinite (planetary station) or extremely long flight time. (AUTHOR)

763

Koochembere, C.T 1952 HUMAN FACTORS RELATIVE TO THE PROBLEM OF ESCAPE-EJECTION ACCELERATIONS. (Paper, Conference on Problems of Emergency Escape in High Speed Flight, 29-30 Sept. 1952, at Wright-Patterson AFB, Ohio) ASTIA AD-14 347

ABSTRACT: This paper concerns itself with research work associated with ejection accelerations and how this data has been utilized in the development of equipment that will safely eject pilots from high performance aircraft. German and British experiments on human tolerance to acceleration are reviewed. On the basis of the data obtained in these experiments, the Martin Baker Aircraft Company developed a high-performance catapult, on which test subjects were exposed to 17-21 g over periods from 0.15 - 0.25 seconds. No injuries or undesirable side reactions were sustained. The firm developed a face curtain "for effectively maintaining the proper body and head position and relieving some fo the loading on the vertebrae during ejection strokes without injury or notable discomfort.

764

Korol'kov, O. N. 1961 CALCULATING THE LOAD FLOOR OF AN AIRCRAFT. Izvestiya Vysshikh Uchebnykh Zavedeniy Aviatsionnaya Tekhnika No. 3, pp. 78-88, 1961 (Translation Services Branch, Foreign Technology Division, Wright-Patterson AFB, Ohio) Translation No. FTD-TT-61-204/1+2; ASTIA AD-269 152; 7 Dec. 1961

CONCLUSIONS: (1) The elasticity of the fuselage does exert a considerable effect on the magnitude of bending moments of non-sandwiched longitudinal beams.
(2) In some instances, when on account of fuselage elasticity there is a sharp rise in the calculated moments of the beams, it is more convenient to change intc longitudinal sandwich beams.
(3) The approximate method of calculating floor cover with consideration of fuselage elasticity, suggested in the report, is very simple and warrants sufficient accuracy for practical calculations. (AUTHOR)

765

Korsak, K. 1960 TRAJECTORIES OF OBJECTS EJECTED FROM AIRCRAFT. Can. Aeron. Journal 6(1):3-9 Jan. 1960

ABSTRACT: A method of calculating the trajectories of objects, such as occupied seats or capsules ejected from an aircraft is presented.

766

Kramer, S.B. & R.A. Byers 1960 A MODULAR CONCEPT FOR A MULTI-MANNED SPACE STATION
In: Proceedings of the Manned Space Stations Symposium, (New York: Institute of Aeronautical Sciences, 1960) Pp. 36-73

ABSTRACT: Contains a section on the Micro-Ecology which is broken down into the following subsections: Biochemical (Respiratory, Nutritional, Waste); Psychological (Termal, Vibratory and Aurol, Gravitational); External Phenomena (Radiation, Meteors); and Hardware (Micro-Atmosphere System, Equipment Weights plus Power).

767

Kooy, J.M.J. 1952 SOME PROBLEMS OF INTERPLANETARY TRAVEL
Ing. 64:37-45, 1952

ABSTRACT: "Calculation of satellite vehicle and escape vehicle. Discussion of overall mass-ratio as a function of exhaust velocity and acceleration."
Brit. Interplan. Soc. J. 12:85, Mar. 1953

768

Kresser, S.L. & R.J. Sippel 1962 PUBLICATIONS OF THE JET PROPULSION LABORATORY, JULY 1961 THROUGH JUNE 1962
(Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena, Calif.) JPL Bibliography 39-3 NASA Contract NAS7-100

ABSTRACT: This bibliography has been divided as follows: author, index, summary publications, astronautics information, numerical index, and subject index.

769

Kuklewicz, E. F. 1950 STATIC ULTIMATE LOAD OF FOUR MAN TROOP SEAT WITH REINFORCED CANVAS SEAT BOTTOM. (Fairchild Aircraft - Hagerstown, Md.) (LT110-722) Test Model C-119B, 25 Aug. 1950 ASTIA ATI 135 824.

770

Kuntz, W.H. 1946 PILOT EJECTION SEAT TESTS AT MUROC ARMY AIR FIELD. (Engng. Div., AMC, Wright-Patterson AFB, Dayton,Ohio) July 1946. ASTIA ATI 43122

ABSTRACT: Report is given of pilot ejection seat tests conducted from an F-61B fighter. Detailed description and general remarks are given for each test. Curves showing the trajectory of seat and dummy with respect to the test airplane after ejection are included. Still prints from the motion picture records of the tests are given. It is concluded that this pilot ejection seat is satisfactory for ejecting a 200-lb dummy and parachute equipment from an airplane in flight up to velocities of approximately 290 mph IAS at 12,000 ft altitude. Automatic devices are satisfactory for releasing the lap belt and the dummy's parachute when proper inspection is applied. Recommendations are given for future tests.

771

Kuntz, W.H. 1948 THE DORNIER 335 PILOT EJECTION SEAT. (LeBoeuf Co., Dayton, Ohio) Report 2-R-001, Feb. 1948. ASTIA ATI 54820

ABSTRACT: The Dornier 335 pilot ejection seat was evaluated to determine if the system or any features thereof might be of value to the USAF in developing ejection seats as a means of emergency escape from high speed aircraft. The seat was ejected by a piston type catapult utilizing compressed air as a source of energy, and the system produced an ejection velocity of approximately 57.4 fps at maximum accelerations of approximately 25 g. The system is described in detail, including performance data and a comparison of Dornier 335 and USAF ejection systems. The complete Dornier installation was studied to determine the relationship between the various components of the system, and the measurements of significant features were recorded. It was found that there are no advantages of this system over the present USAF ejection system utilizing a powder charge catapult.

RESTRAINT, PROTECTION, AND EMERGENCY ESCAPE SYSTEMS

772

Lafferty, R.E., R. Graetzer 1957 A STRAIN GAUGE METHOD OF MEASURING WIND-BLAST ON FLIGHT HEADGEAR. WADD TR 57 204, ASTIA AD 118169

ABSTRACT: The headgear, such as helmets, oxygen masks, etc., worn by pilots must be able to withstand the windblast conditions encountered during emergency ejection from a moving aircraft. During the course of the tests herin described, strain gauges were used to measure the forces exerted by the windblast. When plotted, the data obtained gave qualitatively consistent graphs, and when correlated with high speed motion pictures of the test runs, indicated this method of instrumentation to be a feasible means for windblast force measurements.

773

Laine, C. O. 1961 EVALUATION OF ARMY PARACHUTE, PERSONNEL, TYPE A/P28S-3. (Air Force Flight Test Center, Edwards AFB, California) Addendum II to AFFTC-TR-61-37; ASTIA AD-261 954; Aug. 1961

ABSTRACT: This addendum presents the recommended procedures and techniques for using the "Army Free-Fall Parachute Assembly, A/P28S-3" in conjunction with C-130 C-119, C-123, C-54, C-47, SA-16, and U-1A (Army) aircraft. (AUTHOR)

774

Laine, C.O. 1962 TESTS OF H. KOCH AND SONS, INC., PARACHUTE HARDWARE. (Air Force Flight Test Center, Edwards AFB, Calif.) Technical Documentary Rept. no. 62-36, ASTIA AD- 292981, Nov. 1962

ABSTRACT: This report presents the results of testing experimental personnel parachute hardware designed by Koch and Sons, Inc., Corte Madera, California.

The test items were adjustable connector assemblies, Koch P/N015-10236-1 and canopy release assemblies, Koch P/N015-10217-9. The test items were installed on standard parachute pack and harness assemblies, P/N 51J7730.

The purpose of the tests was to determine the structural strength of the parachute hardware by subjecting it to dynamic loads of 7000 to 9000 pounds and to determine the suitability of the parachute hardware for use on personnel parachutes designed for emergency escape from Century type aircraft by conduct of live jump parachute tests.

The parachute hardware withstood the required dynamic load tests without any deformation. All test parachutists commented favorably on wearing comfort and ease of operation. The experimental parachute hardware is considered suitable for use on personnel parachutes

775

Lakeman, G. M. 1961 SAFETY AND EMERGENCY EQUIPMENT FOR AIRCRAFT CREWS - BIBLIOGRAPHY.
(Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, Den Haag, Nederland) Rapport TDCK Nr. 24600A. ASTIA AD 256 063.

ABSTRACT: This bibliography contains a list of reports, articles and other materials on safety- and emergency equipment for aircraft crews. Sources of materials were compiled from the files of the Netherlands Armed Services Technical Documentation and Information Center, the Central Luchtvarrt Documentatie Dienst and the Index Aeronautics from 1954-1961.

776

Lambert, E.H. 1945 COMPARISON OF THE PHYSIOLOGIC EFFECTS OF POSITIVE ACCELERATION ON SUBJECTS IN THE MAYO CENTRIFUGE AND IN AN A-24 AIRPLANE
(Army Air Forces Materiel Center) Contract No. w(33-038) ac-9166; August 1945; ASTIA ATI 13248

ABSTRACT: An RA-24A Douglas Dauntless dive bomber has been equipped for study of the physiologic effects of positive acceleration on the human subject in flight. The physiologic changes studied in the airplane were the visual symptoms, the changes in the ear pulse, the blood content of the ear and the pulse rate. Motion pictures of the subjects we e taken in many instances. G tolerance as measured by the occurrence of visual symptoms was on the average 0.7 g higher in the airplane than on the Mayo centrifuge. The level of acceleration at which loss of the ear pulse occurred was on the average 0.5 g higher in the airplane. The observations included in this study establish the essential similarity of the effects of positive acceleration on subjects in the airplane and on the centrifuge. They support the validity of applying the results of centrifuge studies to conditions of actual flight

777

Lambert, E.H. 1945 COMPARISON OF THE PHYSIOLOGIC EFFECTS OF POSITIVE ACCELERATION ON SUBJECTS IN THE MAYO CENTRIFUGE AND IN AN A-24 AIRPLANE (Submitted to Nat'l. Research Council, Sept. 1945, and as memo. rept. to Aero Medical Lab., Wright Field, Oct. 1945) CAM Report #467

ABSTRACT: This study was undertaken to determine whether or not there are differences between the subjective and objective physiologic changes which occur in human subjects as a result of exposures to positive acceleration on a centrifuge as compared with those which occur in an airplane. The pulse rates of the subjects both prior to and during exposure to acceleration were higher in the airplane than they were on the centrifuge. On the other hand, the actual cardiac acceleration resulting from exposure to a given magnitude of acceleration was less in the airplane than on the centrifuge, while the increase in pulse rate on exposure to accelerations which produced an equal degree of impairment of vision was almost the same in the two instances. The general pattern of the change in pulse rate during exposure to acceleration was the same in the airplane and centrifuge, although like other events the maximum cardiac acceleration was attained slightly earlier in the airplane.

778

Lambert, E. H. 1945 COMPARISON OF THE PROTECTIVE VALUE OF AN ANTIBLACKOUT SUIT ON SUBJECTS IN AN A-24 AIRPLANE AND ON THE MAYO CENTRIFUGE (Mayo Aero Med. Unit Memo Rept. to AAF Material Center. Contract No. W(33-038) ac-9166. Serial Rept.: Series B, No. 2)
See also: J. Aviation Med. 21(1):28-37, Feb. 1950.

779

Lambert, E.H. 1945 COMPARISON OF THE PROTECTIVE VALUE OF AN ANTIBLACKOUT SUIT ON SUBJECTS IN AN A-24 AIRPLANE AND ON THE MAYO CENTRIFUGE. CAM Report #487, October 1945

780

Lambert, E. H., & E. H. Wood 1952 SOME FACTORS WHICH INFLUENCE THE PROTECTION AFFORDED BY PNEUMATIC ANTI-G SUITS. J. Avia. Med. 23:218-228

781

Lamport, Hoff & Herrington 1944 REVIEW OF METHODS OF APPLYING AIR PRESSURE TO THE EXTREMITIES FOR PROTECTION AGAINST ACCELERATION WITH MEASUREMENTS OF THE EFFECTIVE PRESSURES ON THE SKIN
(National Research Council, Committee on Aviation Medicine, Washington, D.C.)
CAM Rept. No. 228; 24 November 1944

782

Lamport, H. & L.P. Herrington 1944 CENTRIFUGE TESTS OF THE PNEUMATIC LEVER ANTI-"G" SUIT
(National Research Council, Committee on Aviation Medicine, Washington, D.C.)
CAM Rept. No. 368; 14 June 1944

ABSTRACT: Nine male subjects tested the PLS inflated to 1.14 to 1.85 psi on the Wright Field Centrifuge. Overall protection against all visual symptoms was 1.38 "g". Roughly equal protection was obtained against all visual symptoms The PLS suit offers promise of cooler anti-"g" device than those suits where pressurized bladders cover large areas of the body.

783

Lamport, H., & L. P. Herrington 1944 PRESSURE EXERTED ON THE LOWER EXTREMITY BY THE LATEST MODELS BERGER SINGLE PRESSURE ANTI-"G" SUIT AND PNEUMATIC LEVER ANTI-"G" SUIT. (Yale) CAM No. 294; 27 March 1944

ABSTRACT: (a) The pressures imparted to the tissues of the leg by latest models pneumatic Berger single pressure suit and Yale pneumatic lever suit were measured during inflation with acceleration.
(b) Berger SPS gives maximum pressure on calf, the PLS gives gradient pressure decreasing from ankle to the thigh.
(c) The PLS gives much more uniformity of pressure at any given level than the Berger SPS.
(d) Berger SPS is painful over the thighs without acceleration when inflated higher than 7 psi. The PLS is not painful.
(e) It is thought that uniformity of pressurization and provision of gradient pressure might give added "g" protection to PLS.
(f) Further development of PLS and its trial in centrifuge and plane seems indicated

784

Lamport, H., W.C. Clark & L.P. Harrington 1945 THE COMFORT AND ACCELERATION PROTECTION ON THE CENTRIFUGE OF THE L-12 PNEUMATIC LEVER ANTI-BLACKOUT SUIT
(National Research Council, Committee on Aviation Medicine, Washington, D.C.) CAM Rept. No. 483; 1 May 1945

ABSTRACT: Comparison between Pneumatic lever suit and the G-4 suit. Subjects preferred lever suit assuming each gave equal protection.

785

Lamport, H. & L.P. Harrington 1945 TEST OF THE GENERAL ELECTRIC ACCELERATION ACTIVATED AIR PRESSURE REGULATOR (P-321-14) AND VALVE (P-321-13)
1 May 1945

786

Langner, F. C. 1960 CONDUCT STUDY, DESIGN, DEVELOP AND FURNISH PROTOTYPES OF ENERGY ABSORPTION SYSTEMS FOR AIRCRAFT SEATS (Aerotec Industries, Inc., Aerotherm Div., Bantam, Conn.) Contract NOas 57-367-c; ASTIA AD-272 672; 30 March 1960

ABSTRACT: This investigation proved a tube and die energy absorption system can be mounted on a catapult tube and be secured to the ejection seat by its trunnion bolts.
The energy absorber unit was statically and dynamically tested to prove its reliability and load qualities. Final design consists of a 3-1/8" dia. x .049" 4130N steel draw tube secured to the catapult tube by a threaded adapter. A trunnion mounted die is fastened to the ejection seat with two brunnion bolts. The die and its guide sleeve have a maximum O.D. of 3.250" while the inner drawing surface is 2.975" diameter. Provisions are made for 4" of E/A motion with a loading of 7600 lbs. The completed unit weighs 3.31 pounds.
The second phase of this report showed that a tube and die vertical energy absorption system can be adapted to a crew member seat. The energy absorption unit was tied in with the vertical adjustment of an Aerotherm Model 442 Helicopter seat to provide 2" of energy absorber motion when the seat was fully down and 4" maximum movement when the seat is 2" above the lowest point. During static seat test the energy absorption units operated satisfactory. The energy absorption prototype units secured to the three 442 seats use a 7/8" x .035" 4130N steel draw tube with a die I. D. of .851" diameter. These units will go into operation when a 4810 lb. down load is applied to the 442 seat. The E/A units weigh .89 pounds each while the total conversion adds 5.8 pounds to the original seat.

The tube and die energy absorber system possess the following characteristics desirable for an efficient system.
(1) Constant loading during the complete energy absorption cycle.
(2) Reliability of operation
(3) Irreversibility can be incorporated with few additional parts.
(4) Adaptability can readily be accomplished on ejection and crew seats
(5) Low weight energy absorption system.
(6) Simplicity of design for low manufacturing costs.
(AUTHOR)

787

Lansberg, M.P. 1955 ON THE ORIGIN OF THE UNPLEASANT SENSATIONS ELICITED BY MOVEMENTS DURING AFTER-SENSATIONS.
Aeromed Acta (Soesterberg), 4:67-72

788

Lanz, R. C. 1948 KINETIC MEASUREMENTS ON A PILOT-DUMMY EJECTED FROM A P-82 AIRPLANE (Air Materiel Command, Wright-Patterson AFB, Ohio) Rept. MCREXAS-45341-3-4, 11 March 1948; ATI No. 22026

ABSTRACT: Tests were made to obtain data relative to the forces experienced by a pilot-dummy when ejected upward from high-performance aircraft by means of a catapult. Tests were made with a P-28 airplane. The measuring instrumentation consisted of a multi-channel recording oscillograph in conjunction with resistance-type acceleration, air pressure, and position transmitters. It was concluded that rearward accelerations become more critical at airspeeds above 430 knots and that armor plate should be attached to the ejection seat rather than the fuselage to reduce this acceleration. (ASTIA)

789

Lappin, A.N. 1949 DESIGN OF ROTATABLE SEAT FOR ACCELERATION ALLEVIATION (Cornell Aeronautical Laboratory, Inc., Buffalo, New York) December 1949; Report BC-531-S-16; ASTIA ATI 125 505

ABSTRACT: The rotatable seat, described in this report, is an acceleration sensitive device which automatically causes the pilot's or passenger's body to be oriented into a position which greatly increases his tolerance to high acceleration.

790

Latham, F. 1953 ANALYSIS OF EJECTION SEAT ESCAPES.
(Inst. Aviation Med., R.A.F., Farnborough) FPRC Rept. 851

791

Latham, F. 1955 PHYSIOLOGICAL REQUIREMENTS OF EJECTION SEATS.
(Inst. of Aviation Med., R.A.F., Farnborough) FPRC Memo 63, Sept. 1955

792

Latham, F. 1957 LINEAR DECELERATION STUDIES AND HUMAN TOLERANCE.
(Flying Personnel Research Committee, Gt. Brit.) FPRC Rept. No. 1012; June 1957. ASTIA AD 141 044.

ABSTRACT: The limits of physiological tolerance to linear deceleration lasting 0.2 to 0.4 secs. have been assessed for subjects wearing four types of Service torso-restraining harnesses without limb restraint. A combined harness alone, which is proposed for use in Service aircraft, should give protection up to 17 g, but above this figure serious injury is likely. If additional leg-restraint is employed, it is considered that the safe limit may be raised to at least 20 g. Above this figure arm, leg and head restraint, and a jerk in harness should give protection up to 25 g. Attention is drawn to the possible mechanism of injury to the larynx, face and chest. Peak intra-abdominal pressures of 450 mm. Hg, at 12 g have been recorded in a test subject. When the test subjects were relaxed prior to impact a protective extensor response in the lower limbs tending to brace the subject against the rudder pedals was not detected less than 100 milliseconds after impact. (Author)

793

Latham, F. 1957 A STUDY IN BODY BALLISTICS. SEAT EJECTION.
Proc. Roy. Soc. B. 197: 121-139, Aug. 1957
See also: (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. No. 1016, Jan. 1957

ABSTRACT: To define the upper limits of tolerance for short-duration accelerations acting through the vertical axis of the body, subjective reactions from tests in vertical ejection rigs were assessed. Accelerometers on the head and waist recorded up to 30 g lasting 0.01 to 1.0 sec. Frequency and damping characteristics of the man-seat system were determined by vibrating the system over

the frequency range of 1 to 20 c./sec., and by use of sledge-hammer and seat-drop experiments. Tolerance was found to be conditioned by the force-time function of the ejection gun, the alignment of the body and seat, and the dynamic characteristics of the seat pack. For minimum overshoot of acceleration in the body the optimum duration of force was 0.23 sec. Low-frequency response of the man was the important variable, Previously defined limits of thrust should be adhered to as anatomical limits. Maximum overshoot in the body would result with a rate of acceleration change increased to 400 g/sec.

794

Latham, F. 1958 LINEAR DECELERATION STUDIES & HUMAN TOLERANCE
Clin. Sci. 17(1):121, Feb. 1958.

ABSTRACT: The physiological effects of decelerations up to 16 g, with a maximal rate of change of 300 g/second, were studied in human subjects on a rocket-propelled trolley apparatus. Four types of restraining harness were compared, including a conventional Royal Force "Z" harness comprised of shoulder and lap straps, a four-point harness incorporating leg (crutch), lap, and shoulder straps, and two three-point variations of the latter harness. Decelerations up to 12 g were found to produce no undue discomfort or bruising with any harness tested, provided that the head was flexed to an angle of 45° prior to impact. Above 12 g, bruising in the region of the lap belt and shoulder straps occurred, particularly in the absence of crutch straps. Location of the feet in aircraft rudder pedals resulted in a noticeable reduction in lap belt load, although no reflex leg muscle action could be distinguished until 100 milliseconds after the start of deceleration. Peak intra-abdominal pressures of 200-450 mm. Hg were recorded during deceleration. Electrocardiograms were normal immediately following impact, and pulse rates returned to normal resting rates (from 100-140 beats/minute during runs) within several minutes. It is concluded that the leg, lap, and shoulder harness gives protection up to 17 g but that serious injury is likely above this level. It is suggested that the safe limit of deceleration might be increased to 20 g with additional leg restraint, and to 25 g with a jerkin harness and arm, leg, and head restraints.

795

Laughlin, C. P. and W. S. Augerson 1961 PHYSIOLOGICAL RESPONSES OF THE ASTRONAUT IN THE MR-4 FLIGHT. (Results of the Second U. S. Manned Suborbital Space Flight, NASA Manned Spacecraft Ctr) Pp. 15-21, 21 July 1961.

796

Laurell, L. 1959 MEDICAL ASPECTS OF ESCAPE WITH EJECTION SEATS IN THE SWEDISH AIR FORCE. Medd Flyg Navalmed Namnd 8(2):1-6

797

Lautier, R.A. 1942 PILOT'S SEAT UNIT PROOF LOAD TESTS OF NO. 214-MODEL XAT-15. (Boeing Airplane Co., Wichita Div., Kans.) Report No. x120-6324, ASTIA ATI 104 196, Jan 1942

STRACT: It is concluded from the tests made and from a study of the deflection curves which are a part of this report that, since the deflection points of various parts of the chair when plotted are all approximately straight lines, no part of the unit exceeded the elastic limit of the material used and is, therefore, sufficiently strong as now supplied.

798

Lautier, Roger A. 1942 PROOF LOAD TEST - PILOT'S SEAT - MODEL XAT-13 & 14 Warren McArthur Corporation, Bantam, Conn.; Fairchild Engine and Airplane Corporation, Aircraft Div., Hagerstown, Md.) Engineering Report No. 7709 ASTIA ATI 110 521

ABSTRACT: The purpose of the test described in this report was to apply static loads simulating the forces of acceleration on the #203 Pilot's Seat Unit to determine it's behavior while under Proof Loads. In each test 20% of the ultimate load was directly applied to the unit to remove any slack in the joints. Additional loads were applied in 20% increments by means of weights on a platform suspended from a whiffle tree or equivalent in order that after each increment was added the platform might be raised leaving only the initial 20% load. In this manner any set would be noted and plotted to warn of incipient failure. Measurements were taken by means of sliding wooden deflection guages clamped to the seat unit and test rig. All deflections were noted and plotted during the tests. In addition, photographs were taken at the 20% and proof loads, which negatives were later superimposed and the resulting positive prints show the behavior of all parts under the loads applied. The results of the tests showed that the seat unit withstood the applied loads without failing or retaining any permanent set.

799

Lautier, R.A. 1942 PROOF LOAD TEST - CO-PILOT'S SEAT - MODEL XAT-13 and 14 (Fairchild Engine and Airplane Corp., Aircraft Div., Hagerstown, Md.) Eng. Report No. 7710, ATI 109-433

ABSTRACT: The purpose of this report is to describe the results of tests in which static loads simulating the forces of acceleration were applied to the #204 Co-Pilot's Seat Unit to determine its behavior up to Proof Loads. Referring to the curves incorporated in this report which show the deflection of various parts while under the different loads, it will be noted that the deflections form approximately straight lines or form only the elastic portion of the materials used. Points below 20% of the ultimate loads should be neglected because their co-ordinates do not reflect true values due to the slack in the joints. It may be concluded therefore, that the seat unit is sufficiently strong as now supplied.

800

Lautier, Roger A. 1942 PROOF LOAD TEST - RADIO OPERATOR SEAT - MODEL XAT-13 and 14
Warren McArthur Corporation, Bantam, Conn. (Fairchild Engine and Airplane Corporation, Aircraft Div., Hagerstown, Md.) Engineering Report No. 7711 ASTIA ATI 110 522

ABSTRACT: The purpose of the test described in this report was to apply static loads simulating the forces of acceleration on the #205 Radio Operator's Seat Unit to determine its behavior up to Proof Loads. In each test 20 percent of the ultimate load was directly applied to the seat unit to remove any slack in the joints. Additional loads were applied in approximately 20 percent increments by placing weights on a platform suspended from a whiffle tree or equivalent in order that after each increment was added the load might be raised leaving only the initial load. In this manner any set would be noted or probable failure looked for. Measurements were taken by means of sliding wooden deflection gauges clamped to the seat unit and to the test rig. All deflections were noted and plotted to warn of incipient failures. In addition, photographs were taken at the 20 percent and proof loads, which negatives were later superimposed and the resulting positive print shows the behavior of all parts under the loads applied. The results of the tests showed that the seat unit supported the loads applied without collapsing or any parts thereof retaining a permanent set.

801

Lautier, Roger A. 1942 PROOF LOAD TEST - NAVIGATOR'S SEAT - MODEL XAT-13 & 14 (Warren McArthur Corporation, Bantam, Conn.; Fairchild Engine and Airplane Corporation, Aircraft Div., Hagerstown, Md.) Engineering Report No. 7712 ASTIA ATI 109 434

ABSTRACT: The purpose of the test described in this report was to apply static loads simulating the forces of acceleration on the #206 Navigator's Seat Unit to determine its behavior up to proof loads. In each test 20 percent of the

ultimate load was directly applied to the seat unit to remove any slack in the joints. Additional loads were applied in approximately 20 percent increments by placing weights on a platform suspended from a whiffle tree or equivalent in order that after each increment was added the load might be raised leaving only the initial load. In this manner any set would be noted or probably failure looked for. Measurements were taken by means of sliding wooden deflection gauges clamped to the seat unit and to the test rig. All deflections were noted and plotted to warn of incipient failures. In addition, photographs were taken at the 20 percent and proof loads, which negatives were later superimposed and the resulting positive print shows the behavior of all parts under the loads applied. The results of the tests showed that the seat unit supported the loads applied without collapsing or any parts thereof retaining a permanent set.

802

Lawrence, M.L., J.W. Macmillan and associates 1946 ANNOTATED BIBLIOGRAPHY ON HUMAN FACTORS IN ENGINEERING DESIGN.(Aviation Branch, Research Division, Bureau of Medicine and Surgery, Washington, D.C.) Project X-651, Feb. 1946, Astia ATI 82599

ABSTRACT: An attempt has been made to present such information as could be found concerning human factors in the operation of military equipment. Among topics considered are the following:

Anthropometric Data: Physical measurements, Dynamometric measurements.
Physiology: Bodily movements, Work performanc.
Psychology: Measurements of performance, Training.
Instruments: Facing, Illumination, Methods of indication, Association, Auditory factors.
Controls: Shape and coding, Movement, Placement, Sequence of operation.
Work Place: Positioning, Visual Fields, Safety.
Group operations.

803

Lawton, Alfred H. 1952 HUMAN FACTORS IN THE OPERATIONS AND DESIGN OF AIRCRAFT Journal of Aviation Medicine 23: 254-258 & 306

ABSTRACT: Human factors in aviation embrace three broad divisions: (1) aviation medicine, which familiarizes pilots with their equipment, safety measures, and preventive medical aspects; (2) human engineering, which analyses limitations

of human response to the aircraft and its equipment; and (3) human resources which relate to selection, classification, aptitude measurement, training, and human relations, taking into the account the diversified nature of human beings. Psychophysiological aspects of noise, vibration, use of pressurized cabins, use of ejection seats and all kinds of protective equipment, and the impact of speed are discussed. Animal experiments have a great value in furthering research but ultimately each device, method, and principle has to be tested by "human guinea pigs."

804

Lay, W. E. and Fischer, L. C. 1940 RIDING COMFORT AND CUSHIONS. SAE J. 47:482-96. Dec. 1940.

805

Lee, P.A. 1946 INJURIES TO AIRCREW FROM THE CHEST-TYPE PARACHUTE. (Flying Personell Research Committee, Air Ministry) F.P.R.C. Report #658a, May 1946

806

Lehmkohl, J.C. 1947 SPINAL ACCELERATION MEASUREMENTS ON A PILOT-DUMMY EJECTED FROM A P-61 AIRPLANE IN FLIGHT
(Army Air Forces, Materiel Command, Engineering Division) Serial No. TSEAC12A-45341-2-5, 1 July 1947; ASTIA ATI 10 794

ABSTRACT: It is concluded that the existence of a vibrating system; consisting of the ejection seat, the cushioning media, and the dummy; which induces the high peak accelerations is further substantiated by the results of these tests. The peak values of spinal acceleration, as recorded, exceed the present known physiological tole ances of a human subject. The weight of the ejection charge has a very small effect on the peak value of spinal acceleration. The primary factor effecting the magnitude of the spinal acceleration peak is the angle of ejection. Within 0.15 seconds after the catapult separation the spinal acceleration of the dummy stabilizes at approximately -2g for the duration of the record It is recommended that ground tests be conducted to obtain additional data concerning the effect of ejection angle. Corrective action be taken towards the modification of the means of cushioning in order to eliminate or reduce the excessive peak accelerations. (Author)

807

Lent, C.P. 1962 MOBILE SPACE SUIT
(U.S. Patent 3, 034, 131, May 15, 1962.)

ABSTRACT: A high-altitude inflatable aviation suit is described and illustrated which is made of flexible material to withstand internal pressures and to flex freely. The neck section includes an attached air-tight helmet.

808

L..., R.C. 1946 KINETIC MEASUREMENTS ON A PILOT-DUMMY EJECTED FROM A P-61 AIRPLANE IN FLIGHT. (Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio) ASTIA ATI 42654, July 1946

ABSTRACT: Data are presented relative to the forces which act on a pilot-dummy when subjected to ejection by a catapult mechanism from an F-61 fighter airplane in flight. It was ascertained that the average velocity of ejection obtained in these tests closely approximates the velocity for which the catapult was designed. The vertical acceleration, as recorded for the peak values, exceeds the present known physiological tolerance of a human being.

809

Lenz, Ralph 1948 KINETIC MEASUREMENTS OBTAINED DURING PILOT-DUMMY EJECTIONS FROM A P-80B AIRPLANE
(Engineering Division, Air Materiel Command, Wright-Patterson AFB, Ohio)
Serial No. MXREXA8-45341-3-8 August 1948 ASTIA ATI 40805

ABSTRACT: A study is made of the kinetic measurements obtained during pilot-dummy ejection from an F-80B fighter. It was found that the M-1 (service) catapult, containing the M-28 (service) cartridge, attained a practical optimum in ejection acceleration pattern while slightly exceeding the minimum required standard ejection velocity. The neck of the catapult does not meet the general structural requirements under ground test ejection conditions. Following catapult separation, the inside tube assembly of the catapult attained sufficient kinetic energy in its upward swing to impart a strong forward turning moment to the seat upon contact with the seat trunnion. Recommendations are given for further testing of this equipment.

810

Lenz, R. C. 1948 KINETIC MEASUREMENTS ON A PILOT-DUMMY EJECTED FROM A P-82 AIRCRAFT. (Air Material Command, Wright-Patterson AFB, Ohio) Rept. No. MCREXA-8-45341-3-4, March 1948.

ABSTRACT: Tests were made to obtain data relative to the forces experienced by a pilot-dummy when ejected upward from high-performance aircraft by means of a catapult. Tests were made with a P-33 airplane. The measuring instrumentation consisted of a multiple-channeled recording oscillograph in conjunction with resistance type acceleration, air pressure, and position transmitters. It was concluded that rearward acceleration becomes critical at airspeeds above 430 knots and that armor plate should be attached to the ejection seat rather than the fuselage to reduce this acceleration.

811

Leverett, S. D., Jr., R. U. Whitney, and G. D. Zuidema 1961 PROTECTIVE DEVICES AGAINST ACCELERATION. (In Gauer, O. H. and G. D. Zuidema, Gravitational Stress in Aerospace Medicine) (Boston: Little, Brown, and Co., 1961). Pp. 211-220

812

Levy, P. M., D. J. Sekinger & R. S. Stone 1961 A DISCUSSION OF THE NATURE AND SOURCE OF INJURY EXPERIENCED BY AVIATORS EJECTING FROM F9F-8T COUGAR UTILIZING MK-45 SEAT.
Paper, Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Material Center, Philadelphia, Pa. 14-15 June 1961.

ABSTRACT: An analysis of nine aviators ejecting in the MK-45 seat revealed that the more serious injuries were related to the ejection per se and were back injuries. Analysis of the MK-45 seat revealed inadequancies relating to improper positioning of the aviators and application of increased ejection forces to the ejecting aviator.

813

Lew, J. 1949 REVIEW OF PROBLEMS OF EMERGENCY ESCAPE BY PARACHUTE JUMP AND EJECTION SEAT
(Cornell Aeronautical Laboratory, Inc., Buffalo, N. Y.)
Report No. BC-531-5-12, Dec. 1949. ASTIA ATI 125 336.

ABSTRACT: To obtain an understanding of the status of the problems of escape from an airplane at high speeds and altitudes, a search was made of

pertinent literature. The existing literature covered only the normal parachute jump and the catapult seat ejection, methods of egress which are satisfactory at maximum speeds of 350 and 550 mph, respectively, and at a maximum altitude of 50,000 feet.

Information is presented on:

the conditions imposed upon the human by the two methods during egress and the descent to earth, and

the reactions of the human body to these conditions.

814

Lewis, B. M. 1955 EFFECT OF INFLATION OF FULL PRESSURE HALF SUIT ON RESPIRATION (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 314; TED ADC AE 1405; 31 Dec. 1955

ABSTRACT: The full pressure half suit has been shown to produce marked pulmonary congestion. This study has attempted to investigate the effects of this congestion on the lungs. In two individuals, from 500 to 700 cc of air is "trapped" in the lungs by inflation of the suit. In three studies this trapping has been strikingly demonstrated by an increase in nitrogen expired during the inhalation of 100% O_2 when the suit was deflated. Diffusing capacity of the lungs is slightly decreased by inflation of the suit. However, because of air trapping this decrease is an apparent, rather than a real, phenomenon.

815

Lewis, B. M., R. E. Forster & E. L. Beckman 1957 THE EFFECT OF INFLATION OF A PRESSURE SUIT UPON PULMONARY DIFFUSING CAPACITY IN MAN. (Naval Air Development Center, Johnsville, Pa.) Rept. no. NADC-MA-5705, May 1957. ASTIA AD 134 510.
See also J. Applied Physiology 12:57-64, 1958.

ABSTRACT: Inflation around the lower half of the body of a tightly fitting pneumatic suit to a pressure of 75 mm Hg was previously shown (AD-62-492) to produce an acute increase in pulmonary arterial and wedge pressures of about 25 mm Hg in normal subjects. The effects of such an increase in pressure upon the pulmonary capillary bed were investigated by measuring the lung diffusing capacity (D_L) for CO at different alveolar O_2 tensions from below 100 mm Hg to above 600 mm Hg in 4 healthy subjects by the 10-sec breath-holding technique of Krogh (J. Clin. Invest. 33:1135-1145, 1954). Measurements with the inflated suit were compared with control measurements taken immediately before and/or after, with the suit deflated. No significant change in mean D_L was produced by inflation of the suit in 11 series of experiments. The true diffusing capacity of the pulmonary membrane (D_M) and the volume of the blood in the pulmonary capillaries (V_C) were also calculated from the value of D_L at different alveolar O_2 tensions. Following suit inflation, D_M fell in 2 subjects and rose in 2 others, while V_C fell in one subject, rose in 2, and was unchanged in 1 subject.

These changes are probably not significant. An underestimate of D_L during suit inflation may have been produced by gas trapping in the lung.

816

Lewis, B. M., R. E. Forster & E. L. Beckman 1958 EFFECT OF INFLATION OF A PRESSURE SUIT ON PULMONARY DIFFUSING CAPACITY IN MAN. J. Appl. Physiol. 12:57-64.

ABSTRACT: Inflation around the lower half of the body of a tightly fitting pneumatic suit to a pressure of 75 mm Hg was previously shown (AD-62-492) to produce an acute increase in pulmonary arterial and wedge pressures of about 25 mm Hg in normal subjects. The effects of such an increase in pressure upon the pulmonary capillary bed were investigated by measuring the lung diffusing capacity (D_L) for CO at different alveolar O_2 tensions from below 100 mm Hg to above 600 mm Hg in 4 healthy subjects by the 10-sec breath-holding technique of Krogh (J. Clin. Invest. 33:1135-1145, 1954). Measurements with the inflated suit were compared with control measurements taken immediately before and/or after, with the suit deflated. No significant change in mean D_L was produced by inflation of the suit in 11 series of experiments. The true diffusing capacity of the pulmonary membrane (D_M) and the volume of the blood in the pulmonary capillaries (V_C) were also calculated from the value of D_L at different alveolar O_2 tensions. Following suit inflation, D_M fell in 2 subjects and rose in 2 others, while V_C fell in one subject, rose in 2, and was unchanged in 1 subject. These changes are probably not significant. An underestimate of D_L during suit inflation may have been produced by gas trapping in the lung.

817

Lewis, D.H. 1955 THE G-PROTECTION PROVIDED BY THE FULL PRESSURE HALF SUIT (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5511, 23 Sept. 1955 ASTIA AD 79 881

ABSTRACT: An evaluation was made of the g protection provided by the full-pressure half suit, and a comparison was made with the protection provided by straining, by the Z-2 suit, and by a combination of the Z-2 suit and a straining. The mean protection which was obtained by 4 experienced subjects in 415 centrifuge runs was 7.4 g with the full-pressure half suit, 1.1 g with straining, 1.2 g with the Z-2, and 2.2 g with the Z-2 plus straining. Maximum suit pressures of 7 and 9 psi were obtained for the full-pressure and Z-2 suits, respectively. No cardiac arrhythmias or circulatory embarrassment was observed at 7 psi with the full-pressure half suit. For the Z-2 suit, straining, and the combination of the two, the g level at which peripheral light loss occurred was selected as the limiting g level. For the full-pressure half suit, abdominal pain due to suit pressurization limited the g level; voluntary straining was not possible, apparently because of respiratory difficulty. For the full-pressure half suit, the pressure required for protection against peripheral light loss was 2 psi/g above the g level at which light loss occurs without the suit; for the Z-2 suit, the value is 3 psi/g. Acceptability of the full-pressure half suit is limited

by excessive cumbersomeness, difficulty in donning, the presence of abdominal pain at maximum suit pressures, and lack of improvement over the combination of the Z-2 suit plus straining.

The maximum protection obtained by our subjects with the full pressure half suit was about the same as that obtained by the combination of the Z-2 suit plus straining.

818

Lewis, Frederick, J. Jr. 1958 MILITARY HELMET DESIGN, (Naval Medical Field Research Laboratory, Camp Lejeune, North Carolina) June 1958 ASTIA AD-209-762

Abstract: A brief history of the design, development, production, and use of helmets is provided, emphasizing the period since the start of World War I. The design of helmet components is discussed, together with the effectiveness and medical, psychological, logistic, and tactical aspects of helmets. Particular emphasis is placed upon the infantry helmet. Recommendations are made for fundamental development and evaluation studies, and a design approach is outlined. A representative bibliography concerning helmets and descriptions of recent foreign helmet developments are included.

819

Lewis, R. E. F. 1959 EMERGENCY ESCAPE FROM TANDEM-CREWED AIRCRAFT (Defence Research Medical Labs., Canada) Reprint from Canadian Aeronautical Journal 5: 187-194, June 1959.

ABSTRACT: The results suggest that escape sequences for a tandem crew can take an excessive period of time when considered in relation to low level incidents demanding escape. In the light of this evidence it is recommended that in tandem-crewed aircraft the ejection seats be so linked together that the pilot, upon deciding that the crew must escape immediately, operates the firing control of his seat which will automatically eject the observed and in turn, himself. Such an arrangement could reduce total escape time for both occupants to approximately 2.5 seconds. However, in order that the observer be properly positioned for ejection, an automatic restraint for the observer would be a mandatory component of a linked system. Furthermore, the observer should be provided with an override which would enable him to eject alone in case where there is ample time for the escape, or should the pilot be incapacitated, e.g. by anoxia. (Author)

820

Lewis, S. T. and J. P. Stapp 1958 HUMAN TOLERANCE TO AIRCRAFT SEAT BELT RESTRAINT
J. of Aviation Medicine 29(3):187-196, March 1958.

ABSTRACT: Human volunteer subjects were decelerated while restrained by a lap belt three inches in width while seated forward-facing in three experimental devices:

1. An aircraft seat hanging by 20-foot cables forming a swing-pendulum, which could be raised and dropped through a measured vertical component and arrested by a steel cable;
2. A sled, on a 120-foot track, propelled by an ejection seat M1-A1 catapult and decelerated by water inertia brakes; and
3. A catapult accelerating a seat by means of rubber shock cords in an 18-foot distance and decelerating it with mechanical friction brakes in thirty inches or less.

Rate of onset, magnitude and duration of force are tabulated for 30 human experiments. Air transport chrash protection is discussed as well as tolerance limits to the application of crash-type mechanical forces of the magnitude investigated by these experiments.

821

Lhotka, D. C. 1962 A PROGRESS REPORT OF THE JOINT NATIONAL EDUCATIONAL SEAT BELT PROGRAM. (In M. K. Cragun, ed., The Fifth Stapp Automotive Crash and Field Demonstration Conference, Sept. 14-16, 1961) Pp. 241-242.

822

Libber, L.M., L.J. Santa Maria, and V. Vaccaro 1958 DEHYDRATION EFFECTS ON MODERATELY HEAT-STRESSED SUBJECTS WEARING A FULL PRESSURE SUIT IN AMBIENT CONDITIONS REQUIRING A HIGH VENTILATING AIR FLOW Jour. Aviation Med., 29(3):241, March 1958

ABSTRACT: A study was made of the dehydration effects produced in resting subject wearing an impermeable full-pressure altitude suit by ventilation at a comfortable level with 90° F. air flowing at a rate of 900 liters/minute. Determinations were made of rectal and skin temperature, pulse rate, total weight loss, evaporative weight loss, weight deficit, and hematologic and urinary values. Comparison with control subjects wearing unventilated summer flying suits at an ambient temperature of 70° F. revealed no severe thermal stress with the full-pressure suit.

823

Libbey, B.W. 1958 EVALUATION MEASUREMENTS OF ENERGY ABSORBING BUMPERS ON TEST VEHICLES.
(Master's Thesis for MS in Me, University of Minnesota, 1958)

824

Liebel, D. A. 1960 THE EJECTION SEAT IS NOT YET OBSOLETE
Society of Experimental Test Pilots Quarterly Rev. 5(2):5-10, Winter 1960.

ABSTRACT: This article describes in detail the Aircrew Escape System known as the "B" seat in terms of the structural and operational characteristics. Also, the extensive series of developmental tests are summarized. (Tufts)

825

Lincoln Laboratory 1956 BIBLIOGRAPHY OF SCIENTIFIC AND ENGINEERING PAPERS 1954-1956
Lincoln Laboratory, Massachusetts Institute of Technology Contract No. AF 19(122)-458 ASTIA AD 24 972

ABSTRACT: This bibliography is composed of journal articles, meeting papers, and theses concerning science and engineering.

826

Lincoln Laboratory 1960 ABSTRACTS, SCIENTIFIC AND ENGINEERING PAPERS, JUNE 1960
Lincoln Laboratory, Massachusetts Institute of Technology Contract No. AF 19(604)-5200

ABSTRACT: This publication lists, by Lincoln Laboratory author, abstracts of articles published in the technical journals and papers presented at meetings of the scientific societies.

Included also are abstracts of work performed under Lincoln sponsorship or by consultants to the Laboratory, and, in Section A, of theses submitted for advanced degrees.

The period covered by this report is July 1, 1956 - April 15, 1960. An earlier edition, published in 1956 and now out of print, includes abstracts from the period July 1, 1954 - June 30, 1956.

827

Lincoln Laboratory 1961 UNCLASSIFIED PUBLICATIONS OF LINCOLN LABORATORY Lincoln Laboratory, Massachusetts Institute of Technology Contract No. AF 19(604)-7400 ASTIA AD 264 714

ABSTRACT: This report lists all technical reports, G-reports, journal articles meeting speeches, technical memorandums, Lincoln Manuals, special reports, and translations published by Lincoln Laboratories.

828

Lindegard, Bengt 1961 STUDIES ON THE EFFECT OF PROPAGANDA FOR THE USE OF SAFETY BELTS IN CARS. International Road Safety and Traffic Review 9:48-49

829

Lindsey, J.F., V. Mazza et al. 1959 EVALUATION OF THE HUMAN FACTORS. ASPECTS OF THE B-58 WEAPON SYSTEM. CATEGORY II DEVELOPMENT TEST AND EVALUATION (Air Proving Ground Center, Eglin AFB, Fla.) Rept. no. APGC-TN-59-73, 25 Feb 1960, ASTIA AD-315 231

ABSTRACT: This study was conducted in conjunction with the Category II Test of the B-58 Weapon System. Test participants who supplied data for analysis include 297 airmen and 23 aircrew, all members of the B-58 Test Force, Carswell AFB, Texas. The significant findings were as follows: (1) areas requiring additional attention include tests to ascertain the superiority of the encapsulated seat ejection system over the open seat ejection system, certain modifications to personal equipment and the present ejection system, usage of personal equipment, and certain ground maintenance problems; (2) sufficient differences were noted between the job descriptions and the actual duties to justify a new AFSC for flight control personnel and additional shredouts for bomb-navigation personnel; (3) the successful accomplishment of the procedures which must be performed during the simulated combat mission considered in the study is regarded to be within the capability of specially selected aircrews; and (4) because of the nonavailability of simulators and two-pilot-position aircraft, inadequate means are presently available for assessing aircrew performance. (U) (Author)

830

Lippert, S. DESIGNING FOR COMFORT IN AIRCRAFT SEATS.
(Douglas Aircraft Co., Inc., Santa Monica Plant, Calif.)
ASTIA ATI-62618,

ABSTRACT: The dimensional and dynamic aspects of seat design are presented in a design sequence based on fitting groups on which statistically reliable measurements are available. The graphs and tables incorporate data from many seat and related studies and form a working body of information for the seat designer and for the seat purchaser.

831

Lippert, S. 1948 A BIBLIOGRAPHY OF SEATING
(Douglas Aircraft Co., Inc., Santa Monica, Calif.) Rept. No. SM 13425, 14 Dec. 1948

832

Lippert, S. 1948 "PASSENGER COMFORT": A BIBLIOGRAPHY OF COMPANY LITERATURE. (Douglas Aircraft Co., Santa Monica Division, Santa Monica, California) Report no. SM-20163. 26 Aug 1946, revised 2 Nov. 1948

833

Lippert, S. 1949 DESIGNING FOR COMFORT IN AIRCRAFT SEATS.
(Douglas Aircraft Company, Inc., Long Beach, Calif.)
Report No. SM-14741, 7/20/49, revised 10/10/52 and 5/15/53

ABSTRACT: The dimensional and dynamic aspects of seat design are presented in a design sequence based on fitting groups on which statistically reliable measurements are available. The graphs and tables incorporate data from many seat and related studies and form a working body of information for the seat designer and for the seat purchaser. (AUTHOR)

834

Lippert, S. 1953 DESIGNING FOR COMFORT IN AIRCRAFT SEATS. (Douglas Aircraft, Santa Monica Div.) Rept. No. SM-14741.

ABSTRACT: The dimensional and dynamic aspects of seat design are presented in a design sequence based on fitting groups on which statistically reliable measurements are available. The graphs and tables incorporate data from many seat and related studies and from a working body of information for the seat designer and for the seat purchaser.

835

Lippert, S., J. A. Graves & B. A. Rasmussen 1955 A PHILOSOPHY OF AIRCRAFT SEAT DESIGN (Santa Monica Div., Douglas Aircraft Co.) (Paper, Association Francaise des Ingenieurs et Techniciens de l'Aeronautique International Aeronautical Congress, Paris, June 1955).

836

Lippert, Stanley 1956 CELLULAR PLASTICS IN AIR TRANSPORTATION (Douglas Aircraft Company, Santa Monica, California)

ABSTRACT; This paper attempts to define the requirements of both passengers and crew with respect to a wide variety of design problems. Most of the material characteristics of seats discussed are those which insure a proper response on the part of the passengers during various flight conditions and are considered primary requirements. There are other secondary properties of the materials which cannot be neglected. Consistent and close control of the foam density is a necessity. It is also mandatory that a cushion have a reasonable service life without a permanent set or change in properties. This means good life even in case of spillage of liquids and frequent removal of covers for cleaning. Whereas the polyurethanes are superior to Latex Foam in tear resistance, the Process Laboratories have found that the more dense polyurethane foams have a tendency to hydrolize and become soggy.

837

Lippert, Stanley 1959 A QUARTER CENTURY OF AIRCRAFT SEATING. (Paper, Avn Conference, Los Angeles, Calif., 9-12 March 1959, of The American Society of Mechanical Engineers)

838

Lippisch, A.M., R. Noble 1948 TRAJECTORIES OF UPWARD SEAT EJECTION (Naval Air Material Center, Aeronautical Medical Equipment Lab., Philadelphia, Pa.) TED NAM 256005, Report No. 6, Nov. 1948. ASTIA ATI 57 511

ABSTRACT: A method for determining the trajectory of a man and seat ejected upward from a moving aircraft when the initial conditions of flight and ejection are known has been derived. The mathematical derivation is highly complex, but the solution of the differential equations of motion yields a set of equations from which the position of the ejected body with respect to ground or to a point in space can be easily determined when the seven parameters used to define the boundary conditions are given. These seven parameters which comprise the initial conditions necessary for accurate calculation are airplane speed, direction and angle of inclination of flight, flight altitude, ejection velocity, angle of the seat guide rails with respect to the vertical, weight of the ejected mass, and air resistance of the mass. A particular form of the method presented can be used to determine the initial conditions of flight and ejection which are necessary for specified clearance of aircraft for particular dimensions. A preliminary investigation of the effect of the variation of four of the seven parameters is presented. The method for calculating the space and time trajectories of the ejected mass is given, and a comparison of available flight test trajectory data with theoretical calculations is shown. This analysis of trajectories and of the effects of the variable on the path of the ejected body is able to serve as a check and assurance of the validity and completeness of the aero-medical and engineering studies.

839

Lissner, H. R., et al. n.d. AIRCRAFT SEAT DESIGN FOR PASSENGER CRASH SURVIVAL. (Wayne State University, Detroit, Michigan)

840

Livingstone, R. E., & B. F. Weems 1959 TEST AND EVALUATION OF THE NAVY HELICOPTER RESCUE SEAT. (U. S. Coast Guard Testing & Development Division, Washington, D. C.) Project J28-3/1-17; ASTIA AD-228 702; 23 July 1959

SUMMARY: In November, 1957, Commandant (OAV) requested a Testing and Development Project to evaluate, for Coast Guard use, the grapnel type helicopter rescue seat as developed by U. S. Navy Helicopter Squadron 21, Lakehurst, N. J. The project was assigned to Coast Guard Air Station, Miami, Florida. The Navy seat was received in 1 July 1958. Testing was conducted from July to September, 1958, and the test report was received in November, 1958. The Grapnel type seat was considered to fulfill the requirements of the original project directive. It was recommended that it be adopted for Coast Guard use in lieu of the hoisting sling.

841

Lockheed Aircraft Corp., Van Nuys, Calif. 1955 X-7A SUPERSONIC RAMJET TEST VEHICLE PARACHUTE RECOVERY SYSTEM, SECTION TWO, RECOVERY SYSTEMS. (Lockheed Aircraft Corp. Missile Systems Div., Van Nuys, Calif.) Rept. for March 1947 - Dec. 1954, Contract No. AF33(600)-26471, WADC TR 55-162, Sec. 2; ASTIA AD-95 744; June 1955

842

Lockheed Aircraft Corp., Marietta, Ga. 1957 FEASIBILITY STUDY. EXPENDABLE TYPE PLATFORMS FOR LOW COST AERIAL DELIVERY BY PARACHUTE. (Lockheed Aircraft Corp., Marietta, Ga.) Rept. for 5 July 1956 - 2 Aug. 1957; Contract No. AF 33(616)-3792; WADC TR 57-403; ASTIA AD-130 989; Aug. 1957

ABSTRACT: Aerial delivery operations were studied to determine what factors influence the cost of delivery of vehicles, weapons, and other heavy equipment by parachute. Those factors which could affect a saving over the present system were further studied to determine an optimum system. Load combinations, platform sizes, materials, methods of construction, shock absorption methods, and antitoppling devices were analyzed. Consideration was given to aerial delivery system (ADS operating requirements, feasibility of non-load bearing platforms, development of optimum loads for expendable ADS, comparative mission cost analysis, shock absorption at optimum cost, design solutions for platform structures, and making the material cost optimum, and final platform design.

843

Lombard, C. F., R. C. Travis, J. O. Moore & S. W. Ames 1951 HUMAN FACTORS IN MAJOR ACCIDENTS OF JET FIGHTER AIRCRAFT -- PERIOD 1 JAN 50 - 1 JUL 51. (Directorate of Flight Safety Research, Norton AFB, California) 20 August 1951.

844

Lombard, C. F., R. V. Schmidt and P. H. von Essen 1961 PASSENGER SAFETY AND COMFORT CRITERIA STUDY IN DYNAMIC ENVIRONMENTS (Proposal Brief 67, Northrop Corp., Norair Div.,Hawthorne, Calif.) September 1961.

was considered to have better overall characteristics than the grapnel type. Fouling tendency was considered to be minimized. Minor modifications were recommended.
Following modifications which consisted of reducing the overall wheel diameter to 24 inches overall and adding a hand strap for ease of survivors, the wheel and grapnel seats were retested at CGAS, Elizabeth City, N. C. That station reported that the wheel type seat offers more advantages and safety features than the grapnel type.
The one requirement which is not fulfilled in the final wheel configuration is that, because of its padding, this device will not float at a predetermined depth in the water to facilitate mounting. No objection to this was noted during final testing at CGAS, Elizabeth City, N. C. (AUTHOR)

845

Lloyd, S.J. 1941 NAVIGATOR'S SEAT UNIT PROOF LOAD TESTS OF NO. 215 MODEL (X-120) XAT-15. (Boeing Airplane Co., Wichita, Kans.) Report No. X120-6323, ASTIA ATI- 104194, November 1941

ABSTRACT: Tests were conducted applying static loads simulating acceleration forces on the #215 Navigator's Seat to determine the behavior of the seat unit up to proof loads. After completion of the tests, it was concluded that under the proof loads applied the elastic limit was not reached. It was also found that all deflections were simple elastic deformations and the seat was sufficiently strong in its present design and assembly.

846

Loach, J. C. 1958 A NEW METHOD OF ASSESSING THE RIDING OF VEHICLES AND SOME RESULTS OBTAINED. (Paper read at Inst. Mechanical Engs., London, 23 Jan 1958) J. Inst. Locomotive Engineers 48(2):183-208

847

Lockheed Aircraft Corp., Van Nuys, Calif. 1955 X-7A SUPERSONIC RAMJET TEST VEHICLE PARACHUTE RECOVERY SYSTEM. SECTION ONE. PRETEST AND TEST PROGRAM. (Lockheed Aircraft Corp. Missile Systems Div., Van Nuys, Calif.) Contract No. AF33(600)-26471; WADC TR 55-126, Sec. I; ASTIA AD-95 743; June 1955

848

Lomonaco, T., A. Scano and F. Rossanigo 1960 BEHAVIOR OF SOME PERCEPTIVE-MOTOR FUNCTIONS DURING THE PASSAGE FROM ABOUT 2 TO ZERO G AND THE EFFECT OF TRAINING. EXPERIMENTS MADE WITH THE SUBGRAVITY TOWER. In Riv. Med. Aero. 23:439-456, Oct. - Dec. 1960 (Italy)

849

Lorch, D. L. 1958 UNDERWATER ESCAPE PROGRAM: Tests of F8U-1 Pilots' Survival Equipment for Possible Use in Nadevcen Automatic Ditch System. (Naval Air Development Center, Johnsville, Pa.) Rept. no. NADC-ED-5828; ASTIA AD 231 390.

ABSTRACT: The F8U bailout oxygen system with the modified Firewel Regular (1732-3) and the MK-3C life preserver were tested to determine if this equipment might be utilized in an automatic water-crash escape system now under consideration. The tests indicate that this equipment is satisfactory for underwater escape from a depth of 1000 feet

850

Lorch, D L. 1959 UNDERWATER ESCAPE PROGRAM: Underwater Seat Ejection Tests, NAMC Type II Catapult. (Naval Air Development Center, Johnsville, Pa.) Report No. 6, Proj. TED no. ADC AE-6307, NADC ED-5908; ASTIA AD 219 105.

ABSTRACT: The results of 15 dummy underwater ejections and 3 human ejections are compiled and evaluated. These tests were conducted to determine the feasibility of using the inflight ejection system with the NAMC Type II catapult to remove a pilot safely from a sinking aircraft. Test results indicate that underwater ejection with this catapult is not safe. Ejection is also not mechanically reliable unless the following modifications are made: (1) the catapult tube is sealed; and (2) the firing head has been modified for underwater use. Underwater ejection is recommended only if it is impossible for the pilot to escape in any other way.

851

Lorch, D. L. 1962 ROCKET-JET TYPE RELEASE FITTING, DYNAMIC EVALUATION TO ASSIGN CAUSES FOR FAILURE, DRAG LOAD ON PILOT TOWED THROUGH WATER BY PARACHUTE TO EVALUATE ROCKET-JET RELEASE FITTINGS. (Naval Air Material Ctr., Philadelphia 12, Pa.) NAMC-ACEL-474; ASTIA AD-274 459; 31 March 1962

ABSTRACT: This report is concerned with a subjective evaluation of the Rocket-Jet canopy release fittings used on naval parachutes and a fitting modified by

the Air Crew Equipment Laboratory.
An anthropomorphic dummy and two live subjects were towed through the water at various speeds in the 3000' tow tank, Langley AFB, Virginia. Drag loads were measured and the subjects attempted to release either the standard or modified fittings. Curves were prepared correlating actual wind velocities, pilot velocity through water, parachute loads, and release capabilities. (AUTHOR)

852

Lovelace, II, W. Randolph, E.J. Raldes, & V.J. Wulff 1945 THE EJECTION SEAT FOR EMERGENCY ESCAPE FROM HIGH-SPEED AIRCRAFT.
(Air Technical Service Command, Engineering Division, Army Air Forces Serial No. TSEAL-3-696-74C Aug. 31, 1945. ASTIA ATI 7245

ABSTRACT: This report presents data obtained from the German, British and Swedish Air Forces on the research and development of the pilot ejection seat and evaluates this information for application to the Army Air Forces pilot ejection seat program. It was found from tests that emergency escape from fighter aircraft, such as the P-38, P-51, P-47 and P-80, while traveling at high speeds is a diffucult and dangerous operation. Emergency escape from high-speed bombers such as the A-26 is equally difficult. The ejection seat, as used operationally by the German Air Force, is the most successful method known to date for emergency parachute escape from high-speed aircraft. The following design characteristics of the ejection seat assembly are believed desirable up to speeds of 550 miles per hour for AAF aircraft: (a) Maximum duration of acceleration: 0.1 second. (b) Maximum allowable average acceleration: 20 g with peaking to 25 g for 0.01 second or less, when ejecting the pilot above the aircraft. (c) Minimum allowable ejection velocity into wind stream: 57 ft./sec. in aircraft having a single vertical stabilizer of average height. (d) Minimum piston length: 30 inches, based on the above ejection velocity. In designing an ejection seat the following is required: (a) All parts of the body, especially the head, arms, and legs, must be supported. (b) A shoulder harness must be used, to prevent forward bending of the pilot with consequent fracture of the lower thoracic and lumbar vertebrae. (c) Arm rests must be used to reduce the load on the lower vertebral column.

853

Lovelace, W. R., E. J. Baldes, & V. J. Wulff 1945 NOTES ON MECHANICS OF SEAT EJECTION; NOMENCLATURE AND CONVERSION FACTORS. Appendix 1 to Lovelace, W. R. E. J. Baldes, & V. J. Wulff, The Ejection Seat for Emergency Escape from High Speed Aircraft, ATI No. 7245

854

Lovell, G. 1954 DESIGN AND DEVELOPMENT OF THE R. A. E. DUMMY OF THE STANDARD AIRMAN. (Ministry of Supply, London) TN 176, May 1954

855

Lowry, R. H. 1953 TEST TRIALS OF G-4A ANTI-BLACKOUT SUITS IN THE HUMAN ACCELERATOR. (Defense Research Medical Labs, Toronto, Canada) Report No. 157, p. 1-6, April 1953.

ABSTRACT: Blackout tolerances of 50 pilots wearing the suit were compared with those of the same personnal without suits, in the Human Centrifuge. Use of the suit gave an increased tolerance of 1.99.

856

Lubinski, T.P. 1962 TRACK TESTS OF CANOPY ESCAPE CAPSULE (Coleman Engineering Co., Inc., Torrance, Calif.) Project 1362 ASD TDR 62 404, Aug. 1962 ASTIA AD 287 281

ABSTRACT: The results of all of the track tests for the Air Force Canopy Escape Capsule are presented. The purposes of these tests were to evaluate the ejection and recovery of the capsule and to obtain aerodynamic, structural, component functioning, and physiological information. Descriptions of the capsule model, test equipment, and test procedure are included in the report. Feasibility of the canopy-type capsule method of escape was not fully demonstrated because the track tests were terminated prior to completing the design range of test velocities and because the test results indicated a need for an evaluation of the stability and impact problems of the capsule for these velocities. The tests showed that unguided separation of the capsule was successful, that proper functioning of the recovery system was demonstrated for the 150-kt run, and that 10- level ejection capability of the escape capsule was indicated. (Author)

857

Luchsinger, C.W. 1949 ADDITIONAL KINETIC MEASUREMENTS ON A PILOT-DUMMY EJECTED FROM AN F-82 AIRPLANE. (Engineering Division, AMC, Wright-Patterson AFB, Ohio) March 1949. ASTIA ATI 63931

ABSTRACT: Five ejection seat tests, simulating pilot escape from high performance aircraft, were conducted with an F-82 twin engined fighter.

Kinetic measurement intelligence was successfully recording during four of these tests by means of a recording oscillograph in conjunction with acceleration and strain gages. The pilot ejected the test seat, which was loaded with a 185 lb. anthropomorphous dummy, from the right cockpit by closing a switch on the control stick in the left cockpit. The normal maximum acceleration produced by the M-1 (Service) catapult was in the range of 15 g to 17 g units. Average ejection velocity was slightly less than the recommended 60/ft sec. The drag coefficient of the seat and dummy is 1.56 at low Mach numbers, and has a percentage increase equal to that of a sphere with increase in Mach numbers.

858

Luchsinger, C.W. 1950 KINETIC MEASUREMENTS DURING PILOT EJECTION SEAT GROUND TESTS - AND APPENDIXES I AND IX
(Air Materiel Command, Engineering Division, Wright-Patterson AFB, Ohio) Aug. 1950. ASTIA ATI 83 127

ABSTRACT: Kinetic qualities were measured during pilot ejection seat ground tests conducted with various centers of gravity of the ejected components and with various lengths of ejection rails. Sensing and recording of the kinetic quantities was accomplished by the use of resistance-bridge accelerometers, pressure transmitters and multichannel oscillograph, together with bridge balancing controls and appropriate connecting circuits. The normal maximum acceleration produced by the M-1 catapult was in the range of from 12 to 16 G units and the CG location had no consistent effect on the maximum peak value. As the CG was moved forward, the maximum ejection velocity tended to decrease in magnitude and a further decrease in magnitude was encountered when 28-in. ejection rails were used in lieu of the 32 7/8 in. ejection rails.

859

Luft, U.C. 1953 PHYSIOLOGICAL ASPECTS OF PROLONGED FLIGHT AT HIGH ALTITUDES AND SURVIVAL IN EMERGENCIES Aeronautical Engineering Review 12:56-60

ABSTRACT: Problems posed by temperature and humidity, cabin pressure, sudden decompression, and escape from aircraft.

860

Lund, D.W. HIGH ACCELERATION DURING PARACHUTE OPENING.
AAF Memo Report TSEAA-695-72B

861

Lundin, I.E. 1946 STATIC LOAD TESTS OF WMCA NO. 347 - PILOT SEAT ARMORED.
(Warren McArthur Corporation, Bantam, Connecticut) Report No. 347
19 July 1946. ASTIA ATI 102228.

ABSTRACT: Tests were conducted for the purpose of applying static loads simulating acceleration forces on the Warren McArthur No. 347 Armored Pilot Seat to determine its behavior up to ultimate design loads. As a result of the tests, it was concluded that the seat unit supported the ultimate design loads without failure.

862

Lunsford, E.M. 1956 INVESTIGATION OF FORCE REQUIRED TO ACTIVATE THE WEBBING LOOP AND RIPCORD PIN TYPE PARACHUTE PACK CLOSURE.
(Wright Air Develop. Center, Wright-Patterson AFB, Ohio) WADC Technical note no. 56-505, ASTIA AD-110 590, November 1956

ABSTRACT: The current maximum force requirements for actuation of a ripcord system on personnel parachutes as set forth in Specification MIL-P6645, titled 'Parachutes General, Personnel, Specification For,' were established for a ripcord pin, grommet, and cone locking system. Pack assemblies utilized on the latest type parachutes are held closed by webbing loops which are anchored on the pilot chute flaps and pass completely through the pack by way of grommets in the side and end flaps and base panel of the pack and are locked in place by the ripcord pins. It was desirable to determine the maximum force requirements for actuation of a ripcord using the new closing system to provide more up to date data for Specification MIL-P-6645. A series of tests to determine ripcord pull force were accomplished and are recorded in this technical note. (EL abstract)

863

Lutz, C.C. and J.V. Kennedy 1953 PROPOSED EMERGENCY ALTITUDE SUIT. (Wright Air Development Center, Wright-Patterson AFB, Dayton, Ohio) Technical Note WCRD 53-29, ASTIA ATI 203134, 15 January 1953

ABSTRACT: This report describes a method of pressurizing the human body, which is new, simple and practical, and when used with the K-1 Pressure Breathing Helmet, Provides adequate emergency protection to 55,000 feet for a period of 6 minutes.

864

Lutz, C. C. 1959 DEVELOPMENT OF AN EMERGENCY PRESSURE SUIT (COVERALLS, HIGH-ALTITUDE, TYPE CSU-4/P). WADC TN 59-148; ASTIA AD 226 056

ABSTRACT: The design of coveralls, high-altitude, Type CSU-4/P attempts to correct operational deficiencies in presently available garments as to comfort, mobility, heat ease of donning, fitting, and integration with other flight clothes. The requirements of the pressure suit were established, and seven prototype models were designed, each improving on the previous model. The outer layer of the most recent suit is orange in color as an aid to rescue operations. This suit will provide physiological protection for a large segment of the flying population for the times and altitudes required of such a garment (70,000 ft. for 5 minutes). Improved comfort and mobility are achieved in the unpressurized condition, and tolerable comfort and adequate mobility are maintained while pressurized. Present testing of the capabilities of the new garment and continued plans of the program are described.

865

Lutz, R. R. 1951 PASSENGER SEAT - STRUCTURAL TEST, MODEL 340 (Consolidated Vultee Aircraft Corp., San Diego, Calif.) Rept. 6601, 13 Sept. 1951

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866

McCollom, I. N. and A. Chapanis 1956 A HUMAN ENGINEERING BIBLIOGRAPHY (San Diego State Coll., Calif.) Contract Nonr-126801 Tech. rept. no. 15 Nov. 1956 ASTIA AD 122 248

CONTENTS:

General references, methods, facilities, and equipment
Man-machine systems
Visual problems
Auditory problems
Speech communication
Other sensory input channels
Comparison and interaction among sensory input channels
The design of controls and integration of controls with displays
Control systems
Design and layout of workplaces, equipment, and furniture
Body measurements and movements
High mental processes
Simulators and proficiency measuring devices
Environmental effects on human performance
    Behavioral efficiency, fatigue, and human capacities
    Operator characteristics for specific jobs

867

McCollom, I. N. & A. Chapanis 1956 HUMAN ENGINEERING BILIOGRAPHY (PSYCHOLOGICAL ASPECTS - EQUIPMENT DESIGN) (San Diego State College Foundation) Library of Congress PB 132333

868

McCollom, I. N. 1956 FINAL REPT.
(San Diego State Coll., Calif.)
Contract Nonr-126801 1 Dec. 1956 ASTIA AD 118 905

ABSTRACT: Work involved in compiling a human-engineering guide for equipment design is outlined. Bibliographies, abstracts, translations, experimental studies, and special reports were prepared in the following areas: (1) comparison and interaction among sensory input channels (AD-95 131); (2) disorientation; (3) effect on human performance of acceleration, motion, and vibration; (4) effect on human performance of ventilation, temperature, and humidity; (5) man-machine integration (AD-106 677); (6) motion sickness (AD-95 139)and therapeutic drugs; (7) simulators and proficiency measuring devices; (8) speech communication; (9) systems considerations; and (10) work and fatigue (AD-95 133, AD-95 137). A special human-engineering bibliography of 5600 entries was assembled and published. (ASTIA)

869

McCarley, J.B. II 1947 BACKWARD SEATS Flying Safety Journal (HQ Air Transport Command) 2:22-3

870

McCready, W. E. 1958 INVESTIGATION INTO THE DESIRABILITY OR OTHERWISE OF PROVISION OF AIR VENTILATED SUITS TO AIRCREW OF SHACKLETON Mk 1 AIRCRAFT. (Inst. of Aviation Med., R.A.F., Farnborough) FPRC Memo 99, Nov. 1958.

871

McCutchan, J. W. & J. D. Isherwood 1959 PREDICTION OF THERMAL TOLERANCE WHEN USING AN MA-2 VENTILATING GARMENT WITH A MODIFIED MK-IV ANTI-EXPOSURE SUIT, (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADC-TR-59-326 June 1959, ASTIA

872

McDonald, A. E. & W. K. Stewart 1946 NOTE ON SEAT EJECTION FROM HE162 AIRCRAFT.
(RAF, Institute for Aviation Medicine, Farnborough) F.P.R.C. 657, March 1946. ASTIA ATI 31120

ABSTRACT: Tests were made of an experimental seat ejection from a He 162 interceptor carried out under normal temperature conditions, while airplane remained on the ground. Tests were made with the fuselage, with turbine unit removed, setting in a flying attitude and offset slightly to the right. A dead weight of 210 lb was fixed to the pan of the seat. Firing was actuated remotely by means of a long cord. The ejection was photographed and accelerations were recorded on an inductance accelerometer fixed rigidly to back of seat. The firing cartridge used was of German fabrication. Analysis of the film showed that the ejection velocity was 34 ft/sec (± 10%) and that the maximum vertical height was from 14 to 15 ft. It was concluded that the ejection from the He 162 is feasible and, with the adequate cockpit dimensions present, should give pilots of average weight some chance of bailing out. Where ancillary factors are present such as centrifugal accelerations in spins, or high speed, it is doubtful if this installation is effective.

873

MacDonald, H.D. 1961 DEVELOPMENT OF CATAPULT, AIRCRAFT EJECTION SEAT, XM10
(Wright Air Development Division, Wright-Patterson AFB, Ohio)
WADC TR 60 452, March 1961. ASTIA AD 270 108

ABSTRACT: Frankford Arsenal was requested to adapt the ballistic geometry of the rocket assisted pilot ejection catapult, RAPEC No. 1, to USAF aircraft requirements, specifically, as a replacement for M4 catapults presently installed in the F104 aircraft.

The existing RAPEC No. 1 catapult has been successfully scaled down to meet the USAF requirements.

The XM10 catapult supplies the necessary thrust and, consequently, ejection height to permit low-level ejections from high performance aircraft. This device is now ready for qualification and analysis tests. (Author)

874

MacDonald, H.D. & N.J. Waecker 1961 DEVELOPMENT OF CATAPULT AIRCRAFT EJECTION SEAT, T20. (Aeronautical Systems Division, Wright-Patterson AFB, Ohio) WADD TR 59-306, FA Report R-1557, ASTIA AD 299 138

ABSTRACT: Frankford Arsenal was requested to develop a rocket-assisted catapult that would provide sufficient impulse to accomplish safe low-altitude ejection. Two problems were considered during the program; first, attaining sufficient impulse with the rocket-catapult combination; and second, eliminating the bending of the catapult tubes during ejection. The first problem was solved by using a rocket motor attached to the bottom of the catapult. In this case, the rocket provides the sustained acceleration necessary to achieve the required final velocity. The problems associated with catapult tube bending in conventional catapults were eliminated by making the power stroke of the catapult section equal to the guided stroke of the seat in the rails. Flight stability and proper trajectory are obtained during ejection by angling the nozzle of the rocket so that the vector of the rocket thrust passes through the effective center of gravity of the seat-man mass and by igniting the rocket at the instant the rocket catapult is released from the aircraft structure. The T20 catapult is now ready for qualification and analysis testing.

875

MacDonald, J. A. 1960 HUMAN ENGINEERING PAYOFF
(Paper SAE National Aeronautic Meeting, New York, N. Y., April 5-8, 1960)
(Society of Automotive Engineers, Inc., New York, N. Y.)
Rep. 173B, April 1960.

ABSTRACT: Some of the gains in aeronautics that can be attributed to Human Engineering efforts in the past few years are discussed informally. The areas dealt with specifically are escape systems and components, restraint, sealants, vision, and crew station design and arrangements. Some expectations for future developments are mentioned. (Tufts)

876

McDonald, L. I. & E. L. Backman 1958 UNDERWATER TRIALS ON MARTIN-BAKER MARK 2D EJECTION SEAT 2.
(Admiralty Hydro-Ballistic Research Establishment, Glen Fruin, Dunbartonshire) Feb. 1958. ARL/R.4/G/HY/1/2.

877

McFadden, E. B. & J. J. Swearingen 1958 FORCES THAT MAY BE EXERTED BY MAN IN THE OPERATION OF AIRCRAFT DOOR HANDLES.
Human Factors 1(1):16-22.

ABSTRACT: Six handle configurations were tested by 8 male subjects on a test arrangement simulating an aircraft door. The torques exerted by the subjects were measured in angular increments of 45°. Over 1200 static and dynamic measurements were made. A limited check study on 10 females, totaling 120 measurements, was also made. The shape, length, direction of movement, arc of motion, effects of one-handed operation, maximum torques and differences between sexes are discussed.

878

McFadden, E. B., J. J. Swearingen & C. D. Wheelwright. 1959 THE MAGNITUDE AND DIRECTION OF FORCES THAT MAN CAN EXERT IN OPERATING AIRCRAFT EMERGENCY EXITS.
Human Factors 1(4):16-27

ABSTRACT: The maximum forces that men and women were capable of applying to emergency exit release handles under various conditions were determined. Experiments were conducted on both port and starboard sides of a cabin mockup simulating the interior of the Convair 240. Approximately 339 determinations of the maximum force that 17 female subjects were capable of applying to emergency exit handles were obtained. This study was extended to include measurement of the resultant force and its direction with 112 tests conducted by eight female subjects, of which three participated in the above series. In addition 162 tests were conducted by nine male subjects, and a few tests on six children. The effects of handle configuration, location, position of the subject, and the duration of the muscular contraction are discussed.

879

McFarland, R. 1946 HUMAN FACTORS IN AIR TRANSPORT DESIGN
(New York: McGraw-Hill, 1946)

ABSTRACT: The aims of the author are three: to present factual information upon all these aspects of air transport design to be used by those who operate planes or travel by air; to furnish whatever interpretative background is necessary in order to show how a given physical variable creates a human problem; and to offer recommendations or possible solutions concerning human factors in designing for air transport. A summary with recommendations is provided at the end of each chapter. A bibliography accompanies each unit. (CARI)

880

McFarland, R. A. 1953 HUMAN FACTORS IN AIR TRANSPORTATION (New York: McGraw-Hill Book Company, Inc., 1953)

881

McFarland, R. A. & A. L. Moseley 1954 HUMAN FACTORS IN HIGHWAY TRANSPORT SAFETY. (Harvard School of Public Health)

882

McFarland, R. A. & H. W. Stoudt 1955 PHYSICAL VARIABLES INFLUENCING DRIVER COMFORT. In Harvard School of Public Health, Efficiency and Safety, March 1, 1955.

883

McFarland, R.A, Damon, A., and Stoudt, H.W. Jr., 1958 ANTHROPOMETRY IN THE DESIGN OF THE DRIVER'S WORKSPACE. Am. Jrnl. of Phys. Anthro. N.S. 1:1-23, March 1958

ABSTRACT: Differences in human body size may have serious implications for the comfort, efficiency, and safety of vehicle drivers. Our aim has been to out line methods whereby data on human body size may be systematically incorporated into vehicular design. In this report are therefore presented the 5th, 50th and 95th percentiles of 30 pertinent body dimensions of 360 commercial bus and truck drivers. Specific values are recommended for a sample of cab dimension closely linked to human dimensions.

884

McFarland, R. A. 1958 HEALTH AND SAFETY IN TRANSPORTATION. (First annual lectureship on preventive medicine of the Amer. Col. of Preventive Med., Cleveland, Ohio, 13 Nov. 1957) Public Health Reports 73(8):663-680, Aug. 1958

ABSTRACT: Accidents now rank above disease as the chief cause of death and disability to many segments of our population, and now constitute a major threat to the wellbeing and health of our people.

885

McFarland, R. A. & H. W. Stoudt 1960 HUMAN BODY SIZE AND PASSENGER VEHICLE DESIGN
(Society of Automotive Engineers, Inc., New York, N. Y.) Rep. AP 142A, 1960.

ABSTRACT: This study deals with the derivation of seat and workspace dimensions of passenger cars from anthropological data descriptive of the general driving public. The 5th, 50th, and 95th percentiles of static body measurements of passenger-car drivers are interpolated from selected anthropometric studies on various segments of the United States population. The manner of utilizing such data in car design is discussed in general and specifically in regard to dimensions for driver's seat and workspace. Additional aspects of seat design, such as seat comfort, are mentioned. (Tufts)

886

McGuire, T. F. 1960 PHYSIOLOGY AND OPERATIONAL COMPARISON OF MC-1 AND MC-3 (MC-4) PARTIAL PRESSURE SUITS. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADC TR 57-536(I); ASTIA AD-256 873; Oct. 1960

ABSTRACT: A theory on the physiological limitations of partial pressure suits, with supporting evidence, is discussed. Loss of "effective" blood volume, work-load placed on the heart, available oxygen, a number of reflexes that can work separately or together to the individual's disadvantage, and other contributory mechanisms are stressed. The comparative operational characteristics of the MC-1 and MC-3 (MC-4) partial pressure suits are presented. (AUTHOR)

887

McIntyre, A. K. 1944 PRELIMINARY REPORT ON "KOP" ANTI-G SUITS.
RAAF-FPRC-FR No. 92; June 1944

ABSTRACT: KOP is Kelly one-piece pneumatic anti-"g" suit. The KOP I and KOP II have 5 gradient pressures, the KOP III has 3 gradient pressures. It is concluded from tests on one subject that 5 pressures are not superior to 3 and that the KOP is still too bulky for practical use. Photographs.

888

McIntyre, A. K. 1944 PRESENT POSITION OF ANTI-G SUITS.
(RAF Institute of Aviation Medicine, Farnborough) FPRC-FR No. 93.

889

MacIver, John 1959 SAFETY AND HUMAN BEHAVIOR. I. HUMAN FACTORS IN ACCIDENTS. II. ACCIDENT-PRONENESS. III. SAFETY AS A WAY OF LIFE. (Paper, 29th Annual Safety Convention, Greater New York Safety Council, 14-16 April 1959)

890

McKay, B. 1947 STATIC TEST - RADAR OPERATOR EJECTION SEAT AND PILOT EJECTION SEAT OPERATIONAL TEST-QUICK DISCONNECTS RADAR OPERATOR AND PILOTS EJECTION SEATS MODEL XP-89 (Northrop Aircraft Inc., Hawthorne, Calif.) USAF Project MX-808 Contr. No. W33-038-ac-14541, Oct. 1947, ATI 54795

ABSTRACT: Static tests were run on the Pilot's and Radar Operator's Ejection Seats that are utilized on the XF-89 fighter airplane. The tests were made to determine whether or not the seats would support the required static loads as established by Air Forces Specification, number 25282. The results of the tests were satisfactory. In addition, tests were conducted on the electrical, oxygen and gravity suit quick disconnects, to ascertain the load required to release the quick disconnect fittings, and to determine whether or not the assembly would be satisfactory for use in the airplane. The following are the actual up loads required to move the R.O. seat and disconnect the units: to move seat with electrical oxygen and gravity suit unit, resp; connected: 85, 107, and 75 pounds, resp. The quick disconnect assembly will be satisfactory for use in the airplane

891

McLaughlin, R.L. 1959 AUTOMATIC INFLATION OF PERSONAL FLOTATION GEAR PRIOR TO WATER ENTRY. (Paper, Meeting of Aero Medical Association Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: There is evidence to suspect wind blast alone is sufficient to render a man unconscious during ejection seat egress from an aircraft traveling at speeds near Mach one. Add to this non-fatal injuries resulting from flailing arms and legs or impact with flying debris and you have a crewman who needs some automatic assistance to survive, especially in water, even though the ejection itself is considered successful. By the same token there is reason to believe the crewman who effects an over the water excape from an aircraft, completely unharmed, also needs help to survive. Cold water can numb minds and fingers quickly. It is not necessary to go down three ti es to drown, but rather it is possible to drown or enter into a strangling tracheal spasm on one gulp of water. Parachute canopys and shroud lines can entangle and restrict the most powerful swimmer. The help needed is automatic inflation of personal flotation gear. Because it is possible to drown or strangle so easily, personal flotation gear should be inflated in the air before water entry to hold submersion time to the minimum. (J. Aviation Med. 30(3):194, March 1959)

892

McNaughtan, I. I., D. J. Day & E. L. Beckman 1959 ESCAPE FROM DITCHED AIRCRAFT. II. INVESTIGATIONS INTO THE PROBLEM OF CANOPY OPENING IN ESCAPE FROM DITCHED AIRCRAFT.
(Flying Personnel Research Committee, Air Ministry) F.P.R.C. Report No. 1091, Sept. 1959.

893

McNaughtan, I. I., D. J. Day & E. L. Beckman 1959 INVESTIGATIONS INTO THE PROBLEM OF CANOPY OPENING IN ESCAPE FROM DITCHED AIRCRAFT.
(Inst. of Aviation Med., R.A.F., Farnborough) Tech. Note No. Mech. Eng. 299; F.P.R.C. 1091 ii.

SUMMARY: When an aircraft has ditched and submerges with the canopy closed, the canopy may be forcibly held shut by the water pressure load. Preliminary trials to evaluate the factors which prevent jettisoning of the canopy of a submerged aircraft have been made. The time required for a subject to jettison the canopy manually after the aircraft had submerged to 30 feet varied from 30 to 240 seconds depending on aircraft attitude.

The forces closing the canopy have been analysed and defined as a result of these trials and a theoretical analysis of the jettison forces has been validated. These analyses show that with modern operational aircraft ditched with the canopy closed there is little chance of jettisoning the canopy either manually or by power jacks after the aircraft has sunk a few feet.

The need for re-evaluation of the problem of underwater canopy jettison in naval aircraft has been emphasised. (Author)

894

McNaughtan, I.I. and J.S.P. Rawling 1960 UNDERWATER ESCAPE FROM SCIMITAR AIRCRAFT (Royal Aircraft Establishment Gt. Brit.) TN no. Mech Eng. 316, March 1960. ASTIA AD-319 0[illegible]L

ABSTRACT: A description is given of a comprehensive series of underwater tests made on a Scimitar cockpit speciment. The tests included investigations into cockpit leakage rates, canopy jettison system limitations, canopy implosion risk, ejection seat performance and underwater functioning of escape equipment. The results of the tests are discussed in conjenction with a theoretical study of the sink rate of Scimitar aircraft and the best procedure for escape from ditched Scimitar aircraft is derived. (U) (Author)

895

McNutt, D. C. 1958 UNDERWATER ESCAPE. Flight Deck (Autumn 1958): 44-46.

ABSTRACT: Trials have recently been conducted at the Admiralty Hydroballistic Research Establishment Glen Fruin to investigate some of the problems of escape from ditched aircraft. The center section of a Sea Hawk fuselage was used for the experiment, and Martin Baker ejection seats complete with normal parachutes and dinghies were tested.

896

McSurely, A. 1952 GOOD SEATING ENGINEERING SAVES LIVES Aviation Week, 24 Nov. 1952.

ABSTRACT: The importance of seat design and construction is exemplified by the analysis of an airplane crash involving a Convair 240 (in Flushing Bay near La Guardia Airport, New York, on January 14, 1952). The plane ditched in 15 ft. of water at a speed of about 135 mph., and a normal rate of descent of about 500 ft per minute. Peak decelerations in the range of 10 to 15 g were absorbed by hull and wings. Failure of some seat anchorages indicated that standard load specifications of 6 g forward, 6.6 g downward, and 1.5 g sideways were exceeded. Still, no major injuries were incurred by the passengers due to the resilient structure of seat backs and the firm anchorage of the seats. The following improvements are recommended: (1) seats which will stand 15 g loads; (2) seat backs of ductile metal that will cushion body or head shock; (3) firm anchoring of passengers to their seats with snugly tightened 3000-lb. load seat belts.

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897

Maaske, C. A. 1945 A REPORT ON THE INTRODUCTION OF ANTI-"G" EQUIPMENT TO FEAF AND A SURVEY OF AERO-MEDICAL PROBLEMS IN SWPA INCLUDING CONTINENTAL AUSTRALIA (Wright Field) Memo Report TSEAL-696-51h; 24 Feb. 1945

ABSTRACT: The visit of Capt. Maaske and Dr. Baldes of the Mayo Clinic to the Southwest Pacific area and Australia is reported. Tropical climatic conditions interfere with the use of either the G-2 or G-4 coverall anti-"g" suits; the G-3 functions very satisfactorily, preventing blackout and fatigue. However present flying tactics do not indicate a need for anti-"g" equipment. (It is recognized that this situation may change at any time).

The centrifuge at Sydney is described. No physiological recordings have been made on it to date. A brief description is also given of the six-pressure gradient Australian suit.

898

Maaske, C.A., A.L. Roach, E.E. Martin, & G.L. Maison 1944 EVALUATION OF ANTI-G SUITS. (Wright Field) TSEAL-3-696-51-F, Rept. No 6, 16 Nov. 1944.

ABSTRACT: (a) Tests have been made on the Wright Field centrifuge of the efficacy of the G-3 (cutaway) and G-4 (coverall) anti-"g" suits. Eleven subjects tested the G-3, 10 subjects the G-4. Protection was determined relaxed with maximum "g" lasting 10 seconds.

(b) Protection offered was as follows:

Graying	1.0 "g"	1.0 "g"
Peripheral light loss	1.05 "g"	1.14 "g"
Blackout	1.26 "g"	0.9 "g"

(c) The G-3 is pressurized at 0.86 psi per "g" in maneuvers exceeding 2 "g". The G-4 pressurized at 0.88 psi/ "g". The slightly greater protection against adjustable lacings, which are not incorporated in the G-4.

(d) The G-3 has been reported to offer 2 "g" protection in planes, quite adequate for the aircraft now being flown.

899

Maaske, C.A., G.A. Hallenbeck, & E.E. Martin 1944 EVALUATION OF ANTI-"G" SUITS. (Wright Field) Rept. No. 4; Eng-49-696-51D; CAM No 348; 10 June 1944.

ABSTRACT: The efficacy of a single pressure pneumatic suit (G-2) was compared with that of a gradient pressure suit (g-1) with a view to lightening and simplifying anti-"g" protection. The G-1 suit plus oil filter and valve weighs 15.5 lbs, the G-2 assembly weighs 8.5 lbs.

In the G-2 the oil filter has been removed and the abdominal bladder simplified. It is pressurized at 1 psi/"g" for values of "g" over 2. There are one abdominal, 2 calf, and 2 thigh bladders. Air is metered to the suit by a 2 unit single pressure "g" activated valve. Pressure source is the positive pressure side of the B-12 vacuum instrument pump rotating at 3,000 rpm and working on 5 inches Hg intake.

Twenty experienced subjects who tested the G-2 by 10 second exposures on the centrifuge obtained an average protection of 1.2 "g" against visual dimming and peripheral light loss and of 1.9 "g" against blackout. This compares favorably with the performance of the G-1 suit.

900

Maison, G. L. 1943 REPORT TO THE AIR SURGEON ON STATUS OF ANTI-"G" DEVICES AS OF 1 NOVEMBER 1943 (Wright Field)

ABSTRACT: Comparison of operation and construction of hydraulic suits (FFS), gradient pressure pneumatic suits (GPS), and Clark-Wood arterial occusion suit (AOS). Pressurizing devices for GPS and AOS at present time consist of:

(a) Positive side of vacuum instrument pump. Performance of this pump falls off badly at altitude, must be used with oil filter.
(b) Cornelius Co., electrical pump operating on 24 volts DC and using 35 amps. Current model has been shown to be unreliable in service tests at Eglin Field.
(c) Tanks of compressed gases. These give excellent performance at all altitudes and temperatures but are least satisfactory source of pressure because of limited period of usefulness, unsatisfactory valves, and added complications of installation and servicing.
(d) Combination pump and tank units. Still in developmental stage and designed for use with AOS.

Average protection offered to relaxed subjects on centrifuge is reported as follows:

901

Maison, G. L., & C. A. Maaske 1943 EVALUATION OF ANTI-G SUITS
(Wright Field) CAM No. 201; 29 Sept. 1943

902

Maison, G.L. and E.E. Martin 1943 HUMAN PICK-UP.
(War Dept., Air Forces) ENG-49-696-53, 8 October 1943

903

Maison, G.L. 1944 EVALUATION OF ANTI-G SUITS
(Wright Field) Rept. No. 3, ENG-49-696-51C, 18 Apr. 1944. CAM no. 309

ABSTRACT: A total of 22 Berger Bros. pneumatic gradient pressure suits and 22 hydraulic Franks flying suits were flight tested by 26 pilots of the 9th Air Force in P-47 and P-51 aircraft. Complete visual protection was obtained with both suits.

Eighty percent of the pilots thought anti- "g" protection desirable in P-51 aircraft but only about 40 percent thought it necessary in P-47's, probably because the latter planes are less maneuverable. Protection was especially desired for combat flying.

Of the 17 pilots who tested both types of suit, 11 preferred the GPS, one the FFS, and 5 had no preference. The GPS was preferred because it is lighter, less cumbersome, can be worn over ordinary clothing, fitting is less critical, and it does not need to be serviced with water prior to take off.

FFS	0., "g"		
GPS	1.3 "g"	to	1.5 "g"
AOS	2.0 "g"	to	2.5 "g"

Both FFS and GPS have proved acceptable to pilots for operational use. AOS should theoretically prove more valuable, but 20 out of 25 experienced combat pilots who flight tested both GPS and AOS preferred the GPS as the AOS proved too uncomfortable. Further operational testing of both GPS and AOS is suggested.

904

Maison, G. L., & C. A. Maaske 1944 EVALUATION OF ANTI-G SUITS
(Wright Field) Rept. No. 1; Eng-49-696-51A.

905

Maison, G.L., and C.A. Maaske. 1944 EVALUATION OF ANTI-G SUITS. (Wright Field) Eng-49-696-51E-1, Report No. 5, 11 August (To report the status of anti-"g" devices for fighter planes in the various theaters)

ABSTRACT: Two models of the anti-"g" suit have been shown to be necessary, a cut-out suit (G-3) consisting only of the cloth covered bladders to be worn with regular officer's clothing in cold climates, and the G-4, a very light weight coverall for wear in tropical localities where a minimum of clothing is desirable. G-suits are now optional in the 9th Air Force for P-47's and P-51's; they are mandatory in the 8th AAF for P-51"s

The G-3 is a cut out G-2 (single pressure) suit. Comparative weights:

G-2 suit.....6 lbs.
G-2 plane installation...4 lbs
G-3 suit.....2½ lbs
(Plane installation interchangeable with G-2)

The G-4 coverall is made of rayon marquisette; probably is too porous to protect against sunburn. (NB this has been replaced by solid weave nylon at a later date.) Total number of "g" suits delivered to date is 3500. 6600 are on order

906

Maison, G.L., C.A. Maaske, G.A.Hellenbeck & E.E. Martin 1945 ACCELERATION AND G SUIT. Air Surgeon's Bull. 1:3-7, Jan. 1945.

907

Maciolek, J.A. 1955 CIRCULATORY REFLEX ACTIVITY AS A G-PROTECTIVE DEVICE (Aero Medical Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio) Report No. WCRD-55-1. Jan 1955. ASTIA AD 75 056.

ABSTRACT: The response on the human centrifuge of 7 seated subjects to positive accelerations of normal rapid onset (1 g/sec) was compared with their tolerance in runs having 0.07 to 0.1 g/sec rate of onset. The approximate blackout threshold of the group was 3.7 g for the standard runs. The runs of slow onset attained 6.2 g before equivalent symptoms occurred. The 2.5 g difference in symptom level is a measure of the response of the various hemostatic mechanisms tending to sustain blood pressure in man exposed to a gravitational stress which is acting from head to foot. The technique seems to be a simple and practical method of evaluating the activity of the protective reflexes in different persons and in the same person under varying conditions.

908

Mahaffey, P.T. 1945 PROOF TEST OF SEAT INSTALLATIONS. (Douglas Aircraft Company, Inc., Santa Monica, Calif.) ASTIA ATI-105 836, 4 July 1945

ABSTRACT: The pilot's and relief pilot's seats were subjected to the limit down loads, and the bombardier's seat to the limit down load and the belt load. The requirements of specifications AAF 25278 and AN-S-1a were carried out as far as was practicable. The test indicated that the pilot's seat was under-strength, and as a result the material of the seat frame was changed from mild steel tube to alloy steel tube. The other seats were satisfactory as tested.

909

Mahoney, D. I., & J. A. Wood 1949 COMPARISON BETWEEN A FULL LENGTH AND AN ABBREVIATED TYPE OF PARTIAL PRESSURE SUIT. (Air Materiel Command, Wright-Patterson AFB, Ohio) Memo Rept. MCREXD-696-104M; ASTIA AD-63 109; 3 Feb.1949

910

Malcolm, R., W.White 1947 REPORT ON THE "LOBELLE" SEAT EJECTION UNIT - PART 1 (Ministry of Supply, England) June 1947, ATI 100 940

ABSTRACT: The need for Pilot Ejection systems has arisen due to the number of occasions when operational pilots have failed to escape successfully from damaged aircraft at high speeds by ordinary methods. The two major reasons for such failures were considered to be: (a) impossibility of climbing out of the cockpit at high speeds, and (b) danger of pilot being struck by some part of the aircraft after climbing out at lower speeds. The system adopted to overcome these difficulties was as follows: To eject the pilot and the seat together upwards from the aircraft with sufficient initial velocity to clear all parts of the aircraft at speeds up to 600 m.p.h. E.A.S., and for the pilot to remain attached to the seat, which forms a support for his limbs, until such time as he is completely clear of the aircraft and his resultant speed has dropped low enough for him to leave the support of his seat. Other points of this system are: (a) The case with which it could be installed in the type of aircraft in the design stage at the time. (b) The possibility of retrospective installation in aircraft such as the Meteor and Vampire. (c) The minimum variation to standard cockpits and controls that is entailed.

911

Mallan, L. 1956 SECRETS OF SPACE FLIGHT.
(Greenwich, Conn.: Fawcett Publications, Inc., 1956)
Fawcett book No. 298

ABSTRACT: A photographic account is presented of rocketry and space flight. Subjects covered include studies in space medicine; escape capsules and rocket sleds; development of the space suit; launch into the stratosphere; training of space pilots, and research rocket takeoff.

912

Mangelsdorf, J.E. 1959 LOGISTIC SUPPORT TO MAN'S ECOLOGY IN SPACE.
Mechanical Engineering. 81:79, July 1959

ABSTRACT: This paper discusses the ecological elements with which the system must provide the satellite crew. Provision for potable water and nutriment and means of ingestion; gases for breathing; disposal of body wastes; protection from thermal, noise, radiation, psychological and G-stresses are treated in some detail. It is shown that the solution of the problem of man's ecology in space requires talent from a number of technical areas. The author briefly examines the Lockheed ecological model, first as a means of illustrating man's metabolic exchange, and second, as a tool for solving some of the problems of designing for long-endurance, manned satellites.

913

Manzell, , tr. J. B. Bateman 1945 DO 335 CATAPULT SEAT: THREE-COMPONENT MEASUREMENTS. (Dornier-Werke G. m. b. H., Friedrichshafen) Wind Tunnel Research Rept. Pages A-17189 to A-17205
Translated as Appendix 6a to Lovelace, W. R., E. J. Baldes, & V. J. Wulff, The Ejection Seat for Emergency Escape from High-Speed Aircraft, ATI No. 7245

SUMMARY: Three-component measurements were carried out on the catapult seat, both with a dummy and with living subjects. The catapult seat was required to have a backward turning, or positive moment immediately it emerges from the cockpit. Since the back of the Do 335 catapult seat both in position in the airplane and at the moment of its ejection is tilted backward at an angle of 13 degrees, this position (Y-13 degrees) was designated as "normal." It can be seen from the measurements that the catapult seat in the "normal" position was very top heavy. By bringing extra surface to the head guard an attempt was made to reverse the direction of the turning moment, but it had to be recognized that relatively large surfaces were needed in order to fulfill this requirement. The desired result was obtained with extra surface No. V, 0.116 $n.^2$ (1.25 $ft.^2$); the outline of this surface conformed to the internal cross section of the roof of the cabin. A series of measurements of the effect of wind velocity was made using this arrangement.

914

Marciniak, F.P., R.A. Houghton 1958 AN EVALUATION OF A GROUND-LEVEL ESCAPE SYSTEM. SAE National Aeronautic Meeting no. 91A, Sept. 29-Oct. 4,1958.

ABSTRACT: This paper gives a description of the evaluation and testing of the Martin Baker ejection seat for ground-level escape. The ejection seat is credited with being the greatest life-saver since the parachute, but up until two years ago, a pilot could count on a 100% probability of getting himself killed if he ejected below 1000 ft altitude.
Grumman elected to take on a major protion of the evaluation of a Martin-Baker ejection seat. The resulting installation in the Grumman F9F-8T jet trainer is a modification of the existing British system, which has already saved many lives. Although this seat gets some of its ground-level capability from a high trajectory, its main advantage lies in its unique arrangement for rapid, positive deployment of the parachute and positive separation of the pilot from the seat.

915

Marcks, C.A. 1952 HOW DOES EQUIPMENT AND CLOTHING AFFECT THE PROBLEM OF EMERGENCY SYSTEMS DESIGN. (Paper, Symposium on the Problems of Emergency Escape in High Speed Flight September 29-30, 1952, Wright Field, Ohio) AD14344

ABSTRACT: The general trend of personal equipment and protective clothing design for aircraft operations has been a gradual evolution during and since World War II with new components being developed when their need became evident. The accumulative volume and assortment of this equipment has had an adverse effect on pilots and aircrewmen. The bulk and weight of the equipment causes fatigue. Furthermore, the varied attachments slow down movement and could easily be a crucial liability during an emergency. In order to eliminate this heavy burdensome equipment, the author suggests a flight capsule for the pilot.
A flight capsule would also protect a pilot from windblast, cold, and pressure during an emergency escape.

916

Marinelli, J. L. 1960 PROJECT NR AVN 2860, "EVALUATION OF THE IMPROVED PASSENGER SEAT ARRANGEMENTS FOR HU-1A AND HU-1B HELICOPTERS". (U. S. Continental Army Command, Fort Monroe, Virginia) ASTIA AD-245 516; 3 Nov. 1960

CONCLUSIONS: (a) The seven-passenger seat kit as tested is unsuitable for Army use. (b) Based solely on available space and weight-carrying capability of the helicopter, the best seating arrangement for the maximum number of troops is with the three medical attendant seats facing aft, which will accommodate eight

passengers and permit satisfactory entrance and exit. (c) Center-of-gravity limitation and the required ballast for more than six passengers preclude consideration of a seven- or eight-passenger configuration for the HU-1A. (d) A seven-passenger configuration utilizing two medical attendant seats aft of the pilot, facing either aft or outward, and a 4-5 passenger variable-width troop seat across the after cabin bulkhead is considered the optimum seating arrangement for HU-1B Helicopters.
RECOMMENDATIONS: A seven-passenger seat configuration which permits two medical attendant seats to be faced aft or outward and which employs a standard 4-5 passenger variable-width troop seat be utilized in the HU-1B Helicopter. (AUTHOR)

917

Markushewski, L. and W. C. Knerr 1958 UNDERWATER ESCAPE PROGRAM: Description of F86D-11 Airplane Low Level Test Drops and Comparison with F9F-4 Test Drops Key West, December 1957 January 1958. (Naval Air Development Center, Johnsville, Pa.) Proj. TED no. ADC-AE-6307, Rept. no. NADC-ED-5811 Interim rept. no. 2; ASTIA AD 231 389.

ABSTRACT: Results from three F86D-11 airplane test drops are compared with those of the F9F-4. The F86D-11 sank faster than the F9F-4. The implosion of the canopy bubble on the F86D-11 occurred at 5.3 psi less differential pressure than did that of the F9F-4 canopy. Both aircraft were found to sink tail-first to varying degrees of pitch when the cockpit remained dry during submersion. Fuselage structural damage in the cockpit area after the aircraft had been sunk to a depth of about 21 fathoms did not appear sufficient to deter egress. The deformation of stringers and bulkheads was not sufficient to cause injury to the pilot by crushing. The time from release to implosion of the canopy was 45.5 sec. The canopy imploded about 1.7 sec after the aircraft disappeared below the surface of the water. This left the pilot little time to open his canopy after a crash and avert possible fatal injuries from flying pieces of canopy propelled by the implosion force.

918

Marsh, D. P. 1961 CAPSULAR COCKPIT - WEIGHT AND BALANCE ANALYSIS OF MODEL A4D-5 (Douglas Aircraft Co., Inc., El Segundo, Calif.) ES 40258; ASTIA AD-264 292; Jan. 26, 1961

ABSTRACT: This report contains a weight and balance analysis prepared for use in conjunction with the February 1961 proposal to incorporate a capsular cockpit on Model A4D-5 aircraft. Highlights of the analysis include: (1) Detailed "in and out" weights and balances, (2) a weight and balance comparison of the cockpit area before and after modification, (3) cockpit weights and balances for various configurations, (4) airplane weight empty, normal gross weight, and nose heavy condition after modification, and (5) the pitching moment of inertia of the cockpit. A weight and balance breakdown is also included to reflect a change of cockpit P.S.I. from 3.3 to 7.5. (AUTHOR)

919

Martin-Baker Aircraft Co. THE MARTIN-BAKER AUTOMATIC EJECTOR SEAT-MARK 3 (Martin-Baker Aircraft Co., Ltd., England) ASTIA ATI-88684

ABSTRACT: The design of the Martin-Baker automatic ejector seat is described which enables pilots and aircrew personnel to escape from high-speed aircraft at all altitudes. It is effective at any speed and under any G accelerations that may occur whatever the altitude of the aircraft. By the simple movement of a hand lever, the airman has his parachute available for normal rip-cord operation either without ejection with the seat or at any time after ejection has taken place. The seat is ejected from the aircraft by means of a cartridge operated gun and slides during ejection on four rollers in a guide rail. The ejection gun is fired by the withdrawal of a flexible screen, which covers and protects the occupant's face against the effects of the air stream. On ejection, the seat leaves the aircraft at 60 fps.

920

Martin-Baker Aircraft, Ltd. 1946 DETAILS OF DEVELOPMENT WORK ON THE MARTIN PATENT EXPLOSIVE EJECTION SEAT. (Martin-Baker, Higher Denham, Middlesex, England)

921

Martin-Baker Aircraft Company 1956 SOME INCIDENTS WITH MARTIN-BAKER EJECTION SEATS, 1951-1956. (Martin-Baker Aircraft Co., Ltd. Higher Denham (Bucks), Nr. Uxbridge, Middx.)

922

Martin, E. E. 1947 EVALUATION OF THE ANTI-G SUIT. Rept. No. 7, USAF Memo Rept. No. TSEAA-689-2B., Nov. 1947

923

Martin, E.E., J.P. Henry, J.L. Gamble & R.S. Shaw 1948 EVALUATION OF THE ANTI-G SUIT. (USAF Air Material Command, Wright-Patterson AFB, Ohio) MCREXD-689-2C, Report No. 8. 24 July 1948.

ABSTRACT: Three subjects were each exposed to one or more series of runs on the human centrifuge. Each series consisted of direct arterial pressure measurements at 1 g, 2.5 g, 3.5 g, and 5 g without and with each of the anti-g suits. This report presents direct radial artery pressure results obtained while comparing three anti-G suits on the human centrifuge. The G-5 suit proved to be more efficient than the G-4A which gives more than twice the protection afforded by the G-3A suit. The added protection given by the three suits when using the m-1 maneuver is as follows: ½ g for the G-3A, 2.3 g for the G-4A and 0.1 g for the G-5. This protection is over and above the normal arterial pressure method for evaluating G-suit protection can be used to confirm the results obtained by the visual method of G-suit evaluation. Experiments should be conducted to measure cerebral perfusion pressure head and blood flow rates during positive acceleration to determine how they vary in proportion to cerebral arterial pressure.

924

Martin, E. E., G. Schroer, & J. P. Henry 1949 STATIC ASSESSMENTS OF THE RELATIVE EFFICIENCY OF ANTI-G SUITS. Fed. Proc. 8:107.

ABSTRACT: Attempts to estimate the effectiveness of anti-G suits while at rest by measuring the changes they induce in blood pressure have shown increments proportionate to the relative efficiency of these devices during acceleration. The results suggest that test of G-suit efficiency could be devised which do not require the use of a human centrifuge. With this end in view, 3 further measurements were made: venous pressure, vital capacity and teeter board weight shift. Venous pressure was measured at the ante-cubital fossa when the legs only of the G-3A, G-4A, and G-5 suits were inflated. A teeter board was employed to measure the weight shift induced by the inflation. The changes in vital capacity were measured under the same conditions. Eight series of 3 tests each were carried out on 6 subjects. The following table shows the changes induced by suit inflation:

	G-3A	G-4A	G-5
Venous pressure increase ($cm.H_2O$) . . .	0.3 ± 0.2	1.9± 0.6	4.3± 0.5

Vital capacity decrease (cc.)	250 ±60	325 ±70	400 ±60
Teeter Board weight shift (pounds)	0.3± 0.1	0.4± 0.2	0.5± 0.3

These differences are qualitatively confirmed by the results of tests of these suits on the human centrifuge. In the G-3A suit mean protection as estimated from blood pressure changes was 1.0G, G-4A suit 2.2G, and the G-t suit 2.3G.

925

Martin, E. E. 1949 SERVICE TEST REPORT ON USAF TYPE G-4A PILOT PNEUMATIC SUIT, ANTI-G.
(Air Material Command, Wright-Patterson AFB, Ohio) Memo. Rept. No. MCRED-689-2E, 20 May 1949.

ABSTRACT: The G-4A anti g suit was compared with the G3A suit, first without pressure and then using pressure from the M-4 pressure-regulating valve. The suit consists of a coverall incorporting 5 intercommunicating bladders which exert pressure over the thigh, calf and abdominal regions. Tests were conducted at 10,000 ft or higher utilizing the type maneuvers necessary to obtain combat-like accelerations. The superiority of the G-4A suit was indicated in the tests.

926

Martin, E. E., R. U. Whitney & E. B. Smith 1951 DEVELOPMENT AND FABRICATION OF THE USAF TYPE M-8, NO-LEAK ANTI-G VALVE (ARO EQUIPMENT PART NUMBER C10050)
(Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC Memo Rept. No. WCRDB-689-4Q, 21 Nov. 1951.

927

Martin, E.E., and R.U. Whitney 1952 A DESCRIPTION OF THE U.S. AIR FORCE TYPE M-7 NO-LEAK, NEGATIVE-G VALVE. (Wright Air Development Center, Wright-Patterson AFB, Ohio) Technical note no. WCRD 52-11; ASTIA AD-2134; Sept. 1952

ABSTRACT: A description is given of the type M-7 negative-g valve, a unit which automatically responds to negative acceleration so as to provide controlled predetermined pressures within the T-1 altitude helmet. During negative maneuvers

exceeding 1 g the valve closes the breathing port and thereafter regulates the counterpressure in the helmet to 25 mm Hg per g. As the negative g decreases below 1 unit, the valve exhausts the counter-pressure gas and permits the pilot to resume normal breathing. This unit, which satisfactorily provides counter-pressure to the head-neck region during negative acceleration up to 5 g, operates in conjunction with the present aircraft oxygen system. Centrifuge tests showed that the device operates satisfactorily in the range 1 to 6 negative g. In flight tests performance was satisfactory within the 3-g negative limits imposed by an F-84.

928

Martin, J. 1949 REPORT ON RESEARCH AND DEVELOPMENT CARRIED OUT BY MARTIN-BAKER AIRCRAFT CO. LTD. IN CONNECTION WITH EJECTION SEATS FOR HIGH SPEED AIRCRAFT. (Martin-Baker Aircraft Co., England) June 1949. ASTIA ATI 89438

ABSTRACT: A description is given of British research and development carried out in connection with ejection seats and the escape of personnel from high-speed aircraft. The early history of the ejection seat project is presented as well as information on work done on the Defiant and Meteor III fighters, and the 16 and 65 development and construction of the Mark I seat and the fully automatic seat is discussed. Consideration training rig for the RAF. A schedule of dummy and live ejections from the Meteor III is included. Photographs and drawings illustrate some of the equipment and graphs show acceleration data.

929

Martin, J. 1956 EJECTION FROM HIGH SPEED AIRCRAFT. J. Royal Aero. Soc. 60(550):659-668, Oct. 1956.

ABSTRACT: Early studies to determine physiological acceleration limits on a ground ejection rig and to test operational designs of the Martin-Baker aircraft ejection seat in flight are described. The chief design features of the seat, including an automatic ejection device, main time release, ejection gun, leg restraining device, and duplex drogue system are described, and the peculiar conditions and methods of ejection at high altitude, high speed, and low altitude are discussed.

930

Martin, J. 1956 EJECTION SEAT AND PARACHUTE ASSEMBLY FOR A SINGLE PERSON U. S. Patent 2,762,588, 11 Sept. 1956

ABSTRACT: An ejection seat is described and illustrated, provided with two drogue parachutes. It is claimed that this assembly results in a gradual opening of the parachutes in the proper order.

931

Martin, J. 1957 EJECTION REPORTS, (Martin-Baker Aircraft Co., Denham, England)

932

Marvin, F. F. 1955 RECOVERY SYSTEMS FOR DRONES AND MISSILES (Air Force Institute of Technology, Wright-Patterson AFB, Ohio) Rept. No. GAE-23; 30 Aug. 1955

933

Marzella, J., J.R. Hess 1946 GROUND AND FLIGHT TESTS OF MARTIN-BAKER AIRCRAFT COMPANY PILOT'S EJECTION SEAT FROM MODEL JD-1 AIRPLANE (Naval Air Material Center, Aeronautical Structures Lab., Philadelphia, Pa.)

ABSTRACT: Ground and flight tests were made of the Martin-Baker pilot's ejection seat to determine its practicability and limitations as an emergency escape device, to obtain data on the accelerations acting on dummies during flight ejections, and to perform a human ejection at low airspeed. Five flight ejection tests were made at speeds from 200 to 350 mph in 50 mph increments and altitudes from 3000 to 6000 ft, and a live ejection test was made at a speed of 250 mph and an altitude of 5000 ft. It was concluded that the emergency escape device is satisfactory for service aircraft, that the highest accelerations imposed on the dummy and seat in the airstream was caused by the action of the drogue parachute and that the acceleration-time characteristics and operation of the seat catapult are satisfactory for line ejection tests

934

Mases, P., R. Falet & C. Jacquemin 1959 MODIFICATIONS RESPIRATOIRES ET CIRCULATOIRES ENGENDREES PAR CERTAINES POSITIONS DE TRAVAIL DU PERSONNEL NAVIGANT AU COURS DU VOL (Respiratory and Circulatory Changes Caused by Certain Work Positions of Flying Personnel in Flight)
Medecine Aeronautique (Paris) 14(1): 1-3.

935

Mason, J.K. 1958 PATHOLOGICAL FINDINGS FOLLOWING UNSUCCESSFUL EJECTION FROM HIGH SPEED AIRCRAFT.
J. Forensic Med., (Johannesburg, S. Africa), 5(4):173-184, Oct.-Dec. 1958.

ABSTRACT: Operational and performance features of the standard British ejection seat are outlined. Post-mortem examinations of victims of unsuccessful escapes during flight are analyzed. The findings suggest human or instrumental failure in the preparatory stage or during actual ejection. Potential pathologic findings are correlated with various ejection stages. Illustrations are included showing how the post-mortem examination may disclose the circumstances surrounding the unsuccessful escape. On the basis of the degree of pulmonary fat embolism and of local reaction to injury, general observations are made with regard to timing of injuries. The role of post-mortem examinations in preventive medicine is stressed with particular regard to the uncommon causes of death encountered in unsuccessful ejections.
(J. Aviation Med. 30(5):378, May 1959)

936

Mason, John W. 1957 A RESTRAINING CHAIR FOR THE EXPERIMENTAL STUDY OF PRIMATES.
WRAIR-68-57 Project: 6-60-10-017 Subtask No. 4
ASTIA Doc. No. AD 151 646.

937

Masters, P.G., W. Lehman, P.W. Wood & D.M. Bland 1960 INTEGRATED FLIGHT CAPSULE IMPACT AND FLOTATION BAG INFLATION SYSTEM.
(Chance Vought Aircraft, Dallas, Texas) Naval Weapons Contract Noas 59-6150-c, Interim Report No. AER-EOR-12836, 1 March 1960.

ABSTRACT: This report describes the studies made and system selected for inflation of the impact bags and flotation bags used on the integrated flight

capsule. The use of a hot gas generator inflation system was considered early in the study. However, contact with Vendors indicated that the hot gas generator system hardware is feasible, but bag materials are not available which will withstand the generated gas temperature. Three different types of cold gas inflation systems were investigated. The single air bottle, single pressure regulator system requires extremely large lines to achieve desired results. A system using a single air bottle with a pressure regulator at each bag allows use of smaller lines but the required inflation time of 3 seconds is not feasible using the proposed 900 cu. in. air bottle. Both of these systems can be designed; however, calculations are presented only to the point that the assumptions made for system design are insufficient to meet established criteria. The system recommended for this application is individual air bottles with no pressure regulators. The most apparent advantage of this system is insurance against loss of the entire recovery system in the event of failure of one bag.

938

Material Laboratory 1949 REPORT OF TYPE APPROVAL EVALUATION OF PROTECTIVE HATS. (Material Lab., Naval Shipyard, Brooklyn, N.Y.) Report 4526-14, ASTIA AD- 205449, 9 December 1949

ABSTRACT: Samples of eleven protective hats of various design and structure were submitted for tests for electrical protection, ordinary abuse, and peak force endurance. The hats were also tested for insulation resistance, flammability, water absorption, and sterilization. The results of the tests performed on the hats are given in this report.

939

Mathewson, J.H., & D.M. Severy 1953 RAPID DECELERATION TESTS OF CHEST LEVEL SAFETY BELT. (ITTE-UCLA, Los Angeles, Calif.) Rept. No. 27 Reprint Bulletin No. 73 - Highway Research Board, Washington, D.C.

940

Matlock, H., E.A. Ripperger, et al. 1957 HIGH VELOCITY IMPACT CUSHIONING, PART II, ENERGY-ABSORBING MATERIALS AND SYSTEMS. (Structural Mechanics Research Lab., Texas University, Austin, Texas) Contract No. DA 19-129 qm-817, 26 Aug. 1957. ASTIA AD 220 738

ABSTRACT: The cost of air drop can be substantially reduced to the proper combination of aerial retarder and ground cushioning, which depends upon the relative cost of the retarder and cushioning. Laboratory studies of the impact energy absorption of various materials and systems including paper honeycomb foamed plastics, and metal cylinders indicate that minimum cost is achieved with smaller parachutes than those currently in use.

941

Matlock, H., E.A. Ripperger, J.W. Turnbow, & J.N. Thompson 1957 HIGH VELOCITY IMPACT CUSHIONING, PART I. DROP-TEST FACILITIES AND INSTRUMENTATION. (Structural Mechanics Research Lab., University of Texas, Austin, Texas) Aug. 1957. ASTIA AD 220 737

ABSTRACT: Three drop-test installations were developed for research on impact cushioning. These range from a small indoor facility, 28 feet high, to 275-foot tower which provides for both vertical and inclined guided drops of masses weighing up to 5000 pounds. Instrumentation measures time, force, and displacement during impact for determining energy-absorbing properties of materials and systems. (Author)

942

Matlock, H., & J.N. Thompson 1957 HIGH-VELOCITY IMPACT CUSHIONING PART III. PRELIMINARY TEST ON A NONPRESSURIZED AIR BAG. (Structural Mechanics Research Lab., Texas University, Austin, Texas) Contract No. DA 19-129-qm-817, 15 Oct. 1957. ASTIA AD 220 822

943

Matthews, B.H.C. 1941 SERVICE TRIALS OF FRANKS HYDRAULIC SUIT. (National Research Council, Canada) Report #C-2835, July 2, 1941

ABSTRACT: This memorandum from the R.A.F. Physiological Laboratory, R.A.E. Farnborough, recommends that the Franks Anti-G suit be submitted to service trials.

944

Matthews, B.H.C. 1945 HUMAN LIMITS IN FLIGHT
Smithsonian Institute, Washington, D.C. Publication 3785

ABSTRACT: A modern aircraft will climb in a few minutes to heights at which the air is so thin that will no longer support life. It can turn and maneuver so fast that the pilot may easily be rendered unconscious from the mechanical forces which it imposes on his body, and in an aircraft which is moving rapidly in three planes of space the pilot can be subjected to stresses beyond the limits which the human body can stand. Besides the stresses from wind pressure, cold, vibration, and noise, the pilots body must also be protected from other less obvious stresses. The two greatest stresses which an aircraft puts upon the pilot and those reviewed in this publication are those stresses due to acceleration and those due to high flying in the rarefied air of the upper atmosphere.

945

May, J. 1959 OUTFITTERS FOR OUTER SPACE.
Space Age 1(3):20-26, May 1959

946

Mayfield, G. B. & M. C. Crook 1948 TESTS TO DETERMINE STRENGTH OS SAFETY HARNESSES FOR AIRCRAFT PILOTS.
(The David W. Taylor Model Basin) Rept. No. 633, Oct. 1948.

947

Maynard, J. D. 1961 AERODYNAMIC CHARACTERISTICS OF PARACHUTES AT MACH NUMBERS FROM 1.6 TO 3.
(N.A.S.A., Washington, D. C.) NASA TN D-752, May 1961.

ABSTRACT: A wind-tunnel investigation has been conducted to determine the parameters affecting the aerodynamic performance of drogue parachutes in the Mach number range from 1.6 to 3. Flow studies of both rigid- and flexible-parachute models were made by means of high-speed schlieren motion pictures, and drag coefficients of the flexible models were measured at simulated altitudes from about 50,000 to 120,000 feet. (Author)

948

Mayo, A.M. 1951 BASIC ENVIRONMENTAL PROBLEMS RELATING TO MAN IN THE "AEROPAUSE" AS SEEN BY A AERONAUTICAL ENGINEER
(Douglas Aircraft Co., Inc., El Segundo, Calif.) Nov. 6, 1951 ASTIA AD 87 435

ABSTRACT: While many new factors and principles must be considered in design for flight in the AEROPAUSE, emphasis on the cardinal principles of working toward the optimum pilot-airplane combination, will probably pay the greatest total dividend in operational efficiency. This principle can best be approached by making use of the best available aeromedical and engineering data, in order to arrive at workable compromises in each. Some of the new problems will radically affect some of the equipment associated with the airplane.

New problems include those of fit and arrangement of the aircraft cabin, time-distance factor, temperature of the aircraft, pressure environment in the cabin, acceleration, noise and vibration and the escape problem.

949

Mayo, A.M. 1952 BASIC ENVIRONMENTAL PROBLEMS RELATING MAN AND THE AEROPAUSE AS VISUALIZED BY THE AERONAUTICAL ENGINEER
In: White, C.S. & O.O. Benson, Jr., eds., Physics and Medicine of the Upper Atmosphere, A Study of the Aeropause (Albuquerque, New Mexico: University of New Mexico Press, 1952) Pp. 6-22

ABSTRACT: Flight in the aeropause will impose great physiological and psychological demands on pilot and crew. The rapid advances in aircraft construction call for a corresponding step-up in education and training. The human factor should, on the other hand, be considered in the design of equipment and instrumentation. The latter should be reduced to the absolute essentials. Further clarification of the visual effects of reduced light dispersion is required. The reduction of the time-distance factor in high-speed flight will put more reliance on automatic control mechanisms, confining the human element to slow-rate monitoring operations. Temperature regulation systems will have to be adapted to the increasing speeds (a chart indicating various cooling systems practicable at the various speed ranges is presented). Problems concerning pressurization, physiological effects of acceleration, of noise, and vibration are discussed. Brief sections are dedicated to radiation and meteor hazards. General principles of escape mechanisms are analyzed. In conclusion it is recognized that a compromising formula is to be worked out to balance all factors involved and keep the resulting costs at a minimum.

950

Mayo, A.M. 1952 ESCAPE DEVICES REQUIRED FOR FUTURE AIRCRAFT. (Douglas Aircraft Company, Inc., El Segundo, Calif.) 29 Sept. 1952.

SUMMARY: It should be emphasized that no single escape method can adequately cover the needs of all aircraft. It is also important to make certain that arbitrary opinions do not supplant objective analyses and allow the corporation of devices giving less safety per unit effort than would be possible by the application of the proper escape met od. It is also essential to be extremely wary of systems adding large chunks of dead weight or of those which tend to materially increase aircraft dimensions. Wrong decisions in this respect can reduce total safety by excessively decreasing performance or numbers of additional protective aircraft.

951

Mayo, A. M. 1952 ESCAPE DEVICES REQUIRED FOR FUTURE AIRCRAFT (Paper Conference on Problems of Emergency Escape in High Speed Flight. 29-30 Sept. 1952, at Wright-Patterson Air Force Base, Ohio) Sept. 1952 ASTIA AD 14 353

952

Mayo, A.M. 1955 SELECTION OF THE ESCAPE SYSTEM (Chief Equipment and Interiors, Engr. Section, Douglas Aircraft Co., Inc., El Segundo, Calif.) Rept. 1366, Oct. 7, 1955

ABSTRACT: This paper was presented to the Aeromedical-Engineering Association Institute of Aeronautical Sciences. In order to prevent excessive performance or economic penalty, the selection of the escape system should be based on an objective study of the over-all requirements of the man-aircraft into which it is to be incorporated. Full utilization should be made of all available aeromedical, engineering, and statistical data available. The designed should be extremely wary of any system adding substantial increments of complexity, dead weight, or size increments to the over-all aircraft system.

953

Mayo, A.M. 1957 SOME SURVIVAL ASPECTS OF SPACE TRAVEL
Journal of Aviation Medicine 28(5): 498-503

ABSTRACT: In a space craft as in aircraft the over-all objectives must command first attention. Survival problems resulting from space environment will be so severe however, that a larger percentage of total space craft design time is likely to be spent in their solution than in airborne craft. The design of crew compartments will be dictated by the requirements of human operators not significantly different in basic physical and mental capabilities from those of the pilots of present aircraft. Automatic controls will be needed as greatly for actuation of safety equipment and environmental control of the crew quarters as in control of the craft and its propulsion and power systems. A major problem will be that of suitably linking the human operator to his "automatic" systems. Hermetically sealed crew quarters to provide a livable earth environment in space will be a prime survival requirement. The reconversion of liquid and food waste products to useful nutrients that are psychologically satisfactory might be approached by the use of secondary living organisms in the same manner as in nature. Temperature control will undoubtedly require specialized attention. The possibly dangerous stresses to be encountered during space flight include weightlessness and acceleration. The problems of surviving the effects of a wide variety of solar and cosmic radiation are other dangers. Careful consideration must be given to a proper balance of the fundamental moral, morale and economic factors to provide escape equipment justifiably on the basis of the total purpose of the craft involved.

954

Mayo, A. M. 1958 BASIC CONSIDERATION OF SPACE CABIN DESIGN
(Paper, Society Automotive Engineers National Aeronautic Meeting, Los Angeles, California, Sept. 29 - Oct. 4, 1958)

ABSTRACT: Some important environment requirements have been considered and are discussed by category as follows: Radiation, temperatures, acceleration, noise and vibration, meteoroids and space debris, internal atmosphere, food and water supply. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space Medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Repc. No. TDCK-16903; ASTIA AD-227 817; Feb. 1959)

955

Mayo, A. M. 1958 SURVIVAL IN SPACE, THE VEHICLE-COMBINED REQUIREMENTS.
(Douglas Aircraft Co., Inc., El Segundo, Calif.) DACO Technical Paper No 646, 10-12 Nov. 1958

956

Mayo, A.M. 1959 SOME SURVIVAL ASPECTS OF SPACE TRAVEL
Electronic Ind. Pp. 60-63, Feb. 1959

ABSTRACT: Discussion of the need for highly reliable and accurate high-speed automatic control systems. Various environmental problems, such as exposure to cosmic radiation meteorites and temperature, and high acceleration rates are discussed.

957

Mazer, M. 1945 THE G SUIT IN COMBAT
Air Surg. Bull., 2:236-238

ABSTRACT: Presents data on the occurence of grayout and blackout and the highest G force ever experienced as recorded by the Kollsman accelerometer in 35 pilots who wore the G suits on all missions. Ten of the pilots had had grayout but not blackout, 3 had been exposed to 6 G or more. Of the 21 who had never grayed out, 17 had experienced 5 G or more and 14, 6 G or more. Of the 31 who had never blacked out, 20 had experienced a force of 6 G or more. Six pilots had experienced 7 to 7.9 G and 5.8 to 9 G without blacking out.

It is concluded that the G suit is an important factor in increasing the combat efficiency of the P-51 pilot-aircraft combination.

958

Mazza, V. 1947 PNEUMATIC CATAPULTS FOR SIMULATED SEAT EJECTION TESTS.
(Engineering Division, Air Materiel Command) Sept. 1947.
ASTIA ATI 49510

ABSTRACT: Preliminary tests were conducted of two types of pneumatic catapults which were developed for use on the ejection seat test tower to determine the most tolerable acceleration-time diagrams on human subjects. In one catapult type, acceleration is controlled by metering compressed air through a series of orifices in the cylinder which are uncovered successively by movement of the piston. The other pneumatic catapult is accelerated by air metered by a mechanically actuated air valve which is positioned through a cam arrangement by the upward displacement of the ejection seat. The two methods were shown to be feasible, with the former method recommended for work with human subjects from the standpoint of safety and simplicity.

959

Mazza, V., R. W. Briggs, C. E. Caroll, & R. V. Wheeler 1950
HIGH ALTITUDE BAILOUTS. Memo Rept. No. MCREXD-695-66M

960

Mazza, V. 1951 HIGH ALTITUDE BAILOUTS.
J. Aviation Med. 22(5):403-407. Oct. 1951.

961

Mazzei, J.H. 1961 A COMPARISON STUDY. CONFINED VS. UNCONFINED TEST DATA. A CHECK STUDY. INSTRUMENTATION RESPONSE AT HIGH FREQUENCIES.
(Feltman Research Labs., Picatinny Arsenal, Dover, N.J.) September 1961
Technical Rept. No. FRL-TR-45 ASTIA AD 263 564L

ABSTRACT: Confined and unconfined dynamic drop tests were conducted on like specimens of cushioning material of known density, size, and under comparable environmental conditions. The data collected from these tests were employed to plot, on the same graph, a static load-vs-peak acceleration curve, one for confined and one for unconfined data. A comparison of these curves shows conclusively that there is considerable difference in the dynamic behavior of the cushion in the confined, or as-packaged, condition. Beyond the optimum loading range, the peak accelerations transmitted by the unconfined cushion, continue to rise sharply, while peak accelerations for the confined cushion show a secondary decrease beyond the optimum loading range, the peak accelerations transmitted by the unconfined cushion, continue to rise sharply while peak accelerations for the confined cushion show a secondary decrease beyond the optimum loading range, before starting a secondary increase beyond bottoming-out. (Author)

962

Mead, L.C., 1948 APPLICATION OF HUMAN ENGINEERING TO FLIGHT PROBLEMS
J. Aviat. Med., 19:45-51

963

Mead, Leonard C. 1952 HANDBOOK OF HUMAN ENGINEERING DATA -- SECOND EDITION (REVISED)
(Institute for Applied Experimental Psychology, Tufts College) (Under Contract for the Special Devices Center, USN) ASTIA AD 43.650

ABSTRACT: Up to the present, we have been able to keep up with technological progress by education and training. But we have now reached the point where the machine has dwarfed the man, for the characteristics of the individual -- the human machine -- have not changed in the memory of man and will change for countless generations to come, while the man-made engine is capable of ever increasing power, scope, and speed of operation. Our machines must be manned by the average human being, their operator must be governed by his capabilities under the influence of mantal stress, fatigue, and sudden change: consequently the average man's capabilities must be analyzed, measured and made available to the designer and engineer to make good our progress from now on. This book represents only the beginning of what is hoped to be a continuing and ever expanding compilation of data which will provide the planner and designer with the probably characteristics of the average individuals who will man the machines of the future.

964

Meakin, L. W. 1945 REPORT ON BLADDERS, VINYLITE COATED NYLON—ANTI-BLACKOUT SUIT—ENDURANCE TESTS OF.
(Naval Air Experimental Station, Philadelphia) 9 Feb. 1945.

ABSTRACT: Anti-"g" suit bladders (nylon) were exposed to up to 24 hours at 100 degrees F. and 100% relative humidity and up to 24 hours at 120 degrees F. dry, following which leakage was tested. Bladders met BuAer specifications and were actually improved as far as leakage was concerned by weathering.

965

Meier-Muller 1940 MEDICAL PSYCHOLOGICAL INFORMATION REGARDING FLYING ACCIDENTS
Flugwehr. u. Technik. 2: 1940

ABSTRACT: A high percentage of the growing number of flying accidents since the beginning of flights at high altitudes are due to the psychic and physical collapse of the crew. Where the cause of flying accidents is not discovered the confidence of the personnel in the reliability of the material is shaken and an atmosphere of disquiet is created. Medical officers and technicians must be taken with the new construction of aircraft and apparatus, breathing apparatus

to be used at high altitudes, sitting position, safety belt, clothing, etc. The psychic make-up of the crew is of paramount importance for the success of their career. Only a small number of the men with particular psychic and physical powers of resistance will be able to endure the heavy demands upon them by the present war as regards flying at high altitudes and cold. A great number of accidents could be avoided by choosing flying personnel on psychological grounds through psychological supervision of the force and suitable treatment of neurotic occurrences.

966

Meister, David and R.B. Wilson 1960 THE ROLE OF MAN IN THE MAINTENANCE OF EARTH SATELLITES
(Paper, American Rocket Society Semi-Annual Meeting and Astronautical Exposition Ambassador Hotel, Los Angeles, California, May 9-12, 1960.

ABSTRACT: Man will have a role to play in the maintenance of these satellites: 1. First to decide if maintenance is worthwhile for a particular satellite mission. 2. Second, if maintenance is considered necessary, one must next decide which of several means of performing maintenance is the most economical.

His decision must be based on these factors: (a) Mission requirements; (b) Availability and reliability of rocket booster thrust; (c) Equipment failure rate under space conditions; (d) Equipment complexity.

There are several ways in which satellites can be maintained by men in the space environment: (a) By flying a maintenance crew from earth to the malfunctioning vehicles and return; (b) By stationing maintenance personnel in each vehicle; (c) By stationing a maintenance crew within an orbiting space station from which the crew "flies" to the malfunctioning satellite and then returns to the space station.

967

Merrill, G., ed., C. W. Besserer, K. A. Ehricke, & B. B. Small 1959 DICTIONARY OF GUIDED MISSILES AND SPACE FLIGHT. (Princeton: Van Nostrand 1959)

968

Meves, Ernst UNTERSUCHUNG VON MOEGLICHKEITEN DES NOTAUSSTIEGS DER FLUGZEUGINSASSEN BEIM ABSTURZ, INSBESONDERE BEI HOHER GESCHWINDIGKEIT
(Investigations on Emergency Escape from Diving Aircraft)
ASTIA ATI 74752

969

Meyer, R. A. 1958 WIND TUNNEL INVESTIGATION OF CONVENTIONAL TYPES OF PARACHUTE CANOPIES IN SUPERSONIC FLOW. (U.S. Air Force) WADC Tech. Rept. 58-532, December 1958.

970

Michel, E.M. 1955 WINDBLAST TESTS OF THE MB-2 HELMET
(Wright Air Development Ctr., Wright-Patterson AFB, Ohio)
WADC TN 55-287, Nov. 1955. ASTIA AD 95 755

ABSTRACT: During 1954, three phases of windblast tests were conducted on the MB-2 semi-rigid helmet. The first two series of tests were made in conjunction with the B-47 downward ejection program sponsored by the Aircraft Laboratory. The first phase was carried on at Wright-Patterson Air Force Base by using an anthropomorphic dummy ejected downward from the observer's position. The second phase, using live subjects, was made at Eglin Air Force Base, Florida. The third test was carried out at the windblast facility of the Marquardt Aircraft Company, Van Nuys, California, using an anthropomorphic dummy seated in an ejection seat installed in front of a blast nozzle. Results of the test have proved the MB-2 semi-rigid helmet has windblast retention capabilities and might possibly be a satisfactory replacement for the standard P-3 helmet. (CARI)

971

Michel, E. M. 1957 SURVIVAL SPACE REQUIREMENT FOR INDIVIDUAL AIRCRAFT ESCAPE CAPSULES
(Aero Medical Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio)
WADC Tech. note no. 56-526 Feb. 1957 ASTIA AD 110 649

ABSTRACT: In aircraft with an escape capsule, clothing will be part of the survival gear. Studies were made to determine space requirements and the minimum of clothing and survival equipment for survival under extreme conditions. Items were selected, measured, and weighed; and a pack was designed to carry the gear. A minimum of 3700 cubic inches was required to stow the survival items, which weighed 70 pounds.

972

Michelson, I. and B. Tourin 1962 CONSUMERS UNION'S DYNAMIC TESTS OF SEAT BELTS. (In M. K. Cragun, ed., The Fifth Stapp Automotive Crash and Field Demonstration, Sept. 14-16, 1961) Pp. 243-248.

973

Mickelson, W. F. 1960 EMERGENCY ESCAPE CAPSULE SYSTEM (Paper, 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960)

974

Mickelson, W. F., B. J. Mills, J. B. Graves, R. S. Huey, & P. F. Kiehl 1961 EMERGENCY ESCAPE CAPSULE STUDIES: PHASE II: FLOTATION AND SURVIVAL TESTS IN WARM-WATER ENVIRONMENT, PHASE III: FLOTATION, SURVIVAL, AND HABITATION TESTS IN COLD-WATER ENVIRONMENT; PHASE IV: SURVIVAL AND HABITATION TESTS IN COLD-LAND ENVIRONMENT. (Aeronautical Systems Division, Wright-Patterson AFB, Ohio) WADC TR 59-247, Part II; ASTIA AD-272 784; Dec. 1961

ABSTRACT: Flotation, survival, and habitation studies were conducted on full-scale crew escape capsules. The objectives were to determine the use of the escape capsule in a warm-water environment, cold-water environment, and cold-land environment. The individual facets of the program included: the design of capsule clothing, donning of clothing in confined space, stowage of emergency survival items, air exchange requirements, flotation, inhabitation, and communication studies.
As long as the capsule occupant can conduct physical exercise when discomfort is detected, keep the seat cushions from becoming saturated with salt water, and use the survival equipment normally and reasonably, he can survive for 72 hours after landing in cold or warm water. Findings also indicated that a human subject can use the capsule as a basic survival item for 72 hours in a cold-land environment.

975

Milhoan, F.M, J.J. Vorachek and J. D'Allura 1961 INVESTIGATION OF ESCAPE CAPSULE SYSTEMS FOR MULTI-PLACE AIRCRAFT. PART II. PRELIMINARY DESIGN AND WIND TUNNEL TESTING OF AN INDIVIDUAL ESCAPE CAPSULE. WADC TR 57-329, pt. 2; ASTIA AD 273 626.

ABSTRACT: Design and dynamic model and wind tunnel model testing is reported for an individual escape capsule as part of a program for the investigation

of escape capsule systems for a hypothetical multi-place aircraft. The capsule provides safe escape over an aircraft performance envelope through an altitude range from sea level to 55,000 ft and a Mach number of 4.0 from 55,000 to 100,000 ft with a flight duration of 30 hr. The preliminary design is described. Results from stress and weight analyses are included. A preliminary performance and stability analysis of 3 capsule stabilization systems, including fins, boom-balloon configurations, and trailing drag bodies, was made, and a system comprised of a variable sized inflatable drag body was selected and further analyzed. Data used for the analysis was obtained from quarter-scale model free-flight tests and transonic and supersonic wind tunnel tests from Mach 0.5 to 3.0. Graphical results from the wind tunnel tests are included. (Author)

976

Millar, A. 1956 EJECTION SEATS
Aircraft (Toronto) 18(4):16-18, 21; (5):33-34, 37, 84-85, April-May 1956

ABSTRACT: The development of ejection seats and the initial experiments dealing with ejection procedure are discussed. Flight experiments are reported and illustrated of dummy ejections using the automatic Martin-Baker seat. Consideration is given to the design of ejection seats, especially the Weber ejection seat, and to problems associated with downward supersonic ejection and capsule ejection. Mention is made of human ejection drills executed at low speeds. It is stressed that successful ejection always depends on the airman's psychological reactions.

977

Miller, A. E. and E. H. Replogle 1959 DEVELOPMENT OF AN EMERGENCY PRESSURIZATION SYSTEM FOR AN ESCAPE CAPSULE (Wright Air Development Division, Wright Patterson AFB, Ohio) WADC-TR-58-397, May 1959, ASTIA AD-216307

ABSTRACT: An Emergency Pressurization system for an Escape Capsule was developed It is included its own "bottled" high pressure air supply and a sequential system of controls whereby, after being armed either manually or by separation from the aircraft, the system automatically (as a result of the sensing of the drop of cockpit pressure) releases its air at the rate required for fast repressurization. It then cuts short the fast repressurization as soon as the capsule pressure has again returned to a safe level, and directs the air through an absolute pressure regulator which maintains this level, compensating for capsule leakage.

978

Miller, B. P. 1952 A BRIEF HISTORY OF AERIAL EMERGENCY ESCAPE (Paper Conference on Problems of Emergency Escape in High Speed Flight, 29-30 Sept. 1952, at Wright-Patterson Air Force Base, Ohio) (Aircraft Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio) ASTIA AD 14 352

979

Miller, C.O., and J.A. Barton 1957 ANALYSIS OF EJECTIONS FROM JET FIGHTER AIRCRAFT (Chance Vought Aircraft, Inc., Dallas, Texas) Report NO. 11184, 7 October 1957.

980

Miller, C.O. 1957 EVALUATION OF TRANSVERSE ACCELERATION (REAR TO FRONT) UTILIZING CONVENTIONAL AND SPECIAL RESTRAINT GEAR. (Chance Vought Air-craft, Inc., Dallas, Tex.) Rept. No. 10816, Feb. 1957

981

Miller, J. H. 1953 STANDARDIZATION OF THE AIR FORCE-NAVY PILOT'S PNEUMATIC SUIT, TYPE ANTI-G.(Wright Air Development Center.)Techn rept. no. 53-80 AD 30 380

Summary: The better features of the U. S. Air Force type G-4B and the U. S. Navy type Z-2 anti-g suits were combined and modified in an effort to produce a suit superior to both of the suits and acceptable to pilots of both services. The new suits differed from the Z-2 and the G-4A in that it incorporated larger abdominal bladders, internal lacing adjustments extending from crotch to knee and from the waist to the knee, basic cloth of 50% nylon-50% cotton combination, narrower tapes under the slide fasteners, and buttoned pockets located only on the lower legs and left arm. This suit was designated the model S-362-1, abdominal filling. Another suit, identical to the U. S. Air Force suit with the exception that the filling tube in this model extended beyond the mid-thigh area to the middle of the calf bladder, was designated model S-362-1, leg filling. Tests indicated no significant advantage for either inflation system. Centrifugal and flight tests on experimental Air Force Navy anti-g suit indicated acceptability of this suit for use in the fighter aircraft of both services.

982

Miller, R., Bondurant & Hiatt 1959 DURATION OF TOLERANCE TO POSITIVE G IN 11 SUBJECTS. (in minutes). (without g-suit) (with g-suit). In Gauer, O.H. & G.D. Zuidema, Gravitational Stress in Aerospace Medicine (Boston: Little, Brown, and Co., 1961) p. 262

983

Mills, G.J. 1957 DEVELOPMENT AND FABRICATION OF SUPERSONIC WIND BLAST AND DECELERATION HELMET FOR HUMANS AND CHIMPANZEES. (Holloman Air Development Center, Holloman AFB, New Mexico) Progress Report No. 2, Contract No. AF 29(600)-1104, 18 April 1957.

984

Milton, Alexander, H. T. E. Hertzberg 1957 A COMFORT EVALUATION OF A FORM-FITTING HIGH ALTITUDE HELMET (Aero Medical Laboratory, Wright Air Development Center) WADC Tech. Rept 56-404 ASTIA No. AD 110 548

985

Minkler, L.F. 1959 PASSENGER SEAT CRASH RESEARCH TESTS MODEL COMMERCIAL JET. (Convair, San Diego, Calif.) Rept. No. SL-59-423, 2 Dec. 1959.

986

Minkler, L.F. 1960 LOUNGE COMPARTMENT AREA, BULKHEAD AND SEAT BACK HEAD IMPACT DEVELOPMENT TESTS, MODEL 22. (Convair, San Diego) Rept. No. SL-59-364, Jan. 1960.

987

Mohrlock, H.F. 1957 THE DEVELOPMENT OF THE RESCU. (ROCKET EJECTION SEAT CATAPULT, UPWARD) MARK I. A.R.S. Preprint 414-57, 4-6 April 1957.

ABSTRACT: Fast-paced development of today's military aircraft permits the breaking of speed and altitude records with striking regularity. This continual increase in the flight performance envelope has aggravated the task of design engineers in providing an escape system for each new configuration. The problems associated with escape from these high performance aircraft may be categorized as:

a. Low Level Ejection
b. Fin Clearance
c. Tumbling (Seat Instability)
d. Windblast

988

Mohrlock, H. F., Jr. 1957 AIRCRAFT PERFORMANCE SYSTEMS RELATED TO ESCAPE SYSTEMS.
J. Aviation Medicine 28:59-64, Feb. 1957.

ABSTRACT: Many variables influence crew escape from military aircraft. The first item considered is aircraft speed capability. Altitude, here, is an important variable. Improved escape systems are necessary to keep peak deceleration within human tolerance at speeds beyond 600 knots. Several ways are proposed in which this may be accomplished. First, reduce the drag of the seat relative to its ejectable weight. A second measure would be to add seat thrust in the direction of flight. A third improvement might be that of an escape capsule. Aircraft altitude capabilities are a second important consideration.

The goal of the design engineer should be a system that will provide a means of safe escape at any speed and altitude which an aircraft is capable of attaining without airframe failure. It is imperative that such a system be designed for the entire flight performance capabilities of the aircraft. A successful escape system consists of more than the ejection seat or capsule. It is an integration of the man with his clothing, oxygen and pressure supply, body restraints, survival gear, and stabilizing and descent parachutes to provide protection against sudden decompression, deceleration, acceleration, wind blast, thermal changes, and a hostile environment which might exist upon landing.

989

Moller, F. D. 1959 HIGH-ALTITUDE, PARTIAL PRESSURE SUITS DESIGNED WITH DOUBLE CAPSTANS, VENTILATION LAYERS, AND PARTIAL PRESSURE AND FULL PRESSURE SOCKS. WADC TR 59-246; ASTIA AD 216 308.

ABSTRACT: The resizing is described of the Type MC-4 suit (partial pressure, high-altitude, with g-bladder protection) to meet fitting requirements when selection is made by "Stature-Weight" selection charts. The resized suit is known as Type MC-4A. The design and construction of three prototypes of partial pressure suits having various features requiring evaluation in the effort to overcome certain problem areas are discussed. The development of pneumatic socks (both partial pressure and full pressure) for pressurizing the feet is also discussed. (Author)

990

Montagard, F. 1953 SYSTEMATIC X-RAY EXAMINATION OF THE SPINAL COLUMN BEFORE ENTERING EJECTION SEAT TRAINING (Examen radiologique systématique de la colonne vertébrale(avant stage d'entraînement au siège éjectable). Médecine aéronautique, (Paris) 8 (3): 243-248. 1953 In French.

Summary: X-ray examination of the spinal column of fighter pilots to be trained in the use of ejection seats has the triple purpose to detect diseases of the bone, traumatic lesions or their sequelae, and anomalies of the spinal column and body structure in genera. This article is primarily concerned with the latter aspect, expecially with the timely detection of disorders of the equilibrium or of a slipped disk. The standing position was standard for the spinal X-ray examination, but a few pictures were also taken in the ventral position. In the majority of the cases the spinal column showed no abnormalities. Among the pathological conditions detected, the most interesting were: a case of flattening of two vertebrae, agenesia of the disk of the second and third cervical vertebrae, and bilateral spondylolysis of the posterior arc of the fourth and fifth lumbar vertebrae. Spinal malformations are not always indicative of elimination from ejection-seat training; however, anomalies of the lower lumbar column have to be watched carefully.

991

Montagard, F., & R. Picamoles 1956 1.500 RADIOGRAPHIES SYSTEMATIQUES DE LA COLONNE LOMBAIRE POUR APTITUDE AU SIEGE EJECTABLE (1500 SYSTEMATIC RADIOGRAPHS OF THE LUMBAR SPINAL COLUMN TO TEST EJECTION SEAT CAPACITY) Médecine aéronautique (Paris) 11(1):59-69

ABSTRACT: Radiological examinations were conducted in 1552 French airmen to detect the presence of spinal anomalies which might increase the probability of injury during ejection. Minor malformations of the spine, including sacralization and spina bifida, were observed in 30% of the men, but were not considered dangerous. Malformations for which ejection-seat training was considered inadvisable were observed in almost 4% of the men and included spondylolisthesis (2.32%), intervertebral hernias, and vertebral osteochondrosis.

992

Montagard F., R. Papet 1959 LUMBAR DIFFICULTIES FROM THE EJECTION SEAT AND THE TRAINING RAMP. (REFLECTIONS APROPOS OF SYSTEMATIC RADIOGRAPHY OF THE VERTEBRAL COLUMN) Med. Aero (Par) 14:377-83

993

Moody, D. J., & R. H. Shannon 1958 THE ROLE OF ESCAPE SYSTEM GROUND SAFETY PINS IN JET AIRCRAFT ACCIDENTS, 1 JANUARY 1955--30 JUNE 1957 (Directorate of Flight Safety Research, Norton AFB, Calif.) Publication: M-8-58; ASTIA AD-205 121; 18 June 1958

ABSTRACT: A study of the jet aircraft accidents that occurred during the period 1 January 1955 through 30 June 1957 indicated that 87 crew-members failed to remove ejection system ground safety pins prior to takeoff. This failure resulted in delays in initiating the ejection sequence and inability to use the ejection seat during inflight emergencies. In slightly over half of the cases ejection was subsequently effected. The opportunity for successful escape at low altitudes was sharply reduced when ground safety pins had not been removed. Considering the case in which such pins had not been removed, when the emergency occurred below 5,000 feet, two-thirds were fatally injured. In contrast even though ground safety pins were installed, when the emergency occurred above 5,000 feet, three-fourths of the persons survived. (ASTIA)

994

Moody, Donald J. 1960 SUMMARY OF PERSONAL SURVIVAL EQUIPMENT IN AIRCRAFT ACCIDENTS. (Norton AFB, California)

995

Moore, C. B. 1952 PLASTIC BALLOONS: A PLATFORM FOR EXPERIMENTS IN THE UPPER ATMOSPHERE. In White, C. S., & O. O. Benson, Jr., eds., Physics and Medicine of the Upper Atmosphere, A Study of the Aeropause (Albuquerque, N. Mex.: Univ. of New Mexico Press, 1952) pp. 395-404

996

Moore, E.P. 1942 ANTI-BLACKOUT EQUIPMENT -TEST OF - REPORT ON. (Navy Dept., Naval Air Station, Anacostia, D.C.) 12 February 1942

997

Moore, F., Jr. 1959 SUPERSONIC EJECTION TESTS AT SMART. (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: To investigate further and attempt to define more accurately the human tolerance limits to open election seat escape, a program of supersonic tests was conducted at the SMART facility during the fall of 1956 and spring of 1957. Chimpanzee subjects were ejected and successfully recovered at speeds from approximately M0.9 to M1.4. The problems of equipment and instrumentation design are discussed; a brief resume of test results and conclusions as well as test philosophy will be summarized. An 8 minute 16 mm. color sound film is available for presentation which traces a typical test run from start to finish, including a description of specialized test equipment. (J. Aviation Med. 30(3):195, March 1959)

998

Moore, F. L. 1952 NEW DITCHING SURVIVAL PLAN URGED Aviation Week 56:84-87, May 12, 1952

999

Moore, J. O. 1951 ANALYSIS OF EJECTION SEAT OPERATION IN JET FIGHTER ACCIDENTS (Medical Safety Division, Directorate of Flight Safety Research, Norton AFB, Calif.) Publication #M-37; August 10, 1951.

1,000

Moore, J. O. 1957 STATEMENT MADE 8 AUGUST 1957 IN A HEARING BEFORE THE SPECIAL SUBCOMMITTEE ON INTERSTATE AND FOREIGN COMMERCE. Seat Belt Hearings in the U.S. House of Representatives. (Automotive Crash Injury Research, Cornell University Medical College, New York, New York)

1,001

Moore, John 1961 THE HAZARDS OF PROTECTION OF NEW MATERIALS OR STRUCTURES (Paper, Symposium On Impact Acceleration Stress, Brooks Air Force Base, San Antonio, Texas, November 27-29, 1961)

1,002

Moore, W.L. & C.W. Morgan 1956 CUSHIONING FOR AIR DROP. PART IV. THEORETICAL ANALYSIS OF A LANDING SNUBBER FOR USE WITH PARACHUTES (Structural Mechanics Research Lab., U. of Texas, Austin.) Contract DA 19-129-qm-150; 21 Nov. 1956 ASTIA AD-122 375

ABSTRACT: This report describes the characteristics of a landing snubber and a theoretical analysis of its operation. The theoretical analysis is based on fundamental principles of mechanics and certain reasonable assumptions. The analysis yields two simultaneous differential equations which were solved by an analog computer to give the snubber stroke, the motion of the parachute, and the motion of the load in terms of convenient parameters. The results of ten analysis presented in tabular form indicate satisfactory operation of the device if the design is based on the proper combination of parameters. (Author)

1,003

Moore, W.L., Jr. & B. Rowen 1963 DYNA-SOAR (X-20) AND AEROSPACE PLANE Paper: Lectures in Aerospace Medicine, School of Aviation Medicine, Brooks AFB, Texas, 4-8 February 1963

1,004

Morant, G.M. 1947 DIMENSIONAL REQUIREMENTS FOR SEATS IN R.A.F. AIRCRAFT. (Flying Personnel Research Committee, Gt. Brit.) Report no. 682 ASTIA AD-122 025, February 1947

ABSTRACT: Sections of this report deal with: (a) physiological considerations regarding seating in general and aircraft seating in particular; (b) safety considerations relevant to seats in aircraft; (c) experimental trials regarding seating requirements; (d) body measurements relevant to seating for groups of men using R.A.F. aircraft; (e) requirements for particular features of seats; (f) suggested requirements for all kinds of seats in R.A.F. aircraft except ejection seats. (FPRC summary)

1,005

Morant, G. M. & H. P. Ruffell Smith 1957 CRITICAL DIMENSIONS OF A STANDARD HELICOPTER COCKPIT.
(Inst. Aviation Med., R.A.F., Farnborough) FPRC Rept. No. 1002; March 1957.

1,006

Morehouse, G. G. 1949 MODEL TESTS OF SEAT EJECTION FROM A FREE-SPINNING MODEL OF THE F-82B AIRPLANE.
(Air Materiel Command, Wright-Patterson AFB, Ohio) AF TR No. 5777, May 1949 ASTIA ATI 55249.

ABSTRACT: An investigation was made to determine the possibility of the spin being a critical flight condition for pilot ejection from the F-82B aircraft. The tests were performed in the USAF 12-Foot Vertical Wind Tunnel, Wright-Patterson AFB using a 1/25 scale, free spinning model of the aircraft and the pilot-ejection seat combination. The criteria for dynamic similarity necessary for a free spinning model are given in the report. The tests indicated that the pilot can safely escape from the spinning F-82B aircraft by means of the ejection seat. Test results are believed to be conservative.

1,007

Morgan, C.W., & W.L. Moore 1956 CUSHIONING FOR AIR DROP, PART V THEORETICAL AND EXPERIMENTAL INVESTIGATIONS OF FLUID-FILLED METAL CYLINDERS FOR USE AS ENERGY ABSORBERS ON IMPACT. (Structural Mechanics Research Lab., Texas University, Austin. Texas) Contract No. DA-19-129-qm-150, 20 Dec. 1956. ASTIA AD 122 376.

ABSTRACT: In this report is described the design, construction and testing of energy absorbers utilizing metal cylinders either empty or fluid-filled. Energy is absorbed in the crumpling of the metal walls and in imparting kinetic energy to the contained fluid as it is discharged through properly designed orifices in the wall of the container. An equation is derived for the area and spacing of orifices in the wall of the container. An equation is derived for the area and spacing of orifices required to maintain a constant retarding force due to liquid pressure during the crushing of the cylinders. The design of the fluid-filled cylinders is based on this constant retarding force in addition to the force required to crumple the walls of the empty cylinder. The predicted performance of these energy absorbers is shown to be verified by free-fall dynamic tests. The resisting force and the energy absorbed as computed from the force-displacement curves are given. Seamless steel and aluminum tubing, commercial sheet steel cans, and cylinders formed from galvanized sheet steel were tested. A comparison of the various materials is made on the basis of cost per unit of energy absorbed

1,008

Morgan, H. 1955 BEHAVIOR OF TEXTILES UNDER IMPACT CONDITIONS; AND OTHER ABSTRACTS. (Paper, 22nd Shock and Vibration Symposium, Wright Air Development Center, Wright-Patterson AFB, Ohio, 22-23 March 1955)

1,009

Morlock, H. F., Jr. 1957 AIRCRAFT PERFORMANCE SYSTEMS RELATED TO ESCAPE SYSTEMS.
J. Aviation Med. 28:59-64.

1,010

Morris, C. W. 1947 ANATOMY AND STATISTICS AID DESIGN OF PASSENGER SEATS S.A.E. Journal 55:24-26. September 1947. (S.A.E. Preprint under title PASSENGER SEATS CAN BE COMFORTABLE, April 1947.)

1,011

Morris, D. B. 1960 HUMAN FACTORS CRITERIA IN MANNED ANTISUBMARINE WEAPON SYSTEMS
(Paper SAE National Aeronautic Meeting, Los Angeles, Calif., Oct. 10-14, 1960.)
(Society of Automotive Engineers, Inc., New York, N. Y.)
Rep. 244D, Oct. 1960.

ABSTRACT: The human engineering aspects of Anti-Submarine Weapon combat systems are discussed with specific attention to manned airborne systems and projected future designs. Requirements of the aircrew team such as design of tactical display data, vision adequacy, and air-crew workstation design are presented. Basic human engineering criteria that should be evident in the system are discussed. (Tufts)

1,012

Morrison, N. K. & L. A. Schafer 1954 GROUND STUDY OF THE NONEJECTION METHODS OF ESCAPE FROM B-47B AIRCRAFT.
(Wright Air Development Center, Air Research and Development Command, Wright-Patterson AFB, Ohio) WADC TR 54-6, April 1954. ASTIA AD 30282.

ABSTRACT: This report covers Phase I, a Ground Study of the nonejection methods of escape from B-47B aircraft. Because the cabin space available to the crew members is so limited, it was necessary to make a thorough investigation of those body positions and movements at the disposal of the crew when evacuating the aircraft. This study, done at the Wright-Patterson Air Force Base, led to the establishment of optimum procedures to be followed by each man when leaving his station and reaching the possible escape exits, and the most feasible body positions for leaving the aircraft.

The personal equipment worn by each subject during these tests included both winter and summer flying clothing. Each procedure was performed with and without the A-1 survival kit.

Time studies of the crew evacuations were conducted at Lockbourne Air Force Base utilizing the procedures presented in this report. These studies covered crew escape through the ventral hatch, with and without the use of an escape bracket, and through the crawlway to the bomb bay. Eight crews participated in the ventral hatch tests and six crews in the bomb bay tests. Ground studies of egress through the navigator's ditching hatch and canopy were limited to the timing of individuals making personal leads disconnects and standing at their stations. The feasibility of using these exits will have to be determined during the Air Study Phase.

Analysis of the data thus accumulated indicates that the optimum method of nonejection escape from this aircraft is through the ventral hatch in a feet-first, facing-aft position utilizing the Barto escape bracket. It must be stressed that the data are based on the tests made with the aircraft on the ground and in the absence of factors that would cause a flight emergency necessitating bailout.

1,013

Morse, A.L. 1957 TECHNICAL BASES FOR SAFER AIRCRAFT. (Institute of the Aeronautical Sciences, New York, N.Y.) Preprint no. 675

ABSTRACT: The purpose of this paper is to acquaint the reader with the operations of the Aircraft Division of the CAA's Technical Development Center at Indianapolis, Indiana. The work done by the CAA includes a program involving crash tests of helicopters and smaller types of fixed-wing aircraft. Other tests and studies have helped provide better cockpit vision for the pilots of transport aircraft. Another study has analyzed every possible combination of flight paths that could end in a collision to determine angles of transport aircraft. Another study has analyzed every possible combination of flight paths that could end in a collision to determine angles of vision required for each pilot to see the other aircraft. It is proposed that the scope of the crash tests be expanded to cover the general crashworthiness of both helicopters and fixed-wing aircraft. Other testing would look to the development of means for minimizing fritting or galling in structural components subject to fatigue failures.

1,014

Moseley, H. G. 1955 OPERATIONAL EXPERIENCE WITH ESCAPE FROM HIGH PERFORMANCE AIRCRAFT. (Symposium Proceedings, The Institute of Transportation and Traffic Engineering, University of California, 1955)

1,015

Moseley, H. G. 1956 USAF OPERATIONAL EXPERIENCE WITH ESCAPE FROM HIGH PERFORMANCE AIRCRAFT. (Period: 29 Aug. 1949 through 31 May 1956). Pub. No. M-24-56, USAF, Dir. of Flight Safety Res., Norton AFB, Calif.) Aug. 1956.

1,016

Moseley, H.G., 1957. U.S. AIR FORCE EXPERIENCE WITH EJECTION SEAT ESCAPE. (PROBLEMS OF ESCAPE FROM HIGH PERFORMANCE AIRCRAFT: A SYMPOSIUM) J. Aviation Med. 28(1):69-73

SUMMARY: Escape from high performance aircraft by use of the ejection seat to date has been attended with an incidence of 23 per cent fatalities and 14 per cent major injuries. The great majority of ejection attempts were medium and low altitudes and medium and low speeds. The outstanding cause

of fatalities has been inability to separate from the seat and deploy the parachute prior to striking the ground when ejection was attempted at low altitudes, particularly when the aircraft was out of control or in a dive. Airspeed has had little effect upon the outcome, with the exception that ejection attempts at or near the speed of sound may be attended with incapacitating results of deceleration with the type of seat now being used. It is concluded that if the fatality rate is to be lowered, there must be improved provisions for escape at low altitudes and low speeds where the great majority of emergencies occur, and that if escape at supersonic speeds is to be successful, the effects of deceleration and other phenomena must be mitigated.

1,017

Moseley, H.G. & R.H. Shannon 1958 USAF EJECTION ESCAPE EXPERIENCE, 29 AUGUST 1949 THROUGH 30 JUNE 1958 (USAF, Directorate of Flight Safety Research, Norton AFB, Calif.) Rept. M-12-58, Nov. 1958.

ABSTRACT: This study analyzes 1,462 United States Air Force ejection seat emergency escapes from the period 29 August 1949 through 30 June 1958. Results to personnel are studied in relation to altitude, airspeed, altitude, availability and use of automatic equipment, and other pertinent factors. Problem areas associated with ejection escape from high performance aircraft were sought although few cases of attempted escape at supersonic speeds were available. Recommendations designed to reduce the incidence of unsuccessful (fatal) ejections are made in the areas of 1) operations and training, and 2) research and development.

1,018

Mosely, H.G. 1958 INJURIES SUSTAINED IN EJECTION SEAT ESCAPE (Report by Directorate of Flight Safety Research, Hq., USAF, 31 Mar. 1958)

1,019

Murphy, A.C. 1949 GROUND SEAT EJECTION TEST ON XF-90 AIRPLANE (Lockheed Aircraft Corp., Burbank, Calif.) Oct. 1949. ASTIA ATI 65300

ABSTRACT: Ground seat ejection test was conducted on an XF-90 fighter airplane, to determine the suitability of the seat installation. The seat attained a velocity of 54 ft/sec and an acceleration of 13 g's. It reached a vertical height of 35 ft above the cockpit and traveled a horizontal distance of 72 ft. The seat was successfully caught in the net, and no damage was sustained by the airplane, except over the claw on the actuator disconnect, however, this did not interfere with the ejection of the seat. The catapult seat installation was found satisfactory for flight.

1,020

Murphy, J. S. 1952 WHAT'S AHEAD FOR THE REAR-FACING SEATS? Amer. Aviation J., 29 Sept. 1952

1,021

Mur Vilaseca, Tomas 1953 LA ASTRONAUTICA. QUE DEBEMOS PENSAT ACERCA DE LA POSIBILIDAD DE LOS VIAJES POR EL ESPACIO? (ASTRONAUTICS. WHAT OUGHT WE TO KNOW ABOUT THE POSSIBILITY OF VOYAGES THROUGH SPACE?) Rev. Obras Publicas 101:269-279, June 1953

ABSTRACT: Survey of astronautics, including propulsion of a space vehicle, historical outline, fundamental equations of the rocket, the space station, and the trip to the moon.

1,022

Myers, H.C. Jr., & Churchill, E. 1953 ANTHROPOMETRY OF MALE BASIC TRAINEES. (Wright-Patterson AFB, Ohio) WADC Tech. Report 53-49, July 1953

ABSTRACT: Body size data for 60 measurements of over 3,000 AF Male Basic Trainees are presented for use by aircraft & equipment designers. The statistics reported for each measurement are; the mean, standard deviation, coefficient of var. standard errors of stat., range, and sel. percent.

1,023

Myers, H. M. 1947 "REVERSE SEATING ON AIR TRANSPORT COMMAND AIRCRAFT" (Wash. DC) Mem. A-6/P & S 452.031, 27 March 1947

RESTRAINT, PROTECTION, AND EMERGENCY ESCAPE SYSTEMS

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1,024

Nadel, A.B. 1959 SUPPORTING MAN IN SPACE: 1970-1975 (General Electric Co., Santa Barbara, Calif.) RM 59 TMP-85 Nov. 30, 1959

ABSTRACT: Reviews progress in space technology expected during the periods 1970-1975. Discusses requirements and capabilities in these areas: (1) the physical environment-atmosphere, gravitational forces, temperature, and radiation; and (2) acoustic noise and vibration.

1,025

Nading, W. D. 1946 REPORT OF FLIGHT TESTS OF AUTOMATIC PILOT EJECTION EQUIPMENT CONDUCTED AT MUROC ARMY AIR FIELD. (Air Materiel Command, Wright Field, Dayton, Ohio) Memo Rept. No. TSEAA-695-66. 25 July 1946.

1,026

Neal, J. Allen 1958 THE DEVELOPMENT OF METHODS FOR ESCAPE FROM HIGH SPEED AIRCRAFT. (Historical Branch, Wright Air Development Center) Aviation Week, 7 April 1958.

1,027

Nebiker, F.R. 1961 FEASIBILITY STUDY OF AN INFLATABLE TYPE STABILIZATION AND DECELERATION SYSTEM FOR HIGH-ALTITUDE AND HIGH-SPEED RECOVERY. (Goodyear Aircraft Corp., Akron, Ohio) WADD TR 60-182, Dec. 1961. ASTIA AD 272 754.

ABSTRACT: On the basis of the theoretical and experimental wind tunnel test data obtained, it was concluded that an inflatable sphere is a practicable stabilization and deceleration system for initial recovery from high-altitude,

high-speed flight regimes (up to Mach 4.0 at 200,000 feet). Inflatable spheres tested were fabricated utilizing standard manufacturing methods and readily available materials. The recovery system tested exhibited considerable potential as an initail stabilization and deceleration recovery ststem for a disoriented or tumbling high-altitude, high-speed payload. Included are theoretical and wind tunnel test data on the effects of various shaped primary bodies on a secondary spherical body at various trailing distances. Also included is a limited amount of experimental data on flight testing of a full-scale operational unit. (Author)

1,028

Neel, H. 1951 MEDICAL ASPECTS OF MILITARY PARACHUTING. Mil. Surgeon 108(2):91-105.

1,029

Neely, F.R. 1934 DISCOMFORT IN THE SKY. Amer. Mercury, 32:113-117

1,030

Neff, R. J. 1962 A REPORT ON CONSIDERATIONS OF SEAT BELTS FOR INFANTS AND SMALL CHILDREN. (In M. K. Cragun, ed., The Fifth Stapp Automotive Crash and Field Demonstration, Sept. 14-16, 1961) Pp. 249-252.

1,031

Neiswander, R.S. & H.T. Armstrong 1947 MOTION ASPECTS OF FLIGHT STIMULATION (Link Aviation Devices, Inc., Binghamton, New York) Eng. Rept. No. 164.231

1,032

Nelson, S.R.C. 1948 EJECTION OF PILOTS FROM AIRCRAFT In Marcus, Henri et al., Shock and Vibration Bulletin No. 7, Naval Research Lab. Rept. No. S-3229. Pp. 47-58. ASTIA ATI 75 153

ABSTRACT: Tolerance to vertical accelerations and resistance of the body to forces of certain durations are discussed. Observations are made on the effects of air blast upon the body. Safety harness and related automatic devices are described. The problems of installing the gear in aircraft and educating the pilots in the use of the equipments are outlined.

1,033

Neumann, H.L., J.F. Hegenwald, Jr., & W.R. Santshi 1962 HUMAN SUBJECT GROUND AND WATER IMPACT TESTS OF THE XB-70 ESCAPE CAPSULE. (Paper, 33rd Annual Meeting of the Aerospace Medical Assoc., 9-12 Apr. 1962, Atlantic City, N.J.)

ABSTRACT: A testing program was accomplished to validate the performance of the capsule during ground and water impact. Tri-axial acceleration histories were obtained for capsule seat structures and for the head and chest of both anthropometric dummy and human subjects under conditions simulating design parachute descent velocities. The engineering aspects of the impact attenuation system are described briefly as well as test methodology and facilities. Physiological responses to the impacts are discussed and acceleration and photographic data of dummy and human subjects are correlated.
(Aerospace Medicine 33(3):366, Mar. 1962)

1,034

New, G.W. 1955 YOU'RE IN SPACE
Air Training 4(6): 24-25, Jan. 1955

ABSTRACT: This is a subjective description of a test pilot's sensations during a flight higher than 85,000 ft. During the flight, the pilot experienced falling, spinning, weightlessness, and difficulty in orientation.

1,035

Newquist, E. A., M. D. Cassidy, et al. 1959 DEVELOPMENT OF AN EJECTABLE-NOSE ESCAPE CAPSULE.
(Lockheed Aircraft Corp., Burbank, Calif.) WADC TR 59-493, June 1959. ASTIA AD 241 590.

ABSTRACT: This report presents the results of a study to develop the optimum ejectable-nose escape capsule for use in single place high performance type aircraft. The capsule will provide safe escape throughout the speed range from zero to 900 knots EAS or a Mach number of 4 which-ever is lower, and an altitude range from sea level to 100,000 feet. A description of the capsule construction and the devices necessary for stabilization, separation, deceleration, descent, and alighting is given. Trajectories of the capsule and fuselage afterbody are plotted and the accelerations on the pilot are shown for the most ciritical case and compared to human limits. Environment problems such as pressure loss, oxygen deficiency, and carbon dioxide accumulations after separation are discussed along with the problems of surviving in extreme heat and cold on the ocean or on land. The weight requirement is estimated and compared to a current escape seat system and a super escape seat and pressure suit assumed capable of escape at the speeds and altitudes for which the capsule is designed. Volume requirements are also calculated. (Author)

1,036

Newquist, E.A. & G.F. Zimmer 1963 DEVELOPMENT OF EJECTABLE NOSE CAPSULE EQUIPMENT FOR FEASIBILITY TESTING
(Aeronautical Systems Division, Wright-Patterson AFB, Ohio) ASD-TDR-62-752
ASTIA AD 401 917

ABSTRACT: This report presents the results of a project to develop hardware for an ejectable nose capsule and track test sled. Five capsules and a sled were manufactured. The ASD will conduct a track test program of 7 tests from zero to 900 Kn. EAS. Conditions for the tests are delineated herein. Aerodynamic characteristics of the capsule, and a description of the wedges are given. Cockpit details, environment, controls, separation and ejection systems, and escape sequence are discussed. Section IV presents two AF requested contract changes: (1) using a larger rocket motor than planned and (2) changing test sites. Problems and solutions created thereby are covered. Section V describes the entire test program until development of the final hardware. Materials used to manufacture the capsule are described in Section VII. Inertia loads, weight and balance, c.g., wedge alignment, and chute installation procedures are given. Conclusions include test goals, results and pertinent recommendations. Determining the c.g. on nonremovable operational capsules, weight and inertia and load factors are discussed. Ceneral capsule design and cost control are discussed.

1,037

Nichols, George 1954 DISCONTINUITIES IN RESTRAINT SYSTEMS. Chapter VI
(Northrop Corp.)

1,038

Nichols, George 1955 REPORT
(Northrop Aircraft Co)

CONTENTS: Introduction. Discussion of restrained subject response. Analysis of idealized mechanical system: variations of restraint stiffness, and forcing function characteristics. Harness strap properties. Subject response--IBM analysis--simplified restraint and mass system: using actual strap properties with variations in forcing function characteristics. Discontinuities in restraint systems: slack strap, constant force elements, initial pre-load of harness.

1,039

Nichols, J.H. 1959 WIND TUNNEL INVESTIGATION OF STABILIZATION PARACHUTES FOR THE B-58 CREW ESCAPE CAPSULE. (Arnold Engineering Development Center, Tullahoma, Tenn.) ASTIA AD-225463 September 1959

ABSTRACT: An investigation was conducted in the PWT 16-Ft Transonic Circuit to determine the optimum stabilization parachute configuration for use with the B-58 crew escape capsule. Several types of canopies and canopy-suspension configurations were tested using a 1/3 scale model of the capsule and 1/3 scale parachutes. The most satisfactory performance was obtained with a ribbon equiflo parachute which had a flat edge and a 15-percent extended skirt, and which was suspended six equivalent body diameters behind the capsule with riser line lengths equal to two canopy diameters.

1,040

Nicholson, R.A. 1950 WIND TUNNEL STABILITY TESTS OF A ½-SCALE F-86A (FIGHTER) SEAT-PILOT COMBINATION WITH SEAT AND HEADREST FLAPS (North American Aviation, Inc., Engineering Dept., Inglewood, Calif.) Report No. NA-50-7-NAAL 167 ASTIA ATI 73 626

ABSTRACT: The one-half scale model of the seat-pilot combination for the F-86A fighter was wind tunnel tested to obtain data necessary for the determination of trajectory and attitude of the seat-pilot with various seat and headrest stabilizing flaps. Graphically depicted test results show the effect of stabilizing flaps on drag, lift and pitching moment. The model with and without any of the flaps has stable pitching moment slopes near angles of pitch of 100° and 340°. All configurations had trim points near 340° and all except the one with the side headrest flaps had trim points near 100°. At 340° the configurations with the headrest flaps had the most stable pitching moment slopes.

1,041

Nikolayev, A. 1960 ASTRONAUTS PUT ON SPACE SUITS Sovetskaya Rossiya P. 4; 19 May 1960.

1,042

Noble, H., & L. P. Domzalski 1961 EVALUATION OF HUMAN SUBJECT REACTION IN THE FORWARD AND AFT FACING SEATED POSITIONS. (Naval Air Material Ctr., Philadelphia, Pa.) Rept. No. NAMC-ACEL-424; Proj. TED NAM AE-6303.1; ASTIA AD-259 071; 9 Feb. 1961

ABSTRACT: This report presents a comparative examination of the reactions of human subjects to simulated crash acceleration forces, when seated in a standard

Navy passenger seat aligned in either the forward or aft facing position. Environmental parameters such as seat acceleration, end velocity; anthropomorphic dummy motion and acceleration; human subject motion and acceleration; and distribution of seat member loads during a series of simulated crashes are discussed. (AUTHOR)

1,043

Noble, R., E. S. Mendelson, & D. T. Watts 1947 DYNAMIC RESPONSES IN THE EJECTION SEAT SYSTEM. (Naval Air Material Center, Naval Base Station, Philadelphia, Pa.) TED NAM 256005, Rept. No. 5, 7 Aug. 1947, ATI-206 053

SUMMARY: An analysis of oscillograph records obtained from routine ejection seat experiments on the NAES ejection seat test rig shows that the major dynamic response in the system bears a definite relationship to the time interval required for the catapult to attain its maximum pressure. This data can be directly applied in the design and development of a practical catapult for ejection seat use. (AUTHOR)

1,044

Noble, R., E. S. Mendelson & J. R. Poppen 1949 NOTE ON THE TRAJECTORY OF THE EJECTABLE SEAT.
J. Aviation Med. 20(5):343-349.

SUMMARY: A method for calculating the trajectory of the ejection seat is given. The effects of varying the angle of the seat guide rails with respect to the vertical, the ejection velocity, the speed of the airplane, and the flight altitude are investigated.

1,045

Noble, R. & W.G. Law 1950 FLIGHT TESTS OF THE GRUMMAN, MCDONNEL, AND CHANCE VOUGHT EJECTION SEATS AT LAKEHURST, N.J.
(Naval Air Material Center, Aero Medical Equipment Lab., Philadelphia, Pa.)
Topical Report XG-T-136 Ted No. NAM 256005 ASTIA ATI 91 442

ABSTRACT: The purpose of this report is to present relative trajectory and seat behavior data of the Grumman, McDonnell and Chance Vought ejection seats. Instrumented acceleration data was obtained on limited test trials, but photographic coverage was made on all ejection shots. Direct comparison of photographic results of tests made with the various seats aids in the determination of the safety of the seats when these results are compared with instrument records obtained on the test of a specific ejection seat.

As a result of the tests, it was found that at higher airspeeds the pitch rotation tends to decrease in each of the seats tested; at the higher altitudes less rotational motion was observed. The incorporation of a longer time delay between opening of the drogue and retarder chutes and the use of a smaller retarder chute will tend to diminish the opening shock forces on the pilot as airspeed increases.

1,046

Noble, H. & L. P. Domzalski 1961 EVALUATION OF HUMAN SUBJECT REACTION IN THE FORWARD AND AFT FACING SEATED POSITIONS. (Air Crew Equipment Lab, U. S. Naval Air Material Center, Phila., Pa.) Rept. NAMC-ACEL-424, Feb. 9, 1961. ASTIA AD 259 071.

ABSTRACT: This report presents a comparative examination of the reactions of human subjects to simulated crash acceleration forces, when seated in a standard Navy passenger seat aligned in either the forward or aft facing position. Environmental parameters such as seat acceleration, end velocity; anthropomorphic dummy motion and acceleration; human subject motion and acceleration; and distribution of seat member loads during a series of simulated crashes are discussed. The tests were conducted on the Air Crew Equipment Laboratory Horizontal Linear Accelerator.

1,047

Nomura, F. 1944 STRENGTH TEST OF AIRCRAFT PILOT SEAT MADE OF PLYWOOD. (Mitsubishi Heavy Industry Co., Ltd., Nagoya, Japan) ASTIA ATI-3992, February 1944

ABSTRACT: Strength tests were made on a plywood pilot seat to determine its practical value. The tested seat was attached to a V-type airframe having a load factor of 7. All tests were based on the Naval strength test regulation Representative load tests showed that the material was satisfactory, but the shape of the pilot seat changed, due to a negative load. During break-down tests, the "sansa" type connectors, which are a characteristic of this type pilot seat, caused failure. Seat was cut in specified number of parts and studied. Study revealed several exfoliations of thin layer.

1,048

Norsworthy, M. E., P. G. Gard, & L. B. Cochran 1955 AN EVALUATION OF EXPERIMENTAL ANTI-BLACKOUT EQUIPMENT. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. No. NM 001 100 102; Rept. No. 4; ASTIA AD-89 996; 1 Nov. 1955

ABSTRACT: An evaluation on the human centrifuge of experimental anti-blackout equipment which was designed to improve protection and comfort. The equipment

which was tested did not afford a significantly greater amount of protection than the standard U. S. Navy Anti-blackout equipment. The abdominal bladders, regardless of pressure system, which covered the larger area were more effective in increasing the protection. The optimum shape and pressure were not determined. (NSAM)

1,049

North American Aviation 1947 REPORT ON TEST FIRING -PILOT'S EJECTION SEAT -XP-86 AIRPLANE. (North American Aviation, Inc., Los Angeles, Calif NA-47-931, ASTIA ATI-51600, September 1947

ABSTRACT: A test firing of the pilot's ejection seat as mounted in the XF-86 fighter was conducted. The ejection seat, with a dummy wearing full flight equipment, was fired from the XF-86 gun firing nose using a T-4 catapult and T95E1 charges, and the ejection was photographed by three motion picture cameras. The ejection was satisfactory, with monor damage to the seat which was attributed to eccentric loading during firing. The disconnect connection for microphone head set, oxygen, and G suit pressure functioned in a satisfactory manner. Inertia loads during firing were not sufficient to disturb the oxygen mask worn by the dummy. Photographic records of the test ejection provide some information, but are not sufficient to determine transient accelerations during travel of the seat along the guide rails.

1,050

North American Aviation 1948 REPORT ON GROUND TEST FIRING PILOT'S EJECTION SEAT B-45A AIRPLANE. (North American Aviation, Inc., Inglewood, Calif.) Report No. NA-48-600, June 1948. ASTIA ATI 102 200.

ABSTRACT: The seat and a dummy were ejected from a nearly complete nose section and set in a stand on the Flight Ramp. The cockpit interior was identical to that of a finished airplane.

Ejection was considered satisfactory. Due to the lack of a net to catch the seat, considerable damage to the seat resulted. Several undesirable features were encountered during ejection, which were attributed to the coupling of the catapult gun to the seat. Forward rotation of the seat upon leaving the guide rails resulted in sufficient frictional drag in the catapult itself to appreciably reduce the ejection velocity.

Inertia loads did not remove the oxygen mask from the dummy; however, it was pulled away from his face sufficiently to expose his mouth. Air loads that would occur in flight were not simulated.

1,051

North American Aviation, Inc. 1950 STATIC TEST OF PILOT'S EJECTION SEAT FOR THE MODEL F-86E AIRPLANE - N.A.A. MODEL NO. NA-170. (North American Aviation, Inc., Los Angeles, Calif.) 13 Dec. 1950. ASTIA ATI 93 242.

ABSTRACT: The object of these tests was to demonstrate that the pilot's ejection seat complies with the strength requirements set forth in Articles D-6a to D-6i of U.S.A.F. Specification 2528-B, "Seat: Pilot Ejection, Fighter Aircraft, Type C-1b", and to determine the seat's capacity of withstanding 40g forward crash loads, although this crash condition was not required by the contract.

These tests demonstrated that the F-86E pilot's ejection seat complies with the static strength test requirements of U.S.A.F. Specification 25282-B, and that it will withstand 60 percent design ultimate load of the unrequired 40g forward crash condition.

1,052

North American Aviation Inc. 1960 EMERGENCY ESCAPE SYSTEMS (North American Aviation Inc., Columbus, Ohio) NA 60H-322, May 2, 1960

ABSTRACT: Graphs depicting escape systems (HS-1, LS-1, LW-1, and zero to hypersonic).

1,053

North American Aviation, Inc. 1960 TECHNICAL FEATURES OF THE DYNAMIC FLIGHT SIMULATOR (G SEAT). (North American Aviation, Inc., Columbus, Ohio) Rept. No. NA 60 H-442, 12 Sept. 1960.

1,054

North American Aviation, Inc. 1961 AERIAL AND SLED TESTING OF THE B-70 AIRCREW ESCAPE CAPSULE. (Paper, Annual Symposium of the Society of Experimental Test Pilots, Los Angeles, California, 6-8 October 1960; and supplemented for the Physiological Training Officer Symposium, School of Aviation Medicine, Brooks AFB, Texas, 6-10 February 1961) Report No. NA 60-1133. ASTIA Doc. No. AD-268 511.

ABSTRACT: Aerial and sled ejection tests are described wherein the B-70 escape capsule has passed or favorably exceeded specification in the following categories: (1) parachute deployment through complete range of indicated

airspeeds; (2) rate of descent; (3) low altitude airdrops of capsule; (4) 20,000 and 40,000 ft airdrops of capsule; and (5) safe escape at ground level at airspeeds of 90 knots through maximum. Remaining to be tested are performance at high Mach number and high dynamic pressure, with continued development in the areas of ground and water impact and environmental control. (Author)

1,055

North American Aviation, Inc. 1961 CLOSED ECOLOGICAL SYSTEM A LITERATURE SURVEY. (North American Aviation, Inc., Technical Information Center, Downey, Calif.) 20 November 1961. ASTIA AD 282468.

ABSTRACT: This partially annotated bibliography on the problems and experimental results of closed ecological systems covers the period from 1958 to August 1961 with the exception of a few earlier references. The references are filed alphabetically by periodical title and corporate author in one alphabet; there is both a personal author and a subject appended to the bibliography.

1,056

North American Aviation, Inc. 1961 PROJECT APOLLO; PRE-CONTRACTURAL DOCUMENTATION AND ORBITAL RENDEZVOUS: A LITERATURE SURVEY (North American Aviation, Inc., Downey, Calif.) Rept. No. SID 61-470 Dec. 29, 1961

ABSTRACT: A review of literature on Project Apollo and Orbital Rendezvous, in two parts, from August 1959 to December 4, 1961 is given. The references are listed alphabetically by corporate author and periodical title in one alphabet. Following the bibliography are both author and subject indexes. (Author)

1,057

North American Aviation, Inc. 1962 GROUND OPERATIONAL RECOVERY TESTS OF THE LW-1 EJECTION SEAT (North American Aviation, Inc., Columbus Division, Columbus, Ohio) Report No. NA60H-667, June 1962, TCREC Technical Report 62-47, Contract DA 44-177-TC-659, USATRECOM Task 9R38-01-017-61, ASTIA AD-287479

ABSTRACT: Four static, ground operational recovery tests of the LW-1 catapult-rocket escape system were conducted from 28 September 1960 through 5 October 1960 at the Columbus Division of North American Aviation, Inc., utilizing five percentile and ninety-five percentile anthropomorphic dummies fully clothed in GFAE

Army normal issue flight gear. These tests demonstrated the zero altitude, zero speed recovery capability of the escape system. Two static tests of the LW-1 catapult-rocket escape system were conducted at Air Crew Equipment Laboratory, Philadelphia, Pennsylvania, on 10 and 20 January 1962. In addition to data relative to this series of tests, analytical substantiation of recovery capabilities up to 300 KEAS and higher altitudes is included in this report.

1,058

Northrop Aircraft, Inc. 1957 INVESTIGATION OF HEAD-TORSO RESTRAINT (PROPOSAL). (Associated Projects Office, Northrop Aircraft, Inc.) AF 29(600)-790, 24 January 1957.

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1,059

O'Bryan, T.C., & H.G. Hatch 1959 LIMITED INVESTIGATION OF CRUSHABLE STRUCTURES FOR ACCELERATION PROTECTION OF OCCUPANTS OF VEHICLES AT LOW IMPACT SPEEDS. (National Aeronautics and Space Administration, Washington, D.C.) NASA Technical Note D-158, Oct. 1959. ASTIA AD 227 649

ABSTRACT: A limited investigation was made to determine the characteristics of three materials to see how they can be applied for human protection against accelerations encountered at low impact speeds. As a result, if given man's physiological tolerance to abrupt acceleration, which has not yet been well defined, an alleviation system can be designed. Foamed plastics require considerable depth to provide a given stopping distance for impact alleviation and their use would require some control of rebound. They can be made soft enough to obtain the low onset of acceleration that may be necessary for man where depth is not limited. Aluminum honeycomb is an efficient material for impact load alleviation from the standpoint of usable material depth and it exhibits very little rebound. The stiffness of the material results in a very high initial onset rate of acceleration. For many installations this may be controlled by reducing the initial loading area of contact to get the material to start failing. (Author)

1,060

Odelgard, B., & P. Weman 1957 SAFETY BELTS FOR MOTOR CARS. (Swedish State Power Board, Stockholm, Sweden) Publication Blue-White Series, No. 18

1,061

Ordway, F. I., J. P. Gardner & M. R. Sharpe 1962 SPACE MEDICINE: THE BASIC FACTORS.
In: Basic Astronautics: An Introduction to Space Science, Engineering, and Medicine. (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1962) Pp. 468-471.
Sections on Vibration, Sound, Temperature, and Light. (Chapter 12)

ABSTRACT: The effects of vibration on the human being are primarily mechanical and to a much lesser degree thermal. Vibration in space carrier vehicles has many sources such as rotating engine components, engine pulses, and gimbaling,

acoustic pressures, buffeting, and fuel slashing. Vibration produces movement and displacement of the internal organs of the body, all of which have different natural frequencies. The range is still largely unknown but the thorax and abdominal organs appear most sensitive to vibration, having a natural frequency of some 3 cps. Elastic corsets and pressure suits instead of damping this frequency merely shift it to higher values, but a rigid restraint like a cast reduces it to 1.5 cps. With regard to space flight it seems that the vibrational frequency range most detrimental to man lies between 2 and 100 cps. (CARI)

1,062

Oser, J. 1962 DEVELOPMENT OF DAMPING TREATMENTS FOR NEW CONSTRUCTION SUBMARINES. (Mare Island Naval Shipyard, Vallejo, Calif.) Progress Rept. No. 12; Rept. No. 94-39; Proj. S-F013-13-01; ASTIA AD-281 835; 1 Aug. 1962

ABSTRACT: The development of elastomeric materials to replace chromated felt in constrained-layer treatments for damping heavy plating in new construction submarines was undertaken. A treatment having a weight ratio to the treated plate of 1 to 4 and utilizing a perforated nitrile rubber damping layer was found to be almost as effective as Treatment 198, similar treatment developed by the Rubber Laboratory which utilized chromated felt. The new treatment, designated Treatment 227, consisted of an Al constraining layer 1-1/4 in. thick and a perforated nitrile rubber damping layer 1/16 in. thick. It was fastened by means of 1/2 in. thick studs on 12 in. centers to 1-3/4 in. thick steel plate. The average damping at 75 F for treatment 227 over the frequency range of 50 to 2000 cps was 6.2 % of critical as compared to 6.5% of critical for Treatment 198. It was found that the damping behavior of the nitrile rubber layer was affected similarly to the chromated felt by temperature change. Maximum damping occurred at 65 F. Substantially lower damping were obtained at 35 and 120 F. Work was continued on the development of damping treatments which will be efficient over the temperature range of 35 to 120 F. (AUTHOR)

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1,063

Parin, V.V. & V.I. Iazdovskii 1961 PUT' SOVETSKOI KOSMICHESKOI FIZIOLOGII (Advances in Space Physiology in the Soviet Union) Fiziologicheskii zhurnal SSSR (Moskva) 47(10): 1217-1226, Oct. 1961

ABSTRACT: The first and second stages of animal experiments in Soviet space medicine and biology were carried out with rocket flights. Satisfactory data were obtained on physiology and behavior under space-equivalent stresses and on the adequacy of heremetic cabins, cabin equipment, space suits, and recovery equipment. The orbital flight of the dog, Laika, confirmed that a highly organized organism can survive space flight in a satisfactory condition. Other satellite flights with different types of animals allowed continuous observations of their condition throughout the flight and during landing. The final stage was preceded by the selection and training of cosmonauts. The training program subjected the cosmonauts to simulated stresses gradually increasing in intensity until the levels expected in space were exceeded. Careful medical observations were made throughout the training. The results of this preparation were seen in the successful flight of Gagarin. In Titov's flight prolonged weightlessness affected his vestibular sense organs but not his efficiency. Recovery after the flight was rapid.

1,064

Parker, C. G. 1957 AUTOMATIC SEAT STYLE PARACHUTE PART NO. 50C7025 15, TEST OF. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TN 56-5C7, Aug. 1957

ABSTRACT: The automatic seat style parachute, developed for use in high altitude aircraft where seating space is extremely limited and provisions for back style parachutes have not been made, was evaluated. Function tests included aerial drop, bench tests, live jumps, and cold chamber tests. Recommendations are included.

1,065

Parker, P.L. 1962 DROP TESTS OF C-9 PARACHUTE CANOPIES FABRICATED WITH HIGH TENACITY YARNS AND LUBRICATED SUSPENSION LINES (Air Force Flight Test Center Edwards AFB, California, Air Force Systems Command, U.S.A.F.)Technical Document Report No FTC-TDR-62-6, 12 March 1962, ASTIA AD-272976

ABSTRACT: Tests were conducted with C-9 parachute canopies fabricated of cloth woven from type 300 nylon yarn and having lubricated suspension lines to: (1) determine the effectiveness of the lubricated suspension lines in reducing fric- damage, and (2) evaluate the suitability of the test canopies for live jumps. Twisted line, rate of descent, ultimate strength and reliability tests were conducted in accordance with USAF Specification Bulletin 505. The tests did not reveal any discernible difference in performance between the test canopies and standard C-9 canopies. Cloth woven from type 300 and type 330 nylon yarn is suitable for parachute canopies when used under the conditions tested.

1,066

Parkin, G.B. 1945 BLOWER TUNNEL TESTS ON THE FLIGHT PATH OF A MAN EJECTED NORMALLY FROM AN AEROPLANE MOVING AT HIGH SPEED. (Royal Aircraft Establishment, Farnborough) Technical Note No. Aero. 1618, March 1945. Appendix 4 to Lovelace, W.R., E.J. Baldes, & V.J. Wulff, The Ejection Seat for Emergency Escape from High Speed Aircraft, ASTIA ATI 7245

SUMMARY: Blower tunnel tests have been made to determine the flight path of a man when ejected with the seat from an aircraft. It has been found that for the pilot to clear safely the tail unit of a Meteor travelling at 750 F.P.S. his ejection velocity should not be less than 50 F.P.S. if he and the seat are free to part or 40 F.P.S. if he is attached to the seat. He is liable to be rotated in any direction at a rate up to 1 1/2 revs./sec. while travelling from cockpit to tail, when ejected from the aircraft at this air speed. (Author)

1,067

Paton, C.R., E.C. Pickard & V.H. Hoehn 1940 SEAT CUSHIONS AND THE RIDE PROBLEM S.A.E. Journal 47: 273-283, July 1940

1,068

Patt, D. I. 1945 COMFORT EVALUATION OF THE HAMMOCK-TYPE FIGHTER SEAT. (Wright-Patterson AFB, Ohio) WADC TR No. TSEAL 3-65-32EEE.

1,069

Patt, D. I. & F. E. Randall 1945 PRINCIPLES OF SEATING IN FIGHTER-TYPE AIRCRAFT.
(Wright-Patterson AFB, Ohio) WADC TR No. TSEAL 3-695-58, Sept. 1945.

1,070

Patt, D. I. 1946 PRINCIPLES OF COCKPIT SEATING.
(ATSC, Wright-Patterson AFB, Ohio) TR Rept. No. TSEAL 3-695-58C, Feb. 1946. ASTIA AD 50 569.

1,071

Patterson, J. L., Jr., A. S. Burt & M. J. Jones 1946 THE EFFECT UPON SCOTOPIC VISION OF CIRCULATORY CHANGES INDUCED BY NITROGLYCERINE AND CHANGE IN BODY POSITION.
(U.S. Nav. Sch. Aviation Med., Naval Air Trng. Base, Pensacola, Fla.) Research Rept. X-541.1

1,072

Paullin, R.L. and E.B. Heyl 1962 A REVIEW OF CIVIL TRANSPORT AIRCRAFT SAFETY BELT EXPERIENCE. (Paper, SAE S-9 Committee Meeting Olympia Hotel, Seattle, Washington, August 6, 1962)

1,073

Payne, C. F., Jr., & R. A. Dosee 1962 THE MECHANISM AND CAUSE OF VERTEBRAL INJURIES SUSTAINED ON EJECTION FROM U. S. NAVAL AIRCRAFT. (Paper, 33rd Annual Meeting of the Aerospace Medical Assoc., 9-12 April 1962, Atlantic City, N. J.)

ABSTRACT: Considering the available evidence, the basic mechanism responsible for the high incidence of vertebral injury on ejection from U. S. Naval aircraft is the concentration of inertial and restraint force components on the front of the vertebrae by spinal flexion. Flexion occurs because of poor positioning, lack of support, and inadequate restraint of the body. Until further improvements are made in these areas and spinal flexion kept to a minimum, it will not be possible to subject the body to its potentially tolerable limit of ejection acceleration without perpetuating the high incidence of vertebral injury.
Aerospace Medicine 33(3):348, Mar. 1962)

1,074

Payne, C.F., Jr. 1963 STUDY OF PHYSIOLOGICAL STRESSES WITH EJECTION LOADS. (Paper, Thirty-Third Annual Meeting of the Aerospace Medical Association, April 1962, Atlantic City.)

1,075

Payne, C.F. 1963 STUDY OF PHYSIOLOGICAL STRESSES WITH EJECTION LOADS. (Air Crew Equipment Lab., Naval Air Material Center, Philadelphia, Pa.) NAEC ACEL 467, 8 July 1963. ASTIA AD 409 465L

1,076

Payne, F.A. 1960 WORK AND LIVING SPACE REQUIREMENTS FOR MANNED SPACE STATIONS (In: Proceedings of the Manned Space Stations Symposium, Institute Aeronautical Sciences, New York, New York) pp. 100-104

ABSTRACT: The basic knowledge required to design the working and living accommodations for space stations is currently available. If the principles of architecture and engineering are applied to this knowledge, there is a good chance of producing operationally satisfactory manned space stations.

1,077

Payne, P.R. 1960 ANALYSIS OF B-58 CAPSULE LANDING IMPACT TRANSVERSE ACCELERATION DATA WITH HUMAN AND DUMMY OCCUPANTS. (Stanley Aviation Corporation, Denver, Colorado) Stanley Aviation Report No. 742

1,078

Payne, P.R. 1960 PRELIMINARY INVESTIGATION OF THE DYNAMICS OF A MAN-CARRYING CAPSULE SUBJECTED TO EXTERNAL FORCES. (Stanley Aviation Corp.) Rept. No. 1189, 8 June 1960.

1,079

Payne, P.R. 1961 INVESTIGATIONS OF CREW ESCAPE SYSTEM SURFACE IMPACT TECHNIQUES FOR ADVANCED AEROSPACE VEHICLES. (Frost Engineering Corp., Denver, Colo.) Rept. No. 74-1, July 1961.

1,080

Payne, Peter 1961 QUARTERLY STATUS REPT. #1 ON HUMAN BODY DYNAMIC STUDY. (Stanley Aviation Corp., Denver, Colo.) Rept. 776.

1,081

Payne, P. R. 1962 AN ANALOG COMPUTER WHICH DETERMINES HUMAN TOLERANCE TO ACCELERATION
(In: Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, pp. 271-300)

ABSTRACT: The purpose of this paper is to describe and demonstrate a small analog computer which is designed to show the physiological effect of short period acceleration on man. An arbitrary acceleration-time history can be set up on the front of the computer by "plotting" a graph with sliding beads. Calibrated dials enable the dynamic characteristics of the restraint system to be specified (such as cushion thickness, stiffness and damping, for example), and the computer can then be started. A meter reads out the peak value of the "Physiological Index", which is an arbitrary numerical scale.

An analog of this type is only as good as the experimental data upon which its analogy is based. But within this limitation it can be used for five functions

The paper concludes with a description of possible future developments, and particularly the inclusion of non-linear terms and the long period acceleration tolerance limits established in centrifuge testing.

1,082

Payne, Peter R. 1962 THE DYNAMICS OF HUMAN RESTRAINT SYSTEMS
(In: Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, pp. 195-257)

ABSTRACT: Human dynamics is in its infancy, and like all young sciences, must proceed in a series of steps which alternate between theoretical and experimental investigations.

In the sub-division of body-restraint dynamics a great deal of experimental data has now been amassed, and further progress seems to depend upon a thorough investigation of the basic principles of restraint, and the use of dyanmic theory to correlate the existing experimental information. This report is primarily concerned with proposing such a program, and with discussing in depth the approaches that should be used.

Since a satisfactory dynamic model of the human body is an essential prerequisite to a meaningful analysis of restraint dynamics, however, a fairly detailed description of our latest "human models" is also included.

1,083

Payne, P.R. 1962 INVESTIGATION OF THE DYNAMICS OF HUMAN RESTRAINT AND SUPPORT SYSTEMS
(Frost Engineering Development Corporation, 830 South Lipan Street, Denver 23, Colo.) R.F.P. No. 33(657)-62-5709-Q P.R. No. 140970 MRV Proposal No. 122-1 Aeronautical Systems Division, AFSC March 31, 1962

ABSTRACT: This document deals with a proposed research program concerned with the dynamics of human restraint and support in vehicles. A detailed breakdown of the program is given in Section 9.0 of this report.

The main body of this proposal reviews the history of the subject of "body dynamics" and then covers specific areas of theoretical research which have been carried out at Frost Engineering, these being:

Linear dynamic models of the human body.
Non-linear dyanmic models of the human body.
Dyanmic models of the head.
Fundamentals of restraint system dynamics.

Appendices deal with general non-linear theory, the use and significance of mechanical impedance measurements, and an important limit case in restraint theory.

Frost's research rpograms for the U.S. Navy and private corporations are also reviewed briefly, with respect principally to the benefits that the proposed program will derive from them.

The only deviation from the work statement of the request for proposal is a suggestion for development of a simple methodology for restraint system optimization, to embody the results of the proposed program, and to be in a form suitable for use by engineers concerned with the problems.

1,084

Pearson, H. J. 1952 EJECTION-SEAT I--DEVELOPMENT AND CONSTRUCTION OF THE MARTIN-BAKER ESCAPE UNIT.
Aircraft Production 14:154-161, May 1952

1,085

Pearson, R.G 1961 INJURY SEVERITY AS RELATED TO SEAT TIE-DOWN AND BELT FAILURE IN LIGHTPLANE ACCIDENTS. (Aviation Crash Injury Research, Phoenix, Arizona) AvCIR 61-4, TREC Tech. Rept. 61-96, Aug. 1961. ASTIA AD 265 092L

SUMMARY: The purpose of this study was to evaluate the relationship between tie-down effectiveness and injuries sustained by 1,025 occupants of lightplanes involved in ground-object collisions, or in spin-stall crashes. Critical

injuries to the head and upper torso were found to occur even though there was adequate seat belt restraint. In approximately one-third of the 1,025 cases either seat failure or belt failure, or both, occurred. Belt failure occurred more frequently then seat failure, yet injury severity was greater when seats failed than when belts failed. The need for additional safety measures is emphasized by the findings. (Author)

1,086

Peck, F.J. 1951 STRUCTURAL TESTS—SEATS BUNKS AND LITTER INSTALLATIONS DOUGLAS C-124A AIRPLANE. (AMC, Wright-Patterson AFB, Dayton, Ohio) ASTIA ATI 93 534, 8 February 1951

ABSTRACT: The seats, bunks, litter installations and support structure mentioned in this report are structurally satisfactory for all required conditions provided that the reinforcement mentioned in B-11 is incorporated in the structure.

The litter support structure, with the exception of Part No. 43B2330, is satisfactory for 125 percent of the required ultimate down load, the four man troop seats and support structure for 115 percent ultimate load, and the one man troop seat and support structure for 120 percent ultimate load.

1,087

Pecoraro, J.N. A CONTROLLABLE SUPINE SEAT FOR THE PENSACOLA CENTRIFUGE (Spec. Dev. Center, O.N.R., Pensacola, Fla.) Report SDC 9U37a-1.

1,088

Pedersen, Paul E. 1961 STUDY OF PARACHUTE PERFORMANCE AT LOW SUPERSONIC DEPLOYMENT SPEEDS; EFFECTS OF CHANGING SCALE AND CLUSTERING (Cook Electric Company, Chicago, Illinois) Aeronautical Systems Division Technical Report 61-186 July 1961 ASTIA AD 267 502

ABSTRACT: Parachute design and operational data were collected on a series of rocket powered sled tests conducted on the Air Force Flight Test Center Track at Edwards Air Force Base, California. Parachute deployment velocities ranged between Mach 0.76 and 1.57. Parachute types that were investigated included Guide Surface Ribless, FIST Ribbon, Conical Ribbon, Equiflo and Hemisflo

designs. The majority of the test parachutes were designed to have a drag area of approximately 15 square feet. Limited testing was accomplished with some configurations of reduced drag area to investigate effects of changing scale. Results of this were not conclusive. Clustering of parachutes was also investigated with triple clusters of FIST Ribbon parachutes.

The data obtained during the program included inflation characteristics, opening shock factors, drag forces, inflated area-relationships, and stability of the parachutes through the velocity ranges investigated.

Associated systems, such as the deployment and release system, test vehicles and instrumentation system are also discussed.

1,089

Pengelley, C. D. 1952 MODEL TESTING TECHNIQUES FOR INVESTIGATING JETTISONING OF EVACUATION CAPSULES FROM SUPERSONIC AIRCRAFT. (Paper, Symposium on the Problems of Emergency Escape in High Speed Flight, Wright Field, Ohio, 29-30 September 1952.)

ABSTRACT: A study has been made of model testing techniques that may be used to investigate the characteristics of jettisonable capsules for evacuation from high speed aircraft up to speeds of Mach 3.5. - Dimensional theory has been presented and unless the speed of sound can be controlled, complete similarity cannot be achieved between model and full scale. Practical working compromises have been presented. - Captive wind tunnel models, and also free flight models have been studies, both ground-launched from a track and air-launched from an aircraft at high altitude. (Author's summary)

1,090

Pennell, M.L. 1950 PRELIMINARY STUDY OF SIDE BY SIDE PILOT ARRANGEMENT IN B-52 AIRPLANE
(Boeing Airplane Co., Seattle Div., Wash.) Document No. D-11185 Dec. 15, 1950
ASTIA ATI 100 380

ABSTRACT: In response to inquiry concerning the feasibility of side by side pilot arrangement for the B-52 airplane, a very preliminary study of one possible arrangement has been prepared. The arrangement presented represents a first approximation of a configuration embodying the most desirable features of side by side designs developped in previous studies outlined in Document D-11174, "History of the Development of the XB-52 Cockpit". Quantitative answers concerning weight and performance changes and definite features of an actual proposed configuration would require a great deal of additional study. The configuration sketched in this Document must therefore be considered very tentative, but the general conclusions concerning the effects of such a change are considered to be valid since they are representative of answers which were arrived at in previous studies including detail layouts and complete full scale mockups

1,091

Penny, A. R. 1956 JUMPERS DOWN AND UP
Med. Technicians Bull. 7(4):139-141, July-Aug. 1956

ABSTRACT: The personnel of a naval parachute unit conduct tests in connection with the design, use, improvement and adaptation to naval aircraft operations of parachute and ejection seat systems; pilot's personal safety equipment and flight gear; and aerial delivery of supplies and cargo. A medical corpsman equipped with medical kit is in attendance during all jumps to treat any injuries that may occur. Injuries sustained during test jumps are usually minor, consisting of bruises about the face and neck sustained from parachute lines and risers and due to opening shock forces. More serious injuries consist of leg sprains and fractures usually caused by ground impact

1,092

Penrod, K. E. 1942 BAILING OUT ABOVE 30,000 FEET.
(Wright Air Development Cts., Wright-Patterson AFB, Ohio)
Memo Rept. EXP-M-49-696-6A, 27 Nov. 1942.

1,093

Penrod, K. E. 1942 OXYGEN REQUIREMENTS IN PARACHUTE DESCENT FROM 30,000 FEET
(Wright Air Development Ctr., Wright-Patterson AFB, Ohio) Memo Rept.
EXP-M-49-696-6; 24 July 1942

1,094

Penrod, K. E. 1944 OXYGEN FLOW REQUIREMENTS FOR BAILING OUT AT 42,000 FEET
(Wright Air Development Ctr., Wright-Patterson AFB, Ohio) Memo Rept.
ENG-49-696-7J; 24 March 1944

1,095

Penrod, P. R. 1958 RELIABILITY ANALYSIS OF ESCAPE SYSTEM COMPONENTS PRESENT AND FUTURE
(North American Aviation, Inc., Los Angeles, Calif.)
Rept. no. NA 58-1496 26 Nov. 1958 ASTIA AD 256 385

CONTENTS:
Definition of escape reliability
Determination of requirements
Reliability design goal
Mechanism complexity
Functional organization
Equipment redundancy
Alternate modes
Component reliabilities
Automation
Human link and controls
Manufacturing and maintenance
Pre-operational evaluation
Reliability improvement

1,096

Pernini, H. M. 1958 SURVEY AND COMPILATION OF CAPSULE SYSTEMS DATA, VOLUME I
(Armour Research Foundation, Chicago, Ill.) WADC Tech. rept. 57-661,vol 1

Summary: This report summarizes the results of design and development activities which have been conducted to early 1958, in the field of emergency escape capsule systems for high-performance aircraft. Decriptions of 30 escape capsule systems are presented. Summaries are also given of the investigations of jettisonable nose sections conducted by NACA and of pertinent portions of the Manned Supersonic Flight Manual. (Author)

1,097

Pernini, H. M. 1958 SURVEY AND COMPILATION OF CAPSULE ESCAPE SYSTEMS DATA, VOLUME II.
(Armour Research Foundation, Chicago, Ill.) WADC Tech. Rept. No. 57-661.

1,098

Pernini, H. M. 1958 SURVEY AND COMPILATION OF CAPSULE ESCAPE SYSTEMS DATA VOLUME III.
(Armour Research Foundation, Chicago, Ill.) WADC Tech. Rept. No. 57-661.

ABSTRACT: A comprehensive annotated bibliography of all the references contained in the survey in addition to other pertinent escape capsule literature is presented. (unclassified abstract)

1,099

Perreault, W. D. 1951 IMPROVED AIR SAFETY GETS TOP PRIORITY
American Aviation 15(24):13-14, Nov. 1951

ABSTRACT: Recent discussions on safety have been held among presidents of all scheduled airlines, the CAB chairman and the CAA administrator. From these preliminary meetings have come several tentative proposals for improved operation. These trends are evident: (1) A top level committee of airline, CAA, CAB, Air Transport Association, Air Line Pilots Association and Aircraft Industries Association representatives will be formed to monitor safety of airline operations on a regularly scheduled basis. (2) Development of a reliable flight recorder will be high on the list of equipment activities.(3) An attempt will be made to establish an equitable method of handling crew members whose obvious shortcomings might endanger flight operations. (4) CAA will be urged to require all aircraft operating in the vicnity of high-density traffic to be equipped with certain minimum communications equipment. (5) Airlines will be required to revamp cockpit procedures, simplify them where possible, and step up refresher courses for all pilots. Flight deck discipline will get particular emphasis. (6) Installation of high-intensity approach and runway lights and use of voice-type markers in place of present coded marker identifiers will be accelerated. (7) Maintenance and overhaul procedures will be examined to see if the ever-lengthening overhaul and inspection periods are a contributing factor in known shortcomings. (8) Airborne radar will be given renewed attention. On the whole industry is cool to presently available radar.

1,100

Perry, David R. and Lidie C. Dyer 1956
INCIDENCE, NATURE, AND EXTENT OF INJURY IN CRASH LANDINGS AND BAILOUTS
(Artic Aeromedical Lab., Ladd Air Force Base, Alaska)
November ASTIA AD 116 239

ABSTRACT: Data were analyzed to establish the effects of terrain, weather, and type of aircraft upon the number and extent of injuries in crash landings

and bailouts. Based on data obtained from a worldwide survey of major airplane accidents, the rate of fatal or major injury in swampy terrain is 3.4% for a bailout and zero for a crash landing. For flat farmland, the probability of a fatal or major injury for either a bailout or a crash landing is about 2 out of 10 persons. For desert terrain the probability of fatal or major injuries in a bailout is 2 out of 10 as compared to 1 out of 10 in a crash landing. For terrain consisting of small hills, the probability of a fatal or major injury is 1 in 10 for bailouts and 3 in 10 for a crash landing. For a crash landing in wooded areas, the probability of fatal or major injury is 9 out of 10. In mountainous terrain, the indicated probability of fatal or major injuries is 2 out of 10 for a bailout and 6 out of 10 for a crash landing. The probability of fatal or major injury when crash landing in open water is 6 out of 10 as compared to 3 out of 10 for a bailout. Major accidents occurring in Arctic regions are studied with reference to bomber-and jet-type aircraft, jet fighters, trainer aircraft, and all other aircraft. A total of 35 persons were involved in bomber crash landings, of which 6.1% were fatalities. For cargo aircraft, 21.7% of bailouts were fatal, and 17.4% of the crash landings were fatal. Bailouts from jets resulted in 23.1% fatalities. Crash landings involved 28.6% fatalities. No fatalities were reported from trainer aircraft. All other types of aircraft involved 4 fatal injuries. (ASTIA)

1,101

Peschel, F.M. 1946 SEAT ASSEMBLY - PILOT'S JETTISONABLE XP-84 STATIC TEST. (Republic Aviation Corp., Engineering Research Div., Farmingdale, New York) ASTIA 49496, February 1946

ABSTRACT: Proof load tests were made on the pilot's jettisonable seat assembly of the XF-84 jet fighter. The test specimen was mounted on an actual set of guide rails in an attitude duplicating gun having the same working dimensions as the actual ejection device. The guide rails and dummy gun were attached to a rigid jig which could be mounted in various positions to allow convenient application of the test load. Tests included a seat bottom down load test, a seat back load test, a simultaneous safety belt and lap belt load test, and a lap belt mount up load test. All tests were successfully completed to 80% of the ultimate load. No appreciable permanent set or excessive deflection was noted after approaching limit load in any of the test conditions, with the exception of a failure of the shoulder strap support member. It was concluded that the pilot's jettisonable seat assembly is satisfactory for use in the XF-84 fighter.

1,102

Pesman, Gerard J. 1950 ANALYSIS OF MULTIENGINE TRANSPORT AIRPLANE FIRE RECORDS
(National Advisory Committee for Aeronautics Washington) NACA RM E9J19

ABSTRACT: An analysis has been made of Civil Aeronautics Administration and Civil Aeronautics Board commercial airplane fire records collected during the 10-year period ending July 1, 1948. The results of the analysis show that:

1. Gasoline was most frequently the initial combustible ignited in flight and ground fires and is considered to be the most hazardous of the combustibles carried.
2. Although electrical-ignition sources are the most frequent flight-fire ignition source by a small margin, the exhaust system is concluded to be the most hazardous ignition source.
3. Engine failures were the most frequent cause of the union of combustible and ignition source that resulted in flight fires.
4. Fuel-plumbing-system failures were the most frequent cause of fires occurring during ground operation.
5. The evidence concerning crash fires was not sufficiently extensive to provide information concerning the factors that affect the start and the spread of fire.

In order that future records may be more useful, all crash accidents should be studied to determine why fire does or does not occur and to establish data that relate the occurrence and the spread of fire to airplane design and operation.

1,103

Peters, G.A., C.A. Mitchell, & Frank H. Smith 1962 J-2 SPACE MAINTENANCE: PRELIMINARY STUDY
(North American Aviation, Inc. Rocketdyne, Canoga Park, Calif.) Report no. ROM 2181-1004, July 16, 1962

ABSTRACT: Two subjects wearing pressurized space suits performed two selected work tasks (removing and replacing oxidizer bypass ducts and gas generator spark plug assembly) on a J-2 engine during a preliminary investigation of space maintenance conducted at Rocketdyne June 18-22, 1962. The pressure suits were found to be uncomfortable and tiring after a work period of about an hour, and they greatly increased the complexity of, and time expended on, comparatively simple tasks. The results contain discussions on the design of space tools, pressure suit and glove limitations, component removal and replacement task difficulties, and supplemental environmental factors affecting job performance. Implications for further research are made in regard to problem areas which could be involved in the performance of space maintenance tasks on propulsion system equipment.

1,104

Peters, W.H. & R.W. Kluge 1948 PROGRESS REPORT FOR JANUARY, 1948 ON THE SUPERSONIC COCKPIT
Cornell Aeronautical Laboratory of Cornell Research Foundation, Inc. Buffalo, N.Y
Report BC-531-S-1 ASTIA ATI 66 853

ABSTRACT: This progress report is the first to present specific progress made since inception of the program. To determine the present status of each of the many subjects involved, bibliographies have been compiled and sifting of this material is in progress; personal contact has been made with manufacturers of aircraft which will operate or already have operated near to the sonic velocity. Methods of approaching some of the various problems have been devised and are presented. These will permit the future work to be conducted most efficiently. Tentative physiological limitations have been selected, many from German reports, to permit survey of flight phenomena within a reasonable range. Results of a few cursory investigations, such as the displacement of an optical image through a shock wave and the realm of fluid mechanics in which flight will exist, are presented. Part I of this report covers the library research and Part II presents a summary of the conferences with aircraft manufacturers.

1,105

Peterson, H. L. 1961 CABLE AND PISTON DRAG PARAMETER INVESTIGATION FOR HYDRAULIC AIRCRAFT--ARRESTING ENERGY ABSORBERS. (Research, Inc., Minneapolis, Minn.) ASD TN 61-65, June 1961. ASTIA Doc. No. AD 268 173.

ABSTRACT: An investigation was conducted to obtain information on the parameters affecting operation or control of hydraulic energy absorbers used in barrier systems. The influence of independent variables on cable drag was investigated by pulling a test cable (wire rope) through a water filled tube at velocities up to 200 feet per second. Drag forces and tube water pressures were recorded for various test configurations. The variables included water tube length and diameter, smooth and rough test cable and varying amounts of water bleed. Results were analyzed and compared with full scale barrier tests. The variation of piston drag with tube diameter was also investigated. Results, using both single and double piston arrangements were compared to the full scale barrier tests. (Author)

1,106

Peterson, R.L. 1962 AN INVESTIGATION OF THE COMFORT PROPERTIES OF THE NET SEAT CONCEPT (Technical Memorandum 1958-1959) (Flight Dynamics Lab., Aeronautical Systems Div., Wright-Patterson AFB, Ohio) ASRMDD-TM-62-50

ABSTRACT: Results are presented on the evaluation of the comfort properties of the net concept for possible integration in future aerospace vehicles. A description of the experimental net seat delineator, with illustrations, is

included. The three angular positions of special interest in vertically launched long duration space missions are defined. The results indicate that this seating concept provides a high degree of comfort for both short and long duration (up to 36 continuous hours) occupancy and that further evaluation of this concept's capability during periods of relatively high sustained accelerations and low frequency vibrations should be investigated. (AUTHOR)

1,107

Peterson, R.L. 1962 AN INVESTIGATION OF THE SUSTAINED ACCELERATION PROPERTIES OF THE NET SEAT (Flight Dynamics Lab., Aeronautical Systems Div., Wright-Patterson AFB, Ohio) ASRMDD-TM-62-58, Aug. 1962 NASA N 62-17259

ABSTRACT: This report presents the results of an in-house net seat sustained acceleration text program to evaluate the acceleration capability of the net seat concept during simulated launch and reentry profiles. Results of these human centrifuge experiments indicate that the prototype net seat provides the space crew member with an excellent support-restraint system with which to withstand application of transverse (chest to back) accelerations up to 16.5G's

1,108

Pfingstag, C. J. 1953 PILOT'S ABILITY TO SIMULATE AN EMERGENCY ESCAPE WITH VARIOUS TYPES OF EJECTION SEATS WHILE SUBJECTED TO A FLUCTUATING ACCELERATION
(Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.)
Proj. TED no. ADC AE-6303 3 Nov. 1953 ASTIA AD 54 281

1,109

Phillips, L. 1960 INTEGRATED FLIGHT CAPSULE PILOT RESTRAINT, 1 JUNE 1959 - 1 MARCH 1960 (Vought Aeronautics) 7 April 1960

This report discusses the pilot restraint system study accomplished during the preliminary design of the Integrated Flight Capsule. Present day pilot restraint systems were evaluated, and methods of eliminating their major defi-

ciencies investigated. However, the majority of the study effort was directed towards the design of an optimum pilot restraint system. The integration of the pilot restraint and the pilot's flight garment was developed for several of the more promising methods of restraint. A mock-up of these methods was fabricated and a feasibility evaluation performed. Several of the restraint methods used in the mock-up appear to be feasible methods of pilot restraint when used in conjunction with an integrated flight garment. Several of the pilot restraint methods considered appear to warrent further development toward providing the pilot with an optimum restraint system. This study was not concerned with the design of the garment, however, it was considered during the design of the system. Several studies in the area of head restraint are presented. The methods suggested will support the head in the event high loads are experienced by the pilot, but keep at a minimum any hinderance or any restriction of head movement during the long periods when head restraint is not required

1,,110

Phoebus, C. P. 1957 PROBLEMS OF ESCAPE FROM HIGH PERFORMANCE AIRCRAFT: A SYMPOSIUM.
J. Aviation Med. 28:57-100, Feb. 1957.

ABSTRACT: A series of papers presented at a symposium on escape from high performance aircraft are included in this article. The papers are concerned with history of the escape problem, ejection seat escape, engineering problems, human tolerance to escape, accessory equipment and testing problems, psychologic factors in escape, and predictions for the future.

1,,111

Pickert, Gordon D. 1945 ULTIMATE LOAD TESTS OF WMCA NO. 224 RADIO OPERATOR'S SEAT - MODEL c-82
Warren McArthur Corporation, Bantam, Conn. (Fairchild Engine and Airplane Corporation, Aircraft Div., Hagerstown, Md.) Jan. 2, 1945 ASTIA ATI 110525

ABSTRACT: The purpose of the test described in this report was to apply static loads simulating acceleration forces on the Warren McArthur No. 224 Radio Operator' Seat to determine its behavior up to ultimate design loads. In all tests, the load was applied directly to the seat unit to remove the slack in the joints. Then additional increments were added until the ultimate load was reached. After each increment was added the load was reduced to the original increment. In this manner set was noted. During the seat and back load tests increments were added by means of weights on a platform suspended from a shiffle tree or equalizing platform. The load was applied on a platform over the initial shot bag load.

Two pieces of plywood were laid across the [illegible] to support the load in this test. The belt load was applied with a spur-geared chain hoist through a semi-circular form in a leather belt. A traction dynamometer between the form and the hoist measured the loads. Measurements were taken with sliding wooden deflection guages from the unit to the test rig. Deflections and sets were noted and plotted to warn off incipient failures. In addition photographs were taken at the initial and final loads and the negatives were later superimposed to give a positive print which shows the behavior of the seat under load. The results of the tests showed that the seat unit supported the ultimate loads without failure or appreciable set. Controls operated perfectly after all tests. From the results of the tests it may be concluded that the seat as designed is sufficiently strong.

1,112

Pickert, G.D. 1945 ULTIMATE LOAD TESTS OF [illegible] NO. 294, FLIGHT ENGINEERS AND RADIO OPERATOR'S SEAT (Model XF-12) (McArthur, Warren Corp., Bantam, Conn.) ASTIA ATI-46359, April 1945

ABSTRACT: Static loads simulating acceleration forces were applied on the Warren McArthur No. 294 flight engineer's and radio operator's seat to determine its behavior up to ultimate design loads of 1700-lb down load on seat with the base horizontal and 1600-lb belt [illegible] at 45° to the seat frame. The seat unit supported all ultimate design loads without failure and the proof loads without permanent set. It is concluded that the seat as designed is sufficiently strong.

1,113

Pigg, Leroy D. 1961 HUMAN ENGINEERING PRINCIPLES OF DESIGN FOR IN SPACE MAINTENANCE. (Behavioral Sciences Lab., Wright-Patterson AFB, Ohio) ASD TR 61-629, ASTIA AD-271 [illegible], November 1961

ABSTRACT: Results of research on problems related to human performance of maintenance actions in space systems are reviewed. The interactions of sensory, psychomotor, and motor functions are discussed, along with problems of remote-handling applications in the space environment. (Author)

1,114

Pinc, B. W. 1956 MC-3, MC-4, ALTITUDE SUIT ASSEMBLIES, DESCRIPTION, FITTING AND MAINTENANCE. WADC TR 56-654; ASTIA AD 110 668.

ABSTRACT: MA-2 helmet: This is a K-1 frame, face ring, and shell, which feature a long neckpiece, a deep neck seal bladder, a 3-way-stretch insert in the neckpiece, snap fasteners, a facepiece with a new 24-v high-resistance heating circuit and an in-flight feeding port, 3/8 in. -id oxygen hose, and A1C-10 microphone and earmotors. MC-4 suit: Zippers are located at the wrist and ankle. A shortened front-fly zipper is featured, and the suit torso is closed by a chest zipper from the small of the back to the neck. Chest and back closures are heavy duty; all others are medium weight. A full torso bladder extends from the shoulders to mid-thigh, completely surrounding the chest, abdomen, hips, and upper thighs and passing through the crotch. The leads to the torso bladder and capstans are restrained extensions of the bladder systems (14 in. long) and are equipped with positive lock connections. Lacing extends up the inner thigh, the small of the back, and down the chest. Adjustable cords are at the waist and groin. There are suit-to-suit snaps and suit-to-helmet snaps at the front zipper top; suit-to-helmet snaps are at top back of the collar. The MA-1 anti-G suit is built into the altitude suit for pressure against the legs, thighs, and lower abdomen. MC-3 suit: After the first procurement of 1073 garments, this suit will be identical to the MC-4 suit, but will lack the built-in anti-G suit. Gloves: These are characterized by pressure lead on top at the thumb side, positive lock bayonet connections, padded palm zipper, and elastic wristband. The Berger glove is an all-leather construction. The Clark glove has a leather palm and nylon back, and back lacing adjustment. Seat kit regulator: The new, automatic assembly has a seat pan attached to the airman and acts as a cushion.

1,115

Pinkel, Irving and Edmund G. Rosenberg 1956 SEAT DESIGN FOR CRASH WORTHINESS (Paper, National Advisory Committee for Aeronautics, April 17, 1956, Cleveland, Ohio)

ABSTRACT: From a study of many crash deceleration records, a simplified model of a crash deceleration pulse is suggested which incorporates the essential properties of the pulse. The model pulse is considered to be made up of a base pulse on which are superimposed one or more secondary pulses of shorter duration. The results of a mathematical analysis of the seat-passenger deceleration in response to the airplane deceleration pulse is provided. On the basis of this information, presented as working charts, the maximum deceleration loads experienced by the seat and passenger in response to the airplane deceleration pulse can be computed. This maximum seat-passenger deceleration is found to depend on the natural frequency of the seat containing the passenger, considered as a mass-spring system.

Seat failure is considered to be a progressive process, which begins when the seat is deformed beyond the elastic limit. Equations are presented which relate the energy available to deform the seat beyond the elastic limit to the maximum seat-passenger deceleration, seat natural frequency, and seat strength. A method is presented that shows how to arrive at a combination of seat strength,

natural frequency, and ability to absorb energy in deformation beyond the elastic limit to allow the seat to serve without failure through an airplane deceleration pulse taken as the design requirement. These qualities of the seat can be obtained from measurements made under static conditions.

Data are presented from full-scale laboratory and crash studies on the deceleration loads measured on dummy passengers in seats of standard and novel design. The general trends indicated by theory are obtained.

1,116

Pinkel, I.I. & E.G. Rosenberg 1957 SEAT DESIGN FOR CRASH WORTHINESS. NACA Rep. 1332, 1957 (Supersedes NACA TN 3777) ASTIA AD 109 316

ABSTRACT: On the basis of deceleration data obtained in full-scale crashes, a description of crash deceleration pulses is presented which is suitable for seat design. Charts are presented for obtaining the maximum deceleration loads experienced by the seat and passenger in response to their crash deceleration pulses. Finally, a method is presented for determining the seat strength, spring stiffness, and deformation beyond the elastic limit required to serve in a crash deceleration pulse of given description. Measurement of passenger decelerations in full-scale laboratory and crash studies shows that the general principles presented in the report apply.

1,117

Pinkel, I. I. 1959 A PROPOSED CRITERION FOR THE SELECTION OF FORWARD AND REARWARD FACING SEATS. A.S.M.E. Prep. (59-AV-28).

ABSTRACT: Some crash-deceleration records of NASA crash-research programme are used as a basis for estimating the relative merits of both systems. Computed values of relative crash tolerance of the seating systems are used for the selection criterion. Numerous assumptions respecting the incidence of different types of injury are made and the results are admitted to be very general.

1,118

Pinkel, I. I. 1960 AIRCRAFT SEATING. Mechanical Engineering, 82 (2) 60-63.

1,119

Pletcher, K. E., & S. E. Neely 1960 USAF EMERGENCY ESCAPE EXPERIENCE 1949-1959 (Paper, 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960)

1,120

Pletcher, K. E. & S. E. Neely 1961 USAF EMERGENCY ESCAPE EXPERIENCE--1950-1959
Aerospace Medicine 32(6):524-534, June 1961.

ABSTRACT: Ten years' experience of escape from USAF tactical aircraft are reviewed in an effort to establish the actual hazards connected with emergency escape as opposed to those which experience has shown to be of less importance than the amount of attention they have received. The analysis makes use of tables and graphs to show major accident figures for the period under study, the role of escape in fatal accidents, the effect of ejection seat on escape statistics, type of emergency precipitating ejection, amount of terrain clearance, aircraft attitude, difficulties initiating ejection and after egress, water landing, and survival after ejection. Two new developments in escape are discussed: rocket catapults and capsules. (Tufts)

1,121

Pletcher, K. E. 1961 HUMAN FACTORS IN AEROSPACE PATHOLOGY
Aerospace Medicine 32(1):6-11, Jan. 1961.

ABSTRACT: The relationship between pathology and aircraft accident prevention is discussed. Some relatively rare conditons are mentioned which are amenable to both clinical and pathologic detection and which have been definite, probable, or possible causes of either aircraft accidents or incidents: thyroiditis, sarcoidosis, latent malaria, and sickle cell disease. Some more commonly occuring conditions mentioned are myocardial infarction or coronary insufficiency, cerebrovascular accidents, inhalation of noxious fumes, stress and fatigue, smoking, frugs, and larval idiopathic and posttraumatic epilepsy. The most common conditions such as aeroembolism, hypoxia, and the like also are mentioned. (Tufts)

1,122

Pogrund, R.S. 1962 PHYSIOLOGICAL ASPECTS OF THE SPACEMAN. In: Brown, K., and L.D. Ely. Ed., Space Logistics Engineering (New York: John Wiley and Sons, 1962) p. 55-135

ABSTRACT: The complexity of space logistics engineering for the comfort of the astronaut in a space vehicle is described as a function of mission duration and of the operational requirements and performance capabilities expected. The following physiological parameters are reviewed: (1) vehicle-induced stresses (propulsion, noise, vibration, accelerations, zero gravity, re-entry, emergency escape); (2) internal environment of the space capsule (sources of oxygen supply, handling food, biological photosynthesis systems, methods of carbon dioxide elimination, water and waste control, toxicological considerations, temperature and humidity regulation); (3) radiation hazard shielding requirements, low-level chronic exposure hazard); and (4) psychological stress (isolation, confinement, and sensory deprivation)/

1,123

Poppen, J.R. 1938 EFFECTIVENESS OF PNEUMATIC BELTS IN COUNTERACTING ACCELERATION. (Discussion.) J. Aviation Med. 9:214-215, 233

1,124

Poppen, J.R. 1946 PILOTS ESCAPE FROM HIGH PERFORMANCE AIRCRAFT INTERIM REPORT ON LIVE EJECTION FROM AIRCRAFT IN FLIGHT AT LAKEHURST, N.J. ON 30 OCT '46 (Naval Air Experimental Station, Philadelphia, Pa.) Dec. 1946. ASTIA ATI 48167

ABSTRACT: The first live ejection from high performance aircraft was made from a JD-1 bomber at 5000 ft with airspeed of 250 mph. Prior to the live ejection from the bomber, 42 live ejections were made in the test tower using powder charges and catapults to approximately duplicate the acceleration expected, and 5 dummy ejections at 200-350 mph were made from the bomber. The 28-ft chute attached to the seat failed on the live ejection and at approximately 2000 ft the subject left the seat, fell 500 ft. and opened his seat chute and made an uneventful descent. The subjective reaction of the subject are described and the cause of the failure of the 28-ft parachute is explained

1,125

Poppen, J. R. 1947 HUMAN TOLERANCE TO ACCELERATIONS APPLIED FORM SEAT AND HEAD DURING EJECTION SEAT TESTS.
(Naval Air Experimental Station, Philadelphia, Pa.) Rept. TED No. NAM 256005, Jan 31, 1947.

1,126

Poppen, J. C. 1950 PROTECTIVE HELMETS—THEIR INTEGRATION WITH OTHER EQUIPMENT. J. Aviation Med. 21(5):414-418.

SUMMARY: 1. The impetus to the development of protective helmets is outlined.
2. Methods of construction and general configuration of the more commonly worn protective helmets are briefly described.
3. The need for better integration between the helmet and contiguous equipment is defined.
4. The need for better integration of all personal equipment is emphasized.

1,127

Poppen, J. R. 1953 SOME FACTORS INFLUENCING SEAT DESIGN LOADS.
(Eng. Dept., Douglas Aircraft Co., El Segundo, Calif.) Rept. ES-17277 Feb. 1953.

1,128

Poppen, J. R. 1954 THE NEED OR DESIRABILITY OF FOOTRESTS ON UPWARD EJECTABLE SEATS.
(Eng. Dept., Douglas Aircraft Co., El Segundo, Calif.) Rept. ES-17693, June 1954.

1,129

Poppen, John R. 1957 INTRODUCTION AND HISTORY OF THE AIRCRAFT ESCAPE PROBLEM The Journal of Aviation Medicine 28: 57-59, Feb., 1957

ABSTRACT: The history of escape from aircraft starts with the parachute which was followed by the Martin-Baker upward ejection seat. There are four physio-

logic aspects of the gravitational forces involved in ejection just as there are for all gravitational forces in flying. Research on the ejection seat has been performed by all branches of the military services to determine the best design criteria and to define the human tolerance factors

1,130

Poppen, J. R. 1958 SUPPORT OF UPPER BODY AGAINST ACCELERATIVE FORCES IN AIRCRAFT
J. of Aviation Medicine 29(1):76-84, January 1958

ABSTRACT: There is increasing need for the direct support of the upper part of the aviator's body against increasing vertical forces. In a study of the mechanical support and mass distribution of the upper part of the body, principles are determined to be applied in the design of personal equipment to accomplish this support. The objectives are (1) the reduction of dynamic response between the upper and lower masses to lower the compressive impact loads on the lumbar spine, and (2) the use of greater thrust, higher velocities and higher trajectories in upward ejection seats. Certain preliminary tests are reported which confirm the validity of the principles defined and give promise that effective means of providing the desired support can be foreseen.

1,131

Poppen, Modlin 1957 F106A TORSO RESTRAINT SYSTEM. Preliminary Study. (Radioplane Co.) Rept. No. AMM66, April 1957

1,132

Powers, E.E. 1945 VELOCITY AND ACCELERATION MEASUREMENTS OF PILOT SEAT EJECTION CATAPULT. (Army Air Forces Materiel Command) 27 Nov. 1945. ASTIA ATI 52658.

ABSTRACT: Ultra high-speed motion pictures were made of four tests of the firing of the pilot-seat ejection catapult in order to study the velocities and accelerations involved when the ejection gun is fired. A pneumatic brake was used to preload the system, thus increasing the initial load, and the catapult under initial braking loads of 1.2g, 1.6g and 1.9 g. The motion pictures were assessed for space-time-evaluation, and the values of velocities and accelerations were plotted. Acceleration curves show a fluctuation of acceleration prior to reaching maximum acceleration. It is recommended that further tests be conducted to determine whether the fluctuation in acceleration is consistent.

1,133

Preece, C.D. 1960 BANG! ARE YOU ALIVE?
Air Clues, 14(6):176-180 March 1960

ABSTRACT: Between January 1, 1953, and August 31, 1959, 168 RAF personnel ejected, and of these 130 were successful.
The main purpose of this letter is not to analyse the unsuccessful cases, but to pose a question. Are aircrew given, and do they give themselves, a fair chance when the occasion demands that they reach for the handle?

1,134

Pribil, R.F. 1956 HIGH-SPEED TRACK TESTS OF EJECTION SEAT AND PILOT'S EQUIPMENT, F-100 AIRPLANES. TEST NO. 2.
(North American Aviation, Inc.) Report No. NA-56-750-2
30 August 1956.

1,135

Provost, C. J. 1961 EMERGENCY RECOVERY OF GONDOLA PARACHUTE.
(Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD Tech. Note 61-4. ASTIA AD 253 207.

SUMMARY: An 82.3-foot nominal diameter parachute system was modified and prepared for integration with the WADD Gondola III (Stargazer) in such a way that the gondola and crew could be recovered. By locating a 96-inch diameter ring 150 inches above the gondola's suspension attachment points, a telescope, mounted directly on top of the gondola, could rotate freely on a 360° axis, and a 1-inch minimum clearance at maximum and minimum elevations could be assured. Twelve 1/2-inch wide suspension risers have a maximum strength of 23,380 pounds. The parachute assembly will recover a gross load of 3,650 pounds at release air speed of 40 knots from an altitude of 800 feet above ground. More gross weight tests should be conducted to determine the opening characteristics of the parachute canopy at anticipated service altitudes. (Author)

1,136

Putnam, V. K. 1959 SOME HUMAN ENGINEERING ASPECTS OF SEVERAL UNCONVENTIONAL AIRCRAFT
(Paper Fourteenth Meeting of the Flight Test Techniques and Instrumentation Panel, 11-15 May 1959, Athens, Greece)
(Advisory Group for Aeronautical Research and Development, Paris, France)
AGARD rept. no. 244 May 1959 ASTIA AD 243 008

ABSTRACT: Interest by the military services, notable the U. S. Army, in the potential of reatively high speed (compared to helicopters) aircraft that have the capability of vertical take-off, has been sufficient to finance the development of experimental testbeds of several types of VTOL aircraft. At the present time none of these aircraft has been sufficiently developed and tested to permit a comprehensive discussion of performance, stability, airframe dynamics and other objective factors which require extensive analysis. On the other hand, several of these aircraft have been flown sufficiently to permit observations to be made on subjective, or human engineering characteristics such as control, noise, downwash effects, etc. These characteristics, which are readily apparent to the pilot and strongly affect his opinion of the aircraft, are discussed. (Author)

1,137

Putt, D. L. 1952 TRENDS IN AIRCRAFT DEVELOPMENT AND RESEARCH -- IN THE AIR FORCE
SAE Journal 60(3):43-44, March 1952

ABSTRACT: Excerpts: "If there is one key word in our development effort today that word is reliability. The human mind and body cannot be relied upon in the years ahead to participate adequately in combat flight operations.

"The attainment of greater reliability by automatic means is, of course, the major trend. It will increase the number of component parts in equipment and emphasize the need for miniaturization.

"Recent development of the transitor, an electronic device about the size of a grain of wheat, will result in the elimination of many vacuum tubes and greatly accelerate equipment miniaturization, which will bring about a drastic reduction of the size and weight of electronic gear having much greater reliability and life."

RESTRAINT, PROTECTION, AND EMERGENCY ESCAPE SYSTEMS

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1,138

Quinnel, R.K. 1956 THE HUMAN COMPONENT IN EXTRATERRESTRIAL FLIGHT
TAC Surgeon's Bulletin (Langley AFB, Va.) 6(11): 1-24, Nov. 1956
See also: Medical Newsletter 29(4): 27-40 Feb. 15, 1957

ABSTRACT: A general discussion is presented on the physiological stresses to be encountered in extraterrestrial flight such as accelerations, vibrations, cosmic radiations, and weightlessness. Within the cabin, control of pressurization, temperature, oxygen, carbon dioxide, and body odors is required, as well as adequate illumination and presentation of the instrument panel. Vision outside the cockpit may be important only for psychological reasons.

1,139

Quinnell, R.K. 1957 THE HUMAN COMPONENT IN EXTRATERRESTRIAL FLIGHT
Canad. Serv. Med. J. 13(4): 245-258

RESTRAINT, PROTECTION, AND EMERGENCY ESCAPE SYSTEMS

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1,140

Radio Corporation of America 1960 STUDY OF INSTRUMENTATION AND TECHNIQUES FOR MONITORING VEHICLE AND EQUIPMENT ENVIRONMENTS AT HIGH ALTITUDE, INSTRUMENTATION AND MONITORING TECHNIQUES. (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TN 59-307 June 1960 ASTIA AD 268 090

ABSTRACT: Instrumentation techniques are presented which are available within the state-of-the-art; an instrumentation system is proposed for the monitoring of high-altitude environments encountered by typical vehicles. The high altitude environmental effects on typical vehicles and equipment are summarized. The present airborne-instrumentation state-of-the-art is presented for measuring temperature, pressure, strain, vibration, acceleration, radiation, meteorite detection, and acoustic noise. A feasible instrumentation system is discussed for monitoring these deleterious environments. (Author)

1,141

Radke, A. O. 1956 THE APPLICATION OF HUMAN ENGINEERING DATA TO VEHICULAR SEAT DESIGN. (Bostrom Research Laboratories Publications, Milwaukee, Wisc.) No. 117.

ABSTRACT: A detailed report including graphs and picutres of vehicle seats with the areas of position, posture, static comfort and vibration isolation integrated into the final design.

1,142

Raeke, J.W. 1959 IMPACT PROTECTION CHARACTERISTICS OF FLIGHT HELMETS. (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: This study represents an attempt to determine the impact protection characteristics of three types of flight helmets. Tests were conducted at a constant impact velocity of 17.6 ft/sec. and at three impact energy levels:

60, 107.5 and 136.5 ft lbs. Peak resultant acceleration, rate of onset of acceleration, energy absorption efficiency and in several cases impact stress, were determined either directly or indirectly. High speed motion pictures of helmet shell deformation augment the aforementioned quantitative data. Results show that even under the relatively mild test conditions each helmet type displayed at least one undesirable characteristic. The impact response of each helmet type could be significantly improved by relatively minor design or fabrication changes; however, the test as a whole points up the need for a set of minimum acceptable performance standards. (J. Aviation Med. 30(3):199, Mar. 1959

1,143

Raeke, J.W., W.R. Santschi & J.F. Hegenwald, Jr. 1962 ALTITUDE EVALUATION OF THE XB-70 ESCAPE CAPSULE
Paper: 33rd Annual Meeting of the Aerospace Medical Association, Chalfonte-Haddon Hall, Atlantic City, N.J., April 9-12, 1962

ABSTRACT: The B-70 escape capsule represents an advanced and sophisticated method of providing crewmembers with emergency pressure and respiratory protection in addition to escape capability. The capsule will maintain a minimum pressure level of 5 psi (27,000 feet) and is pressurized with a 60% oxygen-40% nitrogen gas mixture to maintain a sea level equivalent oxygen partial pressure. The capsule was extensively evaluated in the altitude chamber to insure adequacy and reliability of operation. Human subjects were exposed to 10-second decompressions from 8000 to 50,000 feet with encapsulation being initiated at approximately 43,000 feet on warning light actuation. Rapid recompression inherent in capsule pressurization was also evaluated as was the rapid decompression resulting from capsule door seal deflation preparatory to egressing from the capsule at 40,000 feet. All aspects of capsule operation at simulated altitude are discussed including biomechanics of capsule operation, noise levels, recompression-decompression rates and respiratory and pressure adequacy. Physiological data such as EKG and arterial blood oxygen saturation are examined in relation to simulated emergency pressure environments.

1,144

RAF Physiological Research Unit 1941 FLIGHT TESTS ON FRANK'S HYDROSTATIC SUIT.
(RAF Institute of Aviation Medicine, Franborough) FPRC No. 339. 30 July 1941.

ABSTRACT: Four subjects tested FFS in planes. They reported that the suit caused no severe discomfort or incovenience in climbing in and out of planes. Vertigo occurred when looking back under 6 "g". Complete visual protection was obtained up to 8 to 9 "g" for about 10 seconds.

1,145

RAF Physiology Lab. 1941 FRANKS' SUIT: PROGRESS
F.P.R.C. Report No. 339a, October 1941

1,146

RAAF Flying Personnel Research Committee 1941 LETTER FROM RAAF FLYING PERSONNEL RESEARCH COMMITTEE TO AIR LIAISON OFFICER, AUSTRALIA HOUSE 3 OCT. 1941. WAM-101-1, FPRC No. 358 (b)

ABSTRACT: Reports that Cotton suit gives protection up to 9 to 10 "g".

1,147

RAF 1942 AIR MINISTRY PAMPHLET NO. 141.
(1st Edition, 1942) Franks Flying Suit--Mark II.
Cited Kennedy, W. A. et al. 10 April 1944.

1,148

RAF Physiological Lab. 1942 DEVICES FOR PROTECTING PILOTS FROM THE EFFECTS OF HIGH ACCELERATION WITH PARTICULAR REFERENCE TO TRIALS OF THE FRANK'S SUIT. (Farnborough) FPRC No. 498, 20 Nov. 1942.

ABSTRACT: At 8 "g", 250 mm Hg aortic blood pressure is needed for clear vision at 20 "g", 625 mm. The heart has difficulty in contracting against even 200 mm Hg.

Service trials of FFS in planes show one to two "g" increase in tolerance. Farnborough experimental trials always show 2 "g" increase, often 4.5 to 8 "g" increase with experienced subjects when 3/4 to 1 3/4 gallons of water are used in the suit.

Pilots complain of loss of "feel" when wearing suit. The danger of pilot's exceeding "g" load of plane is evident. It is recommended that pilots not be protected beyond 6 "g" and that FFS never be used in planes not cleared for 9 "g"

Advantages of FFS is that pressure gradient is produced automatically and independently of any external control.

1,149

RAF, Physiological Laboratory 1942 DEVICES FOR PROTECTING PILOTS FROM THE EFFECTS OF HIGH ACCELERATION WITH PARTICULAR REFERENCE TO TRIALS OF THE FRANKS SUIT. (R.A.F. Physiological Laboratory) F.P.R.C. 498 (National Research Council, Canada) Report #C-2853, 20 November 1942.

ABSTRACT: A brief review is made of the physiology of blackout and the principle of protecting man against it by prevention of venous pooling. The Franks suit is now developed to a state where large scale production is possible. It is the most effective anti-G device available. It is felt that the use of Franks suit should be considered not only on account of the absolute G threshold achieved but also the gain in fighting efficiency at 4 - 5 G. It is clear from the trial reports that all users of the suit are struck by the comfort ease of control and normality of vision under G values which without the suit are tolerated but with some impairment of efficiency. If the suits are widely used the additional strain placed on the heart will need careful observation. The suits should not be used except in aircraft cleared to at least 9 G.

1,150

RAAF, Flying Personnel Research Committee 1942 NOTE OF PROGRESS OF THE PNEUMODYNAMIC SUIT. (EXTRACT FROM AUSTRALIAN FLYING PERSONNEL RESEARCH COMMITTEE REPORT, F.R. 27) FPRC Report 407-a, December 1942.

1,151

RAAF, Flying Personnel Research Committee 1943 TRAINING AND SELECTION OF AIRCREW FOR SPECIAL DUTIES, ON THE EFFECTS OF HIGH "G" AND THE USE OF C.A.A.C. SUIT. Min. Comm. Anti-G Problems Research, Appendix A, FPRC, RAAF - FR 49, 15 June 1943.

1,152

Randall, F.E. 1944 PRONE POSITION
(U.S. AAF Materiel Center, Engineering Div., Aeromedical Laboratory)
Memo. Rept. ENG-49-695-32P, 25 Feb. 1955

ABSTRACT: Beginning with a base platform a series of tests was run on the best positions. It was found that a variable adjustment for the chest offered the best concession to individual likes and dislikes. Comfort was a function of liking the position plus time spent in the given position. Periods up to one hour were spent without undue fatigue, providing a head sling was provided. Thus, an adjustable head sling was rigged to aid the individual in holding the head in such a position as to look forward without undue strain on the dorsal

neck muscles. It was clearly demonstrated that pads or wells should be provided. Th8s, ad adjustable head sling was rigged to aid the individual in holding the head in such a position as to look forward without undue strain on the dorsal neck muscles. It was clearly demonstrated that pads or wells should be provided to take weight off the patellae. The variable adjustments of the chest allowed sharp rises of the upper chest region of 1, 2, 3 and 4 inches. A 10° rise in the long axis of the trunk was provided. The legs lay in the plane of flight.

1,153

RAAF, Flying Personnel Research Committee 1945 EXTRACT FROM SQUADRON LEADER MCINTYRE'S U.K. REPORT (SUGGESTIONS TO IMPROVE PRESSURE SUITS) Min. Acceleration Section, No. 2 Flying Personnel Research Unit, Appendix A. FPRC, RAAF - FR 102, 15 January 1945.

1,154

Randall, F. E. 1945 HUMAN DIMENSIONAL REQUIREMENTS FOR SEAT EJECTION (Aero Medical Lab.) Appendix 20 to Lovelace, W. R., E. J. Baldes, & V. J. Wulff, The Ejection Seat for Emergency Escape from High-Speed Aircraft, ATI No. 7245

1,155

Randall, F., A. Daman, R. Benton, and D. L. Patt 1946 HUMAN BODY SIZE IN MILITARY AIRCRAFT AND PERSONAL EQUIPMENT. US AAF TR No. 5501. June 1946.

1,156

Randall, F. E. 1946 SEAT COMFORT. Mech. Eng. 3:1-3.

1,157

Randel, H. W. & J. E. Ward 1954 AIRCREW INDOCTRINATION IN THE AIR FORCE PARTIAL PRESSURE SUIT AND ACCESSORY EQUIPMENTS. J. Aviation Med. 25:637-650, Dec. 1954.

ABSTRACT: The protective outfit for high flights used by the U.S.A.F. are the K-1 Helmet, the T-1 Emergency Partial Pressure Suit and the C-1 Automatic Oxygen Assembly with high pressure oxygen bottle.

In an emergency, inflation of the suit and delivery of oxygen under pressure occur automatically. The fully inflated suit causes moving limitations. The effect, together with the fatigue caused by the pressure breathing, limits wearing of the inflated suit to brief periods. Also the manufacturing of the suit is described. The material is nylon-cotton of light weight which are porous enough for adequate ventilation.

1,158

Range, R.W. 1944 SANITARY PROBLEMS IN TRANSPORTING THE SICK AND WOUNDED BY AIR (PART 6 OF 6 PARTS) (HYGIENISCHE FRAGEN BEIM KRANKEN - UND VERWUNDETENTRANSPORT MIT DEM FLUGZEUG)
ASTIA ATI 59290

ABSTRACT: Sanitary problems in transporting the sick and wounded by air are discussed and illustrated by describing the Ju-52 ambulance airplane, which has a capacity of 15 wounded and 4 crew members. The airplane was equipped with litters, safety belts, medical instruments, bandages, and oxygen tanks, as well as lavatory facilities and bed pans. The temperature of the cabin, which was sound-proofed against engine noise, was regulated according to the need of the sick. Facilities for hot and cold beverages for the wounded were provided. Patients infected with contagious diseases were not allowed to be transported with other sick or wounded. No dogs or other animals were allowed.

1,159

Raulston, B. O., & C. F. Lombard 1951 PHYSIOLOGICAL, BIOCHEMICAL, AND ANATOMICAI EFFECTS OF ACCELERATION ON THE BODY RELATIVE TO PILOT POSITION IN HIGH SPEED AIRCRAFT. (Dept. Avia. Med., Univ. of Southern Calif.) Final Rept. M-35-51 (Apr. 9, 1946 to Aug. 31, 1950) 10 July 1951.

1,160

Rawlins, J. S. P. 1953 DEVELOPMENT OF A FLYING HELMET AND OF A PROTECTIVE HELMET.
(Flying Personnel Research Committee, Gt. Brit.) Rept no. FPRC 847, Aug 1953 19 p. AD 30 749

Summary: A new protective helmet was designed which uses four layers of continuous filament nylon with an extra layer 2-inch wide coronally across the forehead and another wedge-shaped layer extending backward over the frontal area, and with a final layer of staple weave on the outside. An inner padding of 3/8-inch layers of medium-and soft-density polyvinyl chloride comented together is provided for the frontal region. The harness is made of nylon tape of 1000-lb. breaking strain which has the property of stretching under tension.

A flying or inner helmet is designed (Type-F) which incorporates noise-excluding capsules. A flat telephone comparing well with the Type-32 was found acceptable for use with the helmet. A smaller, lighter telephone is being investigated. A connecter will be provided which is covered with conventional braided cotton insulation and leaves the helmet at the rear. A new oxygen-mask clip is described which permits easy attachment and detechment with one hand. The helmet was subjected to wind and impact tests as well as actual service trials. Results indicated that the inner helmet was intirely satisfactory; the outer helmet was satisfactory from the point of view of shape and weight, but deficient as far as accuracy of fit was concerned. Results of study of both head sizes and helmet sizes indicated tha, owing to shrinkage during casting the outer shell in manufacture, differences as great as 0.5 inch in diameter were present.

1,161

Rawlins, J. S. P. 1955 UNDERWATER ESCAPE
Flight Deck, Winter Issue

1,162

Rawlins, J.S.P. 1956 DESIGN OF CRASH HELMETS.
The Lancet, 6 Oct. 1956

ABSTRACT: Most present-day crash helmets are based not upon scientific theory but upon established lines which have resulted from mis-interpretation of the mechanism of head injury.
When the physics of head injury are studied, it is immediately clear that a theoretically sound helmet is neither difficult to design nor necessarily expensive to manufacture.
Although the shape and details of a properly designed crash helmet may vary with the purpose for which it is intended, its basic properties will always be the same-resistance to penetration, resistance to deformation, reduction of accelerations, and absorption of kinetic energy.

1,163

Rawlins, J.S.P. 1956 INVESTIGATION INTO PROBLEMS OF ESCAPE FROM A SUBMERGED N-139 AIRCRAFT.
(Inst. Aviation Med., R.A.F., Farnborough) FPRC Rept. No. 994, Dec. 1956.

1,164

Rawlins, J.S.P. 1958 UNDERWATER EJECTION. Flight (8 Aug 1958): 195-196.

ABSTRACT: This article gives a factual account of a series of practical investigations into methods of escape from submerged aircraft - in particular, use of the ejection seat in aiding such escapes. Sometimes as a result of official secrecy, but often because of the reticence and modesty of the participants, hazardous experiments of this kind go unpublizied.

1,165

Rawlins, J. S. 1961 A SYSTEM FOR ESCAPE FROM SUBMERGED AIRCRAFT. Rev. Med. Aero (Paris) 2:197-200, Dec. 1961

1,166

Rawlins, J. S. 1963 A SYSTEM FOR ESCAPE FROM SUBMERGED AIRCRAFT. Industr. Med. Surg. 32:73-75, Feb. 1963.

1,167

Ray, J. T., & J. I. Niven 1951 THE PERCEPTION OF THE VERTICAL. XII. THE POINT OF SHIFT FROM VISUAL TO POSTURAL FRAMES OF REFERENCE. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 110 500.21., 8 Feb. 1951

1,168

Redden, R. J. 1961 URINE COLLECTION AND DISPOSAL DEVICE FOR PRESSURE SUIT. (International Latex Corp., Dover, Del.) Contract AF 33(616)7344, Proj. 7164; ASD TR 61-329; ASTIA AD-267 150; Aug. 1961

ABSTRACT: The design, fabrication, and testing of a urine collection and disposal system, to provide a means to remove urine from within a full pressure suit during long periods of use, in a weightless environment, and to provide a means of sampling each individual specimen of urine, are discussed. The prototype system consists of three basic parts: (1) a urinal to collect the urine within the suit, (2) a valve to allow removal of the urine from the suit, and (3) a collecting bag with valving to provide for disposal of the urine. The testing program provides a means of checking conformance to the design objectives as far as possible in the presence of gravity. Tests were performed both with and against gravity. Some of the components, designed for optimum performance in a weightless condition, could be adequately tested only under that condition. Weightless tests were not conducted. (AUTHOR)

1,169

Reed, N.W. 1949 REDESIGNED PILOT'S SEAT (105-9533904) ULTIMATE STRENGTH TEST-MODEL L-13 (LIASON) AIRPLANE. (Consolidated Vultee Aircraft Corp., San Diego Div., Calif.) ASTIA ATI-80029, August 1949

ABSTRACT: An ultimate strength test was conducted on the redesigned pilot's seat of the L-13 liaison airplane. The seat was attached to tubular supports by means of wedjit brackets welded to a steel plate fastened to the jig bed. Loads were applied in increments of 15% up to proof load. After application of proof load, the load was removed to read permanent set deflections and to look the seat over for visible set. The seat was then loaded in increments of 10% to design ultimate load. The seat withstood the specification loads satisfactorily and is therefore considered structurally adequate.

1,170

Rehman, I. 1962 MULTI-DUTY HELMET
(U.S. Patent 3,030,627, April 24, 1962)

ABSTRACT: A multi-purpose helmet is described and illustrated which is adapted to be fitted to the individual head. It is composed of both rigid concave and resilient flexible concave members.

1,171

Reihm, H.D. Jr., 1962 HELMET IMPACT TESTS.
(Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio)
MRL-TDR-62-19. April 1962. ASTIA AD 283950

ABSTRACT: Several helmets, designed and tested to determine which shell thickness and which type of suspension afford maximum protection during high-energy collisions and provide comfort during normal use, are discussed. There are many factors which influence the design of a satisfactory crash helmet; however, a combined analysis of three of its basic properties-reduction of acceleration, reduction of the rate of onset of acceleration, and the absorption of kinetic energy is sufficient to reveal the relative performance of each helmet design. Tests which determine these basic properties are discussed. An analysis of the data correlated in graphical form shows an optimum helmet thickness and most satisfactory suspension system of those studied.

1,172

Reininger, E., E. T. Carter and others 1958 CARDIOVASCULAR EFFECTS OF A PRESSURE SUIT ON THE DOG. WADC TR 57-700; ASTIA AD 155 662.

ABSTRACT: The purpose of this study is to evaluate the efficiency of a specially constructed altitude suit for dogs. Thirteen animals were fitted with this suit and four of them served as controls. Control experiments were differentiated solely by the preclusion of pressurization of the suit. Physiological evaluation of this pressure suit was accomplished by observing the general hemodynamic effects of the device when activated. It was observed that even while the animals were at ground-level, pressure breathing with this particular suit resulted in a marked depression of cardiac output. This effect was associated with a decrease in systemic blood pressure and a rise in central venous pressure. It also appeared that, in spite of fairly efficient application of counterpressure over the torso, poor pressurization of the neck and limbs probably limits and general efficiency of the suit. Certain modifications of the suit were recommended to improve its effectiveness as a counter-pressure garment. (Author)

1,173

REM, Inc. 1959 A PROPOSAL FOR RESEARCH AND DEVELOPMENT IN THE COMBINED ACCELERATION-VIBRATION PROBLEM, PARTICULARLY FOR CREWMAN PROTECTION IN SPACE VEHICLE SEATING SYSTEMS
(REM, Inc., Portland, Oregon) Letter #311. 23 July 1959.

1,174

Renbourn, E. T. and H. C. W. Stockbridge 1961 WAR OFFICE CLOTHING AND EQUIPMENT PHYSIOLOGICAL RESEARCH ESTABLISHMENT. Ergonomics (London) 4(1)73-79. Jan. 1961.

1,175

Rex, Martin A. 1960 FINAL SUMMARY REPORT ENGINEERING AND FABRICATION SERVICES FOR FREE FLIGHT TESTS OF AIRCRAFT CATAPULTS
(American Machine & Foundry Co., Niles, Illinois for Frankford Arsenal, Philadelphia 37, Pa.) Contract DA 11-022-507-ORD-3049 AMF Project MR1098, May, 1960, ASTIA AD 238 141

ABSTRACT: The engineering and fabrication services program was provided by the American Machine & Foundry Company under contract for Frankford Arsenal. The program was broken down into four ventures, namely, Venture No. 1 the Design and Assembly of a Parachute Recovery System for Tests Seats: Venture No. 2, the Design, Modification, and Assembly of three Catapults T18 with cartridge for each; Venture No. 3, The Design and Fabrication of three Free-Flight Test Seats; and Venture No. 4, the Performance of a Test Firing Program using the Catapult T18 and the Rocket Catapults.

1,176

Reynolds, John P. 1951 TESTS ON GUN, DELAYED FIRING, DRAG PARACHUTE EJECTOR, & EJECTION SEAT - AND APPENDIXES A AND B - MEMORANDUM REPORT (Weapons Components Div., Wright-Patterson Air Force Base, Dayton, Ohio) Serial No. WCEE-672-145B3-2 ASTIA ATI 116 632

ABSTRACT: This is a report of tests conducted to check the operation and performance of the delayed firing, drag parachute ejector gun submitted by Picatinny Arsenal on Contract (33-038)-49-1969-E for use on the ejection seat.

1,177

Rhein, L. W. & E. R. Taylor 1962 INCREASED SKELETAL MUSCLE ACTIVITY FOLLOWING IMPACT. (Aeronautical Research Lab., Holloman AFB, New Mex.) Report No. ARL-TDR-62-26, Dec. 1962.

1,178

Rhoads, C. S. 1950 EFFECTIVENESS OF EJECTION SEAT TRAINING WITH SPECIAL REFERENCE TO SDC DEVICE NO. 6EQ-2. (Richardson, Bellows, Henry, & Co., Inc.) Technical Rept. No. SDC 383-5-1. ASTIA ATI 91 514.

ABSTRACT: Investigations were made of the effectiveness of an indoctrination program and the relative effectiveness of the SDC Device no. 6EQ-2 and the Research Tower in improving pilot attitudes toward the use of ejection seats. The indoctrination program comprised a lecture by a flight surgeon, a training film, and ejection on either the Research Tower or Device 6EQ-2. The Research Tower, developed in England, consists of a typical ejection seat which travels upward 45 ft. or more on a 100-ft. rail when a standard ejection cartridge is exploded beneath the seat. Device 6EQ-2 was designed to be mobile, reduce ejection-seat travel to 12 ft., and provide procedural training by including a dummy cockpit. The attitudes of 82 Navy and Marine pilots toward the use of the ejection seat were measured by a questionnaire survey before and after ejection-seat training. One group received training on the Research Tower and the other on the SDC trainer. Similar pretraining data for a group of reserve pilots were used for comparison. The 2 training devices proved equally effective. In general, the attitudes expressed toward the use of the ejection seat were more favorable after the training program than before. However, little or no change in the more personal attitudes was noted. A copy of the attitude questionnaire is included.

1,179

Rhodes, R. P., & R. G. Gilbert 1956 REPORT ON HOOD AND HATCH UNDERWATER JETTISON TRIALS. (de Havilland Aircraft Co.) Sept. 1956

1,180

Richards, M. A. 1962 ANALYSIS OF A HIGH SPEED ENCAPSULATED SEAT CREW ESCAPE SYSTEM FOR ZERO SPEED AND ZERO ALTITUDE CAPABILITY. (Weber Aircraft Corp., Burbank, Calif.) Contract AF 33(616)7923; Proj. 1362; ASD TDR 62-242; ASTIA AD-284 455; Aug. 1962

ABSTRACT: The equations of motion for six degrees of freedom of a high speed encapsulated crew escape system were developed and formulated into the analog computer. The computer study revealed bad lateral response primarily due to downstream divergence effects on the towed drag body stabilizer. Longitudinal G loads were marginal or unacceptable at 800 kn E. A. S. depending on Mach number. Lateral G loads in the transonic range were generally severe and not acceptable. A thrust to c.g. misalignment of 1.5 in. caused erratic trajectories at low speeds but was negligible at high speeds. An improved system employing a flat platyrrhin forebody with longitudinal and lateral spoilers coupled with two downstream surfaces that behave like lateral afterbodies was introduced. For improving thrust "self seeking" nozzle sensitive to coriolis acceleration of the rocket exhaust was proposed. A technique for estimating human tolerance limits to simultaneous longitudinal and lateral acceleration was developed. (AUTHOR)

1,181

Richardson, Bellows, Henry and Co. 1950 EFFECTIVENESS OF EJECTION SEAT TRAINING WITH SPECIAL REFERENCE TO DEVICE 6-EQ-2 (Office of Naval Research. Special Devices Center, Port Washington, N.Y.), Report no. 383-5-1, November 1950.

1,182

Richter, G. EFFECT OF FORCES ON A CATAPULT SEAT: MEASUREMENTS MADE IN THE HIGH-SPEED WIND TUNNEL OF THE D.V.L. (Kraftmessungen an einem Katapultsitz im Hochgeschwindigkeitswindkannel der D.V.L.) ASTIA ATI 51053

ABSTRACT: A model of a seat with pilot on it was tested in a wind tunnel to determine air forces, air moments, and the influence of the Mach number in order to furnish data for the calculation of the flight path and the twist moment of the seat after it has been catapulted. A forward twist has to be avoided because in this position, high accelerations can not be endured by the human body.

The scale of the model was 1:3 with four different prolongations of the back rest. Lift resistance and moment were measured at various angles of rotation and at various Mach numbers. Schlieren pictures were taken at the highest Mach numbers. Contrary to the lift and resistance, the twist moment is largely dependent upon the prolongation of the back rest. At high Mach numbers, the moment is influenced favorably, the lift is not influenced, and the resistance increases rapidly after M = 0.7. At large angles of rotation, the prolongation of the back rest does not influence the aerodynamic forces considerably. The moment was positive, i.e., twisting in a favorable sense at all rotation angles and velocities only at the largest back rest prolongation. Secondary drive and resistance moderately increase with prolongation. The influence of the Mach number did not manifest itself clearly.

1,183

Richter, H. 1940 PHYSIOLOGISCHE BETRACHTUNGEN UEBER DAS SITZKATAPULTIEREN (Physiological Analysis of the Effects of Catapulting by an Ejection Seat) July 1940. ASTIA ATI 60910

ABSTRACT: The physiological effects of catapulting flying personnel by means of an ejection seat from the He-280 jet fighter were investigated. The seats were released at accelerations of 10 and 12 g. Possible injuries are compression of the spinal column, brain concussion, hemostatic effects and injuries to the inner ear. Cardiograms were taken before the seat was catapulted, during ejection and after the seat was stabilized. In order to avoid possible bodily injuries, it is recommended that the catapult of the ejection seat be made with the pilot in a prone position, in which accelerations up to 16 g can be endured without ill effects.

1,184

Richter 1940 SCHUSSVERSUCHE MIT DEM KATAPULTSITZ (Ejection Seat Test) Oct. 1940. ASTIA ATI 51210

ABSTRACT: An evaluation was made of ejection tests with a German Heinkel catapultseat, and the method is given for determining the piston pressure, friction, acceleration and velocity. Graphical data represent ejection altitudes dependent on the piston pressure and the maximum accelerations acting on the catapult seat. At a known weight of the occupied catapult seat and the minimum ejection height expected, the minimum piston pressure and the acceleration acting on the body can be determined.

1,185

Richter, H., tr. J.B. Bateman 1945 CATAPULT SEAT He 280 (Ernst Heinkel Flugzeugwerke G.m.b.H., Seestadt Rostock, Research Civision) V.B. 3009, Pages A-17156 to A-17186, 21 Oct. 1940. Translated as Appendix 8 to Lovelace, W.R., E.J. Baldes, & V.J. Wulff, The Ejection Seat for Emergency Escape from High-Speed Aircraft ASTIA ATI No. 7245

ABSTRACT: The investigation dealt with the following subjects: 1) Testing of the catapult cylinder (drawing No. 280.101-25) 2) Tests on rapid opening valve, drawing No. 280.101-26. 3) Tests on compressed air cylinder with reservoir attachment, Drawing No. 280.101-14. 4) Experiments on ejection of sand bags from mockup He 280 (high speed moving pictures and indicator diagrams) 5) Seat ejections with human subjects on the inclined track (high speed moving pictures and indicator diagrams) together with various types of measurement of acceleration and electrocardiograms). (Author)

1,186

Richter, H., tr. J.B. Bateman 1945 EJECTION EXPERIMENTS WITH THE CATAPULT SEAT (Ernst Heinkel Flugzeugwerke (Seestadt Rostock) Research Division) V.B. 3009, Appendix 2, Pages A-17138 to A-17155, 7 Nov. 1940. Translated as Appendix 9 to Lovelace, W.R., E.J. Baldes, & V.J. Wulff, The Ejection Seat for Emergency Escape from High-Speed Aircraft ASTIA ATI 7245

ABSTRACT: Following upon the ejection experiments with sandbags, ejections of human subjects were undertaken with the cooperation of Professor Wacholder of the Physiological Institute, University of Rostock, and his assistant Doctor Aeffner. We made two experiments with Mr. Voss (VSA) and Mr Wegner (Statik); both subjects were ejected, the first at 12 and the second at 10 g. In each case electrocardiograms were recorded with electrodes on the right and left wrists. The procedure was first to record the heart beat before ejection, then during ejection, and finally once again some time after the completion of the ejection. The electrocardiograms obtained are recorded in Figure 5. Here, having discussed the matter with Professor Macholder, I wish to bring together a statement of all the processes which might cause injuries of any kind to experimental subjects in this work: 1) Compression

1,187

Rickards, M. A. 1957 A STUDY OF THE UNSTABILIZED AFT-FACING EJECTION SEAT. (Weber Aircraft Corporation, Burbank, Calif.) DR 5609

1,188

Rickey, K. L. and T. W. Temple 1962 RESEARCH ON AN ELECTRONIC INSTRUMENTATION SYSTEM FOR TESTING EMERGENCY CREW ESCAPE SYSTEMS (Technology, Inc., Dayton, Ohio) Contract AF 33(616)7440; Proj. 1360, ASD TDR 62-628, Aug. 1962, ASTIA AD-286 831

ABSTRACT: A complete instrumentation system is presented for testing escape capsules ejected downward from a test vehicle traveling at supersonic speeds and high altitudes. The capsule, which contains an instrumented 95th percentile dummy, is installed in an inverted position in the test vehicle, a modified MB-1 Pod, carried by a B-58 aircraft. Instrumentation systems are located in both the pod and the capsules. Instrument readings and the ejection sequence are recorded photographically in the pilot's station. A ground support console for ground checkout of the systems and an instrumentation trailer for "quick-look" receiving station capability were also developed. (AUTHOR)

1,189

Riddell, F.R. & R.W. Detra 1959 RETURNING ALIVE FROM SPACE (Avco Mfg. Corp., Avco Research Lab., Everett, Mass.)

ABSTRACT: The paper discusses three problems of re-entry: deceleration, heat, and terminal landing conditions. (CARI) Hypersonic gliders and pure drag re-entry vehicles are compared. The drag vehicle has inherent advantages over the hypersonic glider which are usually not generally observed.

1,190

Risinger, B.W. 1960 PILOT ACCELERATION PROTECTION IN THE INTEGRATED FLIGHT CAPSULE (Chance Vought Aircraft, Inc., Dallas, Texas) CVA EOR-12843, 31 March 1960.

1,191

Ritchie, M.L., C.A. Baker 1957 PSYCHOLOGICAL ASPECTS OF COCKPIT DESIGN - A SYMPOSIUM REPORT (University of Illinois & AML) Contract No. AF 33(616)-3000, TR 57-117, proj. & task: 6190-71573, 71556, April 1957, ASTIA No. AD-118079

ABSTRACT: This report contains the papers and discussions of the WADC symposium on the Psychological Aspects of Cockpit Design, which was held October 24, 25, 1956. Seven papers were presented which represent in-service and contractor efforts in the Air Force and the Navy programs to improve flight instrumentation. In addition to these papers a panel discussion was held on each of three subjects: "Problems and Methods in Cockpit Research", "Problems and Methods of Whole-Panel Flight Evaluation and "Whole-Panel Design Objectives to be met in Future Aircraft."

1,192

Roberts, J. F. 1960 REPORT OF PROJECT NR AB 3959 "USER TESTS OF THE SNAP FASTENER, STATIC LINE, CARGO PARACHUTE, DEVELOPMENTAL". (Army Airborne & Electronics Board, Fort Bragg, N. Carolina) 17 Oct. 1960

CONCLUSION: (a) The Snap Fastener, Static Line, Cargo Parachute, Developmental, is suitable for use with cargo parachutes and air delivery systems (b) The Snap Fastener, Static Line, Cargo Parachute, Developmental, is unsuitable for use with personnel parachutes.
RECOMMENDATIONS: (a) That no further consideration be given to Snap Fastener, Static Line, Cargo Parachute, Developmental, in its present state of development (b) that a snap fastener suitable for use with personnel parachutes, cargo parachutes, and air delivery systems be developed. (AUTHOR)

1,193

Roberts, K. A. 1961 WE CAN BUILD A CRASH-PROOF CAR. SAGA, Oct. 1961. Pp. 17-21; 91-93.

ABSTRACT: This article contains a detailed report and illustrations of a "Magic Bumper", seat belt, and "Ensolite" which Professor James Ryan claims could prevent one-half of all injuries and deaths suffered in automobile accidents every year. The "Magic Bumper" absorbs collision shocks by hydraulic device and would cost less than fifty dollars a car installed. The seat belt adjuster allows passengers complete freedom of movement but cinches tight upon any impact. Unbelievable "Ensolite" 1-inch cushioning, proposed for padding inside cars, can absorb bouncing raw eggs without cracking them.

1,194

Roberts, L. B. & W. E. Mann 1945 SEATS FOR TRUCKS (4x4) 1/4 TON (PEEP) (Armored Medical Research Laboratory, Fort Knox) Project #5-12, February 1945.

1,195

Robertson, K.V. n.d. FLIGHT TRIALS OF C.A.A.G. SUIT. (Report, Comm. Flying Personnel Research) FPRC, RAAF -FR 97

1,196

Robertson, S. H., W. H. Shook & J. L. Haley, Jr. 1962 CRASH INJURY BULLETIN: MODIFICATIONS TO THE PASSENGER SEAT BELT TIEDOWN ATTACHMENTS IN THE U. S. ARMY HU-1 SERIES BELL IROQUOIS HELICOPTER. (Aviation Crash Injury Research, Phoenix, Arizona) AvCIR 62-1, TCREC Tech. Rept. 62-45, May 1962.

ABSTRACT: Report is made of weaknesses in the occupant tiedown system in the HU-1 Series helicopter as disclosed by analysis of several accidents. A quick "off-the-shelf" interim fix is presented to make the existing system four times more effective.

A permanent fix is suggested that would ensure the strength of the tiedown to be equal to the seat-belt strength. (Author)

1,197

Robertson, S. H. 1962 DYNAMIC TEST OF AN EXPERIMENTAL TROOP SEAT. (U. S. Army Transportation Research Command, Fort Eustis, Virginia, contract with Aviation Crash Injury Research, Phoenix, Arizona) AvCIR 62-5; Contract DA 44-177-tc-802; TCREC TR 62-48; ASTIA AD-283 604L; June 1962

1,198

Roegner, H. F. 1960 CRASH INJURY EVALUATION: U. S. ARMY AO-1BF MOHAWK MOCKUP, BETHPAGE, LONG ISLAND, NEW YORK, 31 MARCH 1960. (Aviation Crash Injury Research, Phoenix, Arizona) AvCIR-12-PV-117, TREC Tech. Rept. No. 60-45, August 1960

ABSTRACT: This report contains an evaluation of Grumman AO-1BF U.S. Army "Mohawk". The purpose of the evaluation was to: (1) Evaluate the overall crashworthiness of the basic aircraft structure. (2) Determine the existence, if any, of certain features which could lead to the unnecessary exposure of crew members to serious or fatal injury in the event of a survivable-type accident. (3) Make recommendations for remedial action in order to decrease the exposure of the crew members to certain injury causation factors. (4) If necessary, recommend additional crash safety design be integrated into the basi overall design of the aircraft. The above work was accomplished through a detailed crash injury evaluation of the entire aircraft, its components and equipment, in combination with references to technical manuals and personal contact with members of the Grumman engineering staff. This is the final repor on the crash injury evaluation.

1,199

Roegner, H. F. 1960 CRASH INJURY BULLETIN: PART I - ATTACHMENT OF SEAT BELTS IN THE HU-1A HELICOPTER; PART II - STOWAGE OF EQUIPMENT UNDER TROOP SEATS. (Aviation Crash Injury Research, Phoenix, Arizona) AvCIR 69-0-120, September 1960, TREC Tech. Rept. No. 60-61

ABSTRACT: This report gives detailed instructions on the correct and incorrect method of installation of the seat belt in the HU-1A helicopter. In the second section, the stowage of equipment under troop seats is discussed. Accident experience with seats in this aircraft indicates that the seats will fail when under moderate crash loads. It is, therefore, important that the area directly beneath all occupied troop seats be kept free of loose equipment.

1,200

Roegner, H. F. 1960 IMPROPER INSTRUCTION IN THE USE OF SAFETY BELTS IN THE H-21 HELICOPTER MANUAL in Injury Prevention Bulletin. (Aviation Crash Injury Research, Phoenix, Arizona) AvCIR-65-0-111, March 1960

ABSTRACT: This report contains two instruction oulletins to pilots on the aircraft seat and harness. One bulletin gives the correct instructions for fastening the seat belt and harness. The second bulletin gives improper and fatal instructions. The report emphasizes that to ensure full bodily restraint the safety belt must be drawn through the openings on both sides of the seat support structure before fastening.

1,201

Roegner, H.F., G.J. Walhout & J.D. Davenport 1961 CRASH INJURY INVESTIGATION: U. S. Army G-91 RECONNAISSANCE JET FIGHTER ACCIDENT, FORT RUCKER, ALABAMA, 1 FEBRUARY 1961. (Aviation Crash Injury Research, Phoenix, Arizona) AvCIR 61-2, TREC Tech. Rept. 61-91, July 1961.

ABSTRACT: Report is made of crash injury investigation involving a U.S. Army G-91 aircraft to determine cause of fatality. Wreckage was examined at crash site, photographs obtained, and reconstruction of the approximate kinematics of the crash sequence made. It was concluded that the fatal injury was caused by a blow to the head and recommended that the ejection seat, since it is designed to provide safe escape at all altitudes and speeds, be utilized as an escape device in lieu of "riding the aircraft in" in a crash landing, with the exception, possibly, of crash landing on a well prepared surface or runway.

1,202

Rogers, K. 1943 STATIC TESTS OF PLYWOOD SEAT ASSEMBLY. (Boeing Airplane Co., Wichita, Div., Kans.) Report No. 75-6321 ASTIA ATI-104 192, March 1943

ABSTRACT: Tests were made to see if the seat was structurally satisfactory to meet the requirements and to determine the ultimate strength of the seat for the shoulder harness load.

1,203

Rohles, F. H., M. E. Grunzke, & H.H. Reynolds 1962 A DETAILED ACCOUNT OF CHIMPANZEE PERFORMANCE DURING THE BALLISTIC AND ORBITAL PROJECT MERCURY FLIGHTS. (6571st Aeromedical Research Lab., Holloman AFB, N. Mex.) Rept. No. ARL TDR 62-15; Proj. 6893; ASTIA AD-282 687; July 1962

ABSTRACT: The insults of prolonged periods without sleep, the suturing of the physiological sensors, and the long period of restraint before launch, did not affect performance during flight; this also appeared true of the prolonged breathing of 100 per cent oxygen under reduced atmospheric pressures for the time period of these flights. The noise and vibration accompanying launch did not affect performance during flight. Accelerations accompanying launch and re-entry in excess of 7 G's had an immediate effect upon performance; however, recovery to a prelaunch level appeared to be rapid. Adaptation to weightlessness took place during the long exposures to the weightless state, and re-entry accelerations did not have as severe effect upon performance as during the shorter flight. Eating and drinking were accomplished during weightlessness without difficulty. The visual processes, as measured, were unaffected by the rigors of space flight; this was also true of temporal response processes as well as continuous and discrete motor behavior. The pellet and water dispensers functioned properly during weightlessness. The chimpanzee appears to be a highly reliable subject for future space flights. (AUTHOR)

Two space flights with chimpanzees were made as part of the Project Mercury program. In the first flight the subject was placed through a ballistic trajectory and during the flight had to perform a continuous and discrete avoidance task. During a second flight in which the capsule orbited the earth twice, a chimpanzee had to perform a complex multiple operant task.

1,204

Rokhlin, G. A. 1959 AN AUTOMATIC PARACHUTE-CANOPY RELEASE Byulleten' izobreteniy 1959(15):69

ABSTRACT: A device for the stabilizing parachute of the ejection seat, actuated by dynamic air pressure. To lower the safe ejection altitude, by automatically selecting the most convenient operating moment when the parachute drag has reached its optimum value, the device is provided with an adjustable spring locked with the aid of a ball-type lock by a spring-loaded core. This core is connected by means of ball lock and a spring plug (whose tang is compressed by a brake ring with adjustable compression) with a rod with a lung on its end to which the parachute is fastened.

1,205

Rollings, W. 1950 SEAT INSTALLATION PILOT, CO-PILOT, JUMP AND REAR. (Bell Aircraft Corporation, Buffalo, New York) Report No. 48-909-011, ASTIA ATI-105794, May 1950

ABSTRACT: This is a detailed report of the following subjects: installation of the four-man rear troop seat; seat assembly jump; pilot and co-pilot seat assembly; and the Eraus Product Company Report #31.

1,206

Roman, P. 1958 SEMIRIGID ENVELOPE AS A MEANS OF PROTECTION FROM IMPACT. (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TR 58-123.

1,207

Roos, C. A. 1959 BIBLIOGRAPHY OF SPACE MEDICINE
U. S. Armed Forces Med. J. 10(2):172-217, Feb. 1959
See also National Library of Medicine, Washington, D. C., Public Health Service Publ. no. 617, 1958.

ABSTRACT: This compilation of 446 references covers aspects of space medicine such as sealed cabin problems, acceleration and deceleration, fractional and zero gravity, cosmic radiation, nutrition in space flight, survival problems, psychological and social problems, ground crew problems, and extraterrestrial aspects. Entries are arranged chronologically starting with 1958 and going back as far as 1928.

1,208

Root, D. M. 1958 SOME FUNDAMENTAL CONSIDERATIONS IN THE SELECTION AND DESIGN OF ESCAPE CAPSULES. (Paper, Society Automotive Engineers National Aeronautical Meeting, Los Angeles, Calif., Sept. 29 - Oct. 4, 1958)

1,209

Rose, B. and W.R. Martin 1942 REPORT ON THE VISIT OF LIEUTENANT T. FERWERDA, U.S. NAVAL AIR STATION, ANACOSTIA, D.C., TO THE ACCELERATOR HUT, NO. 1 C.I. U. MARCH 25 to APRIL 13, 1942, FOR THE PURPOSE OF TESTING OUT AN ANTI-G SUIT. (Min. Exec. Assoc. Comm. Aviation Med. Research, NRCC) Appendix D, July 1942

1,210

Rose, B., & Accelerator SectionStaff 1943 THE PROTECTION AGAINST G AFFORDED BY THE CANADIAN PROTOTYPE FRANKS FLYING SUIT AS ESTIMATED BY TESTS MADE IN THE CENTRIFUGE. (Rept. to Associate Committee on Aviation Medical Research, Nat'l. Research Council of Canada) NRC Grant No. AMS Rept. No. 9, File No. A.H. 100-5, 1 Sept. 1943

1,211

Rose, B. 1944 PROTECTION AGAINST G AFFORDED BY THE CANADIAN PROTOTYPE FRANKS FLYING SUIT AS ESTIMATED BY TESTS MADE IN THE CENTRIFUGE. Proc. Assoc. Comm. Aviation Med. Research, NRCC, Appendix X, 29 September 1944

1,212

Rose, B., & W. K. Stewart 1944 REVIEW OF THE PRACTICABILITY OF AND NECESSITY FOR ANTI-G DEVICES IN THE RAF WITH PARTICULAR REFERENCE TO THE FRANKS' FLYING SUIT MK. [illegible]. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 584, July 1944.

1,213

Rose, C. W. 1948 WHEN CAN WE STOP GUESSING ABOUT SAFETY BELTS? National Safety News, October 1948.

1,214

Rose, E.S. 1949 MODEL TESTS OF SEAT EJECTION FROM A FREE-SPINNING MODEL OF THE F-80A AIRPLANE. (Air Materiel Command, Wright-Patterson AFB, Ohio) ASTIA ATI-55252, May 1949

ABSTRACT: Model tests of seat ejection from the F-80 Airplane in spinning flight are described. These tests were conducted to determine the minimum distance by which the pilot and ejection seat avoid striking the aircraft. The test ejections were performed from a free-spinning model of the airplane The criteria of dynamic similarity for free-spinning tests are briefly discussed. Test results are presented, and the conclusion is drawn that the ejection seat is a possible means of pilot escape from the F-80A airplane, while in spinning flight.

1,215

Rose, H.W. & P.H. Ripple n.d. VISUAL PROBLEMS OF PILOT IN PRONE POSITION (USAF School of Aviation Medicine, Randolph Field, Texas) Proj. 21-24-011, Rept. No.

ABSTRACT: Visual problems imposed by the prone position in flight were investigated. Test persons were subjected to elevated gaze in a pront-position bed. Determination was made of their muscle balance, their ability to maintain elevated binocular gaze, and the lateral limits of their binocular vision during elevated gaze. During elevated gaze of 15 to 30 degrees, all the subjects experienced discomfort. With elevation of 20 degrees or more, the discomfort was serious, probably to the point that the subject could not perform with precision intricate tasks such as piloting aircraft.

1,216

Rose, H. 1945 PROOF TEST OF A GUNNER'S SEAT. (Douglas Aircraft Company, Inc., Santa Monica, Calif.) Report No. 9579, ASTIA ATI-104797, February 28, 1945

ABSTRACT: The subject seat was loaded to limit load in the belt load, and down load conditions, with the seat facing forward. It was then swiveled around to the aft facing position and re-tested. It again was satisfactory in the belt load condition, but failed to meet the down load requirements. After being redesigned somewhat, the seat was retested in the final condition, and proved satisfactory.

1,217

Rosenbaum, D. A. 1957 EXPLOSIVE DECOMPRESSION STUDIES WITH ANIMALS WEARING FULL BLADDER SUIT AND HELMET. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 57-685; ASTIA AD-142 149; Nov. 1957

ABSTRACT: Studies on 17 dogs, wearing a full bladder suit and helmet while connected to an automatic oxygen regulator, show that no apparent residual pulmonary pathology results following explosive decompression (30 msec) through 10 psi and 14 psi.

1,218

Rosenbaum, D.A. 1958 EXPLOSIVE DECOMPRESSION OF ANIMALS WITH A FULL BLADDER SUIT (MC-4 TYPE), HELMET AND AUTOMATIC REGULATOR Jour. Aviation Med., 29(3): 248, March 1958

ABSTRACT: Studies were conducted of unanesthetized dogs decompressed from ground level or 8,000-65,000 feet to 72,000 feet in 30 milliseconds. The animals wore a

full bladder pressure suit and full head helmet, and breathed from a modified MB-2 regulator. Pathologic examination revealed little or no pulmonary damage, and no clinical abnormalties were observed. Transient atelectasis probably occurred, but was "blown-out" by the high breathing pressure.

1,219

Rosenberg, I. 1962 TESTS OF PARACHUTE ASSEMBLY AND ATTACHED SURVIVAL KITS USED WITH THE F-106 MODEL "B" EJECTION SEAT.
(Air Force Flight Test Center, Edwards AFB, Calif.)
ASTIA AD-272 178, February 1962

ABSTRACT: This report presents the results of functional suitability tests conducted on parachute assemblies and attached survival kits as used with the F-106 Model "B" Ejection seat. Fifty-eight test were made during the program.

It was determined that the kits can be retained during exposure to wind-blast at indicated airspeeds up to 450 knots at 1000 feet altitude, and that the deployment line between the drag chute and the main canopy can damage the parachute pack.

1,220

Ross, H. E. 1961 A "SIT-ME-DOWN" SPACESUIT
Spaceflight 3(4):151-152, July 1961

ABSTRACT: A list of problems involved in the designing of space suits, and the author's criticism of present designs are presented. (JPL)

1,221

Ross, J. C., G. D. Ley et al 1962 INFLUENCE OF PRESSURE SUIT INFLATION ON PULMONARY DIFFUSING CAPACITY IN MAN.
In J. Appl. Physiol. 17:259-262, March 1962.

1,222

Ross, Malcolm D. 1958 NAVY INTERESTS IN SEALED CABINS
(American Rocket Society) Pub. No. 694-58

1,223

Rossbacher, R.I. and G.W. Baker 1962 STATUS SUMMARY OF FEASIBILITY STUDY OF SHAPED CHARGE SEPARATION OF THE AIRCRAFT FLIGHT CAPSULE II (Naval Weapons Lab.) NWL Report No. 1790 Jan 23, 1962

ABSTRACT: Developments since the aircraft feasibility experiments of 1959-60 are summarized. Material and assembly techniques have been developed which have been functionally tested and are considered likely to prove serviceable. Light weight laminated plastic structures have been developed which will contain the back blast. Additional safety tests are reported.

1,224

Roth, H., C.F. Lombard, A.G. Gross and A.Z. Klain 1948 STUDIES OF NEW MATERIALS FOR CONTROLLED IMPACT ENERGY ABSORPTION. (Paper, nineteenth annual meeting of the Aero-Medical Association, Toronto, Canada, June 1948) Department of Aviation Medicine, University of Southern California. Contract N6ori77, Task 1, 31 March 1951.

ABSTRACT: Utilizing newly developed impact-test apparatus enabling greatly improved resolution of force-time relations during impacts, preliminary studies were made of various materials which might find application in the protection of the human body (especially the head) against impact forces. Both theoretical analysis and experimental results demonstrated that low-density materials exhibiting largely non-resilient behavior under impact forces have definite value in design of protective equipment.

1,225

Roth, H P., C.F. Lombard, A.G. Gross, A.Z. Klain & S.W. Ames 1949 IMPACT ACCELERATION OF THE HUMAN HEAD USING PROTECTIVE HEADGEAR. (Dept. of Aviation Med., University of Southern Calif.) Proj. Nr 161 014 Progress report. 18 March 1949.

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Roth, H. P., C. F. Lombard, A. G. Gross and A. Z. Klain 1951 STUDIES OF NEW MATERIALS FOR CONTROLLED IMPACT ENERGY ABSORPTION (Office of Naval Research, Washington, D. C.) March 1951 Contract N6ori77.

SUMMARY: Utilizing newly developed impact-test apparatus enabling greatly improved resolution of force-time relations during impacts, preliminary studies were made of various materials which might find application in the protection of the human body (especially the head) against impact forces. Both theoretical analysis and experimental results demonstrated that low-density materials exhibiting largely non-resilient behavior under impact forces have definite value in design of protective equipment.

1,227

Rothwell, W.S. and E.G. Sperry 1952 FOOTRESTS ON UPWARD EJECTION SEATS. (Wright Air Development Center, Wright-Patterson AFB, Dayton, Ohio) WADC Technical Report 52-208, ASTIA ATI 184800, September 1952

ABSTRACT: Tests were conducted to determine the importance of footrests on ejection seats, using a 100 foot vertical ejection seat test tower and a mock-up which simulated the control wheel, instrument panel and rudder pedals of the B-47B pilot's position.

The paths followed by the toes and knees during ejection were varied by changing the catapult, size and weight of shoe and position of the leg at the time of ejection.

Theree principle test conditions were studied:

a. Footrests removed, feet extended on rudder bar.
b. Footrests removed, feet retracted against seat.
c. Footrests in place, feet extended on rudder bar.

Results were recorded by (a) high speed motion pictures, (b) accelerometers placed on the man's hip and on the seat, and (c) time and distance magnet displacement to measure velocity. The subject was briefly examined before and after each test.

It is recommended that footrests be included on all ejection seats, to support leg weight below the knees and to provide about 3 inches additional knee clearance during ejection.

It is further recommended that sharp leading edges on footrests be avoided in order to eliminate the possibility of leg injury when the feet are not positioned during ejection.

The security classification of the title of this report is Unclassified.

1,228

Rothwell, W. S. and E. G. Sperry 1953 ESCAPE FROM AIRCRAFT BY DOWNWARD EJECTION
J. of Aviation Medicine 24(4):322-327 August 1953

ABSTRACT: In certain aircraft downward ejection offers advantages insofar as avoidance of fixed obstacles within the cockpit or on the upper surfaces of the fuselage is concerned. It is also desirable in multiplace jet aircraft to have some crew members eject downward in order to avoid the collision hazard which might exist if all used upward ejection. The absence of protruding structures on the under surface permits the use of lower ejection velocity which may be attained with an acceleration within physiological tolerance limits for negative G. However, special problems exist regarding harness suspension and support of the extremities.

1,229

Rowen, B. 1961 BIOASTRONAUTICS SUPPORT OF THE X-15 PROGRAM. (AF Flight Test Center, Edwards AFB, California) Rept. No. FTC TDR 61-61. ASTIA Doc. No. AD-268 665.

ABSTRACT: One objective of the X-15 program is to obtain the pilot's physiological response to flight at increased speed and altitude. This objective is accomplished with the pilot wearing the new A/P 22S-2 full pressure suit in eighteen X-15 operations. The suits were evaluated for a flight time of 171 hr and a ground time of 554 hr. The A/P 22S-2 has major improvements over the original MC-2 full pressure suit with respect to increased visual area, ease of donning, and removability of gloves. A new system of electrical connections was installed through a pressure seal to facilitate data acquisition and to void the older snap pad arrangement used in the MC-2 suit. Flight test data showed that the continuous electrical lead has greatly increased reliability in data acquisition.

1,230

Roxburgh, L.H.L. 1947 A REVIEW OF ENVIRONMENTAL FACTORS AFFECTING COMFORT IN AIRCRAFT (Flying Personnel Research Committee, Farnborough, England) RPRC 686 June 1947 ASTIA ATI 96436

ABSTRACT: (1) The factors to be considered in air conditioning of an aircraft are reviewed and, where these differ from ground practice, are discussed in more detail. (2) Possible solutions to the problems of rapid climatic change are indicated. (3) An assessment is made of the desirability of air recirculation

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Roxburgh, H. L. & J. Ernsting 1956 THE PHYSIOLOGY OF PRESSURE SUITS. (Inst. Aviation Med., R.A.F., Farnborough) FPRC Rept. No. 983, Nov. 1956

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Roxburgh, H. L. 1961 BIOLOGICAL PROBLEMS OF ESCAPE AT HIGH ALTITUDES. In Bergeret, P., ed., Escape and Survival: Clinical & Biological Problems in Aero Space Medicine. (London, New York, Paris: Pergamon Press, 1961) AGARDograph 52. Pp. 1-4. ASTIA AD 261 881

ABSTRACT: Experimental work of a biological nature on escape at high altitudes is difficult to undertake, for stresses are involved which cannot be simulated in combination on the ground. At the present time, by far the most important means of escape from aircraft is the ejection seat. Escape by ejection seat at high altitude exposes the man to a series of physical insults about which our knowledge is oncomplete. Of particular interest are the following subjects: decompression, cold, and anoxia.

1,233

Royal Aircraft Establishment 1953 PARACHUTE TESTS IN AFRICA (AUTUMN, 1952) (Royal Aircraft Establishment, Farnborough) Interim Rept., M.E. Dept. Test Note

1,234

Rudeseal, P. R. 1954 HUMAN SUBJECT DOWNWARD EJECTION SEAT TESTS FROM B-47 AIRCRAFT
(Directorate of Flight and All-Weather Testing, Wright-Patterson Air Force Base, Ohio)
Tech. note no. WCT-54-100 Nov. 1954 ASTIA AD 88 324

ABSTRACT: "A series of downward seat ejection tests were conducted from the navigator-bombardier position with human subjects of a B-47 aircraft to demonstrate that this was a safe method of escape. Prior to conducting the tests with human subjects, a series of tests were performed with instrumented anthroprometric dummies to measure the force on the hands tending to break the handgrip during ejection. After the forces were determined, a shock absorbing device was installed in the handgrip system which enabled human subjects to be ejected at 425 knots IAS from 10,000 feet without injury. This proved that downward seat ejection was a feasible means of escape up to 425 knots IAS from the B-47 aircraft." (DFAWT summary)

1,235

Rudolph, J. 1952 STATIC TEST-PROTOTYPE 32G EJECTION SEAT AND RAILS-MODEL F-94C. (Lockheed Aircraft Corp., Burbank, Calif.)
Report No. 8667, July 3, 1952. ASTIA ATI 162 996

ABSTRACT: At the request of the F-94C Project Structures Engineer, static tests were conducted on the 32 G ejection seat rails. The seat was in the fully extended position during the tests. Inertia, catapult, and air loads at both low and high airplane speeds were simulated. Attention was given to the effect produced by the offset catapult.

1,236

Rudoy, B.L. 1963 THE SUIT OF THE COSMONAUT
(Translation Services Branch, Foreign Technology Div., Wright Patterson AFB, Ohio)
FTD-TT-63-189/1 28 Feb. 1963 ASTIA AD 299 858
Original Source: Russian Book: Novaya Zhizn'Stekla, Series IV, Tekhnika, Nr. 2, 1963, pp. 27-28.

ABSTRACT: The cosmonauts suit must protect him from extremely high temperatures and from radiation and gamma rays. Such a suit will be made of glass fiber fabric coated with a thin layer of aluminum. The surface of such an ultra-light weight suit reflects about 90% of the entire irradiating heat, and the remaining part of the heat is scattered in the glass fiber layer.

1,237

Ruff, S. 1937 KOPFVERLETZUNGEN BEI FLUGUNFÄLLEN, IHRE ENTSTEHUNG UND MOGLICHKEITEN ZU IHRER MINDERUNG (Head Injuries During Flight Accidents, Its Origin and Possibilities to Its Decrease)
Luftfahrtmedizin 1: 355-360

1,238

Ruff, S. 1937 UNFALLERFAHRUNGEN (Protection Against Possible Injuries Caused by Airplane Crashes) Part V of 10 parts.
March 1937. ASTIA ATI 60742

ABSTRACT: Protective measures against possible injuries to flying personnel by airplane crashes were investigated. Statistics show an overwhelming number of head injuries in airplane crashes. The causes of the injuries were investigated, and suggestions for the protection of personnel are presented. It is suggested that in addition to the crash-helmet, the pilot should be fastened to the seat by several belts (one belt around the abdomen being insufficient) The back strap should be tight enough and fastened in such a manner as to prevent a forward surge of the body. Suggestions for cockpit-seat improvements are made.

1,239

Ruff, S. 1943 ATTEMPTS AT RESCUE FROM HIGH ALTITUDES. (Versuche zur Rettung aus grossen Hoehen) ASTIA ATI-55446,

ABSTRACT: A discussion is given of the possibilities of saving air crews after loss of cabin pressure at high altitudes. Light pressure-suits which automatically inflate after loss of cabin pressure, emergency dives to lower altitudes, and parachutes as rescue measures are considered. A parachute equipped with an oxygen breathing device, and an automatic release mechanism which opens the parachute at about 13,000 feet is suggested.

1,240

Ruff, S. & R. Schroedter 1957 EINE SCHLEUDER FUR BESCHLEUNIGUNGSUNTERSUCHUNGEN (A Catapult for Acceleration Tests)
Luftfahrttechnik Pp. 38-39

1,241

Ruff, S. 1958 ÜBER BESCHEUNIGUNGSUNTERSUCHUNGEN AM MENSCHEN (Concerning Acceleration Investigations on Humans)
Deutsche Versuchsanstalt für Luftfahrt Rept. 902

1,242

Ruseckas, J. A. 1962 DEVELOPMENT OF FLYING OUTFIT, FULL PRESSURE, HIGH ALTITUDE TYPE A/P 22S-2.
(Aeronautical Systems Division, Air Force Systems Command, Andrews AFB, Washington, D. C.) AF33(600)36525, ASD-TR-61-469, March 1962.
ASTIA AD 329 373.

ABSTRACT: Increased capability in range, altitude and speed of military aircraft necessitated the development of an improved full pressure, high altitude flying outfit. This report describes the efforts, methods of approach and solutions to problems encountered in developing one type of pressure garment.

In addition to the changes in position of the diaphragm, pressurization of the anti-blackout suit increased the overall intrarectal pressure by an amount sufficient to support a column of blood from any point in the abdomen to a level above the diaphragm without a contribution by the vascular walls.

The overall increase in intrarectal pressure appeared to be produced by increased tension or stretching of the diaphragm.

The distance from the base of the heart to the base of the skull was reduced by an amount sufficient to provide a protection of about 0.5 g during exposure to 5 g.

In addition to this mechanism for protection there is probably an increase in blood pressure at heart level to account for the remainder of the protection produced by the anti-blackout equipment.

1,243

Russian Press 1937 RUSSIAN METHODS: PHYSICAL TRAINING OF FLYING PERSONNEL, GLIDER PILOTS AND PARACHUTISTS.
(RAF, Institute of Aviation Medicine, Farnborough)
FPRC Report 30,

1,244

Ryabchikov, Ye 1962 IN THE CITY OF "THE CELESTIAL BROTHERS" (Translation Services Branch, Foreign Technology Div., Wright-Patterson AFB, Ohio) FTD-TT-62-1583/1+4 9 Nov. 1962 ASTIA AD 292 600 Original Source: Pravda August 7, 1962, P. 4

ABSTRACT: This article gives a brief description of the temperature chamber, pressure chamber, and silence chamber used in the training of Russian cosmonauts. It also describes the cosmonauts' experiences in the centrifuge, weightless basin, and the training panel.

1,245

Ryan, J. J. & E. R. Podnieks 1958 SAFETY DEVICES FOR GROUND VEHICLES. (Automotive Safety Research Project, Univ. of Minnesota, Minneapolis, Minn.) USAF Rept., 31 July 1958.

1,246

Ryan, J. J., & E. R. Podnieks 1958 SAFETY DEVICES FOR AUTOMOTIVE VEHICLES. (Automobile Safety Research Project, University of Minnesota) 31 July 1958

1,247

Ryan, James J., and Egons R. Podnieks July 1958 FINAL REPORT OF RESEARCH ON SAFETY DEVICES FOR GROUND VEHICLES. (Air Force Missile Development Center, Holloman AFB, N. Mex., 31 July 1958)

1,248

Ryan, J.J., & J.P. Stapp 1959 HUMAN EXPERIMENTS ON AIR TRANSPORT CRASH PROTECTION. (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: Modulated Deceleration. It has been found in experimental tests with human subjects on the principle of the hydraulic cylinder and piston for controlled attenuation that: (1) Hydraulic shock absorbers afford maximum protection to human occupants upon crash; (2) inherent design makes possible protection for different loads, speeds and displacements; and (3) maximum energy absorption is provided with minimum weight, complexity and modification.

Applicability on Air Transports. Although the human tests were made with the automobile as the research vehicle, including restraints accompanied by quick retraction of dangerous projections, the hydraulic energy absorber may be applied in air transport crash protection as follows: (1) attachment to seat tracks in a jet airliner; (2) distribution of absorber forces in aircraft structure; and (3) individual absorbers on seat supports. This paper includes calculations, designs and conclusions for maximum human protection in aircraft utilizing hydraulic shock absorbers. (J. Aviation Med. 30(3):201, March 1959)

1,249

Ryan, J. J. 1960 AUTOMATIC SEAT BELTS
(Univ. of Minnesota, May 9-11, 1960)

ABSTRACT: In this paper, it is suggested that if automatic seat-belts were installed in automobiles the public would be glad to utilize them as an injury prevention device. The automatic seat-belts are attached to the seat by a mechanism which continually keeps them retracted to the rear of the seat in proper position for immediate use. When the ends of the seat-belt on each side of the passenger are clasped and pulled forward slowly, the belt may be easily fastened in front. If the belt is pulled rapidly the automatic locking device clamps it. The driver is not restrained in forward, lateral, or rotary motion. When the buckle is released the two ends of the seat-belt retract to the back of the seat. If a sudden force is applied by the body on the seat-belt as in an accident the belt is locked tight and the passenger is restrained securely. Several safety factors are added to the seat locking device to insure protection. The seat is anchored to the floor with cables in such a way that it may only move for the adjustments established by the car manufacturers. The use of automatic seat-belts will prevent the distaste observed by the present haphazard arrangement and will allow convenience and security.

1,250

Ryan, James J. 1960 SAFETY DEVICES FOR GROUND VEHICLES
U.S. Department of Health, Education and Welfare, Public Health Service, National Institutes of Health Grant # RG-6284 (C-1) April 1, 1959-September 1, 1960

ABSTRACT: The primary object of this research is the investigation of means to reduce injury and death caused during automotive accidents. The high frequency of crashes make imperative the development of methods for most effectively decelerating the vehicle and properly packaging the occupants. Equipment has been developed for the evaluation of the hydraulic shock-absorbing bumper and the seat belt assembly so essential in accomplishing these goals. Preliminary testing and modification of these devices is

performed on the Project's machine for applying high-impact loads. The data obtained from human tests with seat belts is applicable to most endeavors utilizing human limitations in deceleration. The tests have shown the similarity of the dynamics of a human with an equivalent mechanical figure and have pointed out the effectiveness of force measurement by models in place of a human. The tests have also shown the forces that must be resisted under conditions of deceleration which are established up to the limit of material strengths. The determination of the magnitude of the forces humans can withstand about the pelvic regions and the chest is of great importance and will be sought by further studies.

1,251

Ryan, J.J. 1961 HUMAN CRASH DECELERATION TESTS ON SEAT-BELTS. (Paper, Annual Meeting of the Aerospace Med. Assoc., Chicago, Ill., 26 April 1961)

ABSTRACT: Tests have shown that seat-belt forces applied to the human subject in deceleration are sinusoidal in character, are determined by the natural frequency of the spring-mass system and by damping, and are dependent upon the time history of the forces applied at the belt connections. The development of favorable seat-belt characteristics is described. The limiting forces are dependent upon the ability of the pelvic bone system to transmit the sinusoidal rearward and downward forces exerted by the belt on the body. A secondary problem is the rotation of the upper torso about the seat-belt after impact. The results of these force applications from tests are noted. Criteria of aircraft design are suggested to allow maximum impacts without immobilizing injury, permitting immediate evacuation. (Aerospace Med. 32(3):246, March 1961)

1,252

Ryan, J.J. 1962 AUTOMOTIVE HUMAN CRASH STUDIES
In Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, Pp 345-354

ABSTRACT: The development of safety devices for vehicles has required research into the application of engineering principles for the mechanical reduction of impact forces. It has been shown that the forces exerted on a human supported by a seat-belt may be reduced four times through proper engineering design of the vehicle and the belt. Further studies with human beings in the seat-belt environment using the apparatus available require an extension of the engineering with bio-physics and applied medicine.

1,253

Ryan, J.J. 1962 CRASH DECELERATION TESTS WITH HUMAN SUBJECTS (Paper, Fourth Annual Meeting of the Human Factors Society, Boston, Mass., Sept. 14, 1960)

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Ryan, J.J. 1962 MECHANICAL REDUCTION OF IMPACT FORCES BY AUTOMOTIVE DESIGN. (Presented before the Annual Meeting of the American Med. Assoc., New York, 27 June 1961) Published in Research Review 6(2):1-37 by the National Safety Council, Chicago, June 1962.

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Ryan, J.J. 1962 REDUCTION IN CRASH FORCES. In Cragun, M.K., ed., The Fifth Stapp Automotive Crash and Field Demonstration Conference, Sept. 14-16, 1961. Pp. 48-89

1,256

Rye, J.R. 1949 QUALIFICATION TESTS OF A PILOT'S SEAT ACTUATING CYLINDER (152-58037) FOR AIR FORCE APPROVAL. (North American Aviation, Inc., Los Angeles, Calif.) Report no. NA-49-174, ASTIA ATI-59336, March 1949

ABSTRACT: Qualification tests were requested on a pilot's seat actuating cylinder designed for the F-86 fighter. With the exception of the low temperature test, all tests were conducted with AN-0-366 specification hydraulic oil. For the low temperature test (-65°F), the actuating cylinder was made of parts with dimensions that allowed minimum clearances and were within 10% of the worst conditions the prints allowed. The finishes on sliding surfaces were determined on a Profilometer and found to be within the tolerances the prints allowed. It was concluded that the actuating cylinder satisfactorily passed qualification tests in accordance with the requirements of specification AN-C-66.

RESTRAINT, PROTECTION, AND EMERGENCY ESCAPE SYSTEMS

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1,257

Sabbagh, E.N. 1956 PERFORMANCE CHARACTERISTICS OF CUSHIONING MATERIALS IMPACTED UNDER A HEAVY WEIGHT HIGH IMPACT SHOCK MACHINE. (Lowell Technological Institute Research Foundation, Mass.) Rept. for Dec. 1954- June 1955, Contract No. AF18(600)-127, Rept. No. TR-55-229, Feb. 1956. ASTIA AD 90 856

ABSTRACT: The energy absorption characteristics of cushioning materials impacted under a heavy-weight high-impact shock machine (AD 90 917) are reported as analyzed by an analog computer system. Test specimens were fabricated in the shape of circular cylinders; the diameter of the circular bases was 24 in. and the thickness of the specimen was either 2, 4, or 6 inches. Specimens for tests at standard conditions were stored for 5 days on racks in an air-conditions testing room at 70 degrees F and 56% RH. Cushioning materials tested at -67 degrees F and 160 degrees F were conditioned in a temperature chamber for 3 to 4 hours prior to testing. The impacting hammer had a static weight of 1.28 psi over the area of the sample throughout the tests. The velocity of the hammer at the time of initial contact varied from 20 to 50 fps in increments of 5 fps. Graphs of energy are presented for 36 materials. Test results are also given in tabular form for certain values of thickness and velocity in order to present strain data, values of resilience, and other information. Results for 15 additional materials, for which insufficient quantities were available for complete tests, are also presented in tabular form. The tests show that the expanded polystyrenes are the best energy absorbers. Wood fiberboard, high-density wool pads, and cane fiberboard, respectively, follow the expanded polystyrenes in energy absorbing capacity.

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Salter, N. 1952 THE EFFECT OF DEGREE OF ELBOW FLEXION ON THE MAXIMUM TORQUE DEVELOPED IN PRONATION AND SUPINATION. J. Anatomy 86:197-202.

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Sandborg, H. 1959 EJECTION SEAT FOR SUPERSONIC SPEED. Medd. Flyg Navalmed Namnd 8(2):22-3

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Santa Maria, L.J. 1958 THE EFFECTS OF VENTILATING AND HIGH AMBIENT TEMPERATURES ON FLOW RATES NECESSARY TO MAINTAIN COMFORT IN A FULL PRESSURE SUIT Jour. Aviation Med., 29(3):249, March 1958

ABSTRACT: A study was made of the effects of ventilating and high ambient temperatures on the ventilating flow required for maintenance of comfort in subjects wearing a full pressure suit. Total and evaporative heat loss, mean skin temperature, and rectal temperature were measured in 3 subjects maintained for 2 hours at a simulated altitude of 18,000 feet, with ambient temperatures of 150°, subjects were thermally comfortable with ventilating flow rates averaging 800 liters/minute. With 90° ventilating air, flow rates as high as 900 liters/minute were inadequate to maintain thermal comfort.

1,261

Santi, G.P. 1948 EJECTION FLIGHT TESTS CONDUCTED WITH P-82B AIRPLANE AT MUROC ARMY AIR FIELD (Air Material Command, Wright Field, Dayton, Ohio) Memorandum Report No. MCREXA 7-45341-3-5. 10 May 1948, ATI 63579

ABSTRACT: A series of twenty flight tests were conducted with regard to human- and dummy-subject pilot ejection from a TF-80C fighter airplane. Five of these tests were conducted with a human subject. A modified Lockheed Aircraft Corporation ejection seat equipped with the M-1 aircraft personnel catapult was used. Satisfactory ejection of a pilot with gear totaling approximately 300 lb can be accomplished from an airplane in flight up to indicated airspeeds of at least 500 mph. The stabilization parachute functioned satisfactorily in initiating operation of the automatic-parachute and safety-belt accessory equipment.

1,262

Santi, G. P., T. C. Hill, & V. Mazza 1949 PILOT EJECTION FLIGHT TESTS CONDUCTED WITH A TF-80C AIRPLANE AT MUROC AND HAMILTON AF BASES. (Air Material Command, Wright-Patterson AFB, Ohio) Rept. No. MCREXA-7-45341-4-1, Aug. 15, 1949

1,263

Santi, Gino P. 1953 FLIGHT TESTS OF DOWNWARD AND REARWARD EJECTED SEATS CONDUCTED WITH A B-29 AIRPLANE (Wright Air Development Center, Wright-Patterson Air Force Base, Ohio) WADC TR 53-360 ASTIA AD 76 427

ABSTRACT: A series of 29 tests was conducted to investigate downward and rearward ejection of aircrew personnel as methods of emergency escape from disabled aircraft. All the tests were made in flight from a B-29 airplane. Tests data was obtained from recording instruments and photographic airplanes.

The results show that these methods of escape are feasible and should be further investigated.

The tests were conducted by personnel of the Aircraft Laboratory, Wright Air Development Center, at Edwards Air Force Base in February and March 1947.

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Santi, G.P. 1955 ACCELERATION PROBLEMS IN EJECTION-SEAT DESIGN. In U.S. Assistant Secretary of Defense (Research and Development) Washington D.C., Shock and Vibration Bulletin No. 22 Supplement. ASTIA AD 94 697

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Santos, F. R. 1951 PROBLEMAS MÉDICOS DA SAÍDA DE EMERGÊNICIA DOS AVIÕES DE GRANDE VELOCIDADE (Medical problems of Emergency Escape From High Speed Aircraft) Imprensa Medica, (Rio de Janeiro) 27:81-92, Feb. 1951

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Santos, F. R. 1952 SALTO PARAQUEDAS, DECISAO E PROBLEMAS. (PARACHUTE JUMPING: DECISION AND PROBLEMS) Imprensa medica, Rio de Janeiro 28(459):51-67

ABSTRACT: The decision to bail out from an airplane is influenced by factors related to the aircraft (type, condition, position in the air, velocity, and degree of maneuverability), by factors related to the altitude (degree of anozia, temperature, and distance from anti-aircraft fire in combat), by terrain features, and by atmospheric conditions. Factors determining the degree of safety during the jump are as follows: acceleration during free fall, deceleration during opening of the parachute, and impact on hitting the ground.

An analysis of 50 fatal instances (17.5%) out of 400 emergency bailouts revealed the following causes: (1) bailout elevation was too low, 48%: (2) the parachute got caught in the plane, 10%; (3) the subject was hit by the plane during fall, 20%; (4) other causes (parachute was improperly adjusted prior to jump, parachute caught fire from burning plane, drowning of airman), 22%. Bone fractures on hitting the ground occurred three times less in experienced parachute jumpers than in those who had never jumped. In conclusion, the most important reasons for the unsuccessful outcome of emergency bailouts are summarized.

1,267

Saul, E. V., M. W. Raben, L. B. Seronsy, L. Weiner, et al. 1958 HUMAN ENGINEERING BIBLIOGRAPHY. 1956 - 1957. (Naval Engineering Psychology Branch, Office of Naval Research, Wash., D. C.) Contract NONR 494(13), ONR Rept. ACR 32, Oct. 1958

ABSTRACT: Personnel responsible for the human factors considerations in the design and development of equipment have a major need for rapid and easy access to the literature pertinent to their work. This bibliography is one of a planned series of annual bibliographies of literature pertinent to human engineering designed to meet this need. There are five main parts: 1) a topical outline that defines over 300 topic headings, 2) an index that relates the bibliographic entries with the topic headings, 3) an alphabetic index of search terms, 4) an annotated bibliography, and 5) an index of authors.

1,268

Saul, E. V. 1959 HUMAN ENGINEERING BIBLIOGRAPHY, 1957 - 1958 (The Project Staff, Human Engineering Information & Analysis service, Institute for Applied Experimental Psychology, Tufts University) ONR 1 RT ACR-43; ASTIA AD-235 970: Oct. 1959

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Savely, H.E., W.H. Ames, & H.M. Sweeney 1946 LABORATORY TESTS OF CATAPULT EJECTION SEAT USING HUMAN SUBJECTS. (AMC, Wright Field, Dayton, Ohio). Memo Rept. TSEAA 695-66C Oct. 1946. ASTIA ATI 119947

ABSTRACT: The purpose of this report is to present the results of ejection seat experiments on the 30-foot test tower using the T2 catapult. Successful

utilization of the present type catapult ejection seat requires a solution to the following problems: (a) Reduction of the added acceleration imposed on the occupant because of the effects of cushioning, compression of the body, and slipping forward in the seat. (b) Provision of safeguards against extreme flexion or extension of the neck during the ejection stroke. Before human subjects are used with the next higher fractional charge of cartridges of Type IOW 6030-S, namely the 67.7-gram charge, either in aircraft or in experimental tests, a larger number of subjects should be used with the lower fractional charges in order to find a solution to the problems detailed in this report. An indoctrination program involving ejection on a test tower should be required of all personnel flying airplanes equipped with ejection seats. The two 100-foot test towers now under construction will provide experimental conditions more nearly simulating those in aircraft.

1,270

Savely, H. E., & W. H. Ames 1948 ARM RESTS ON EJECTION SEATS. (Air Technical Service Command) TSEAA 695-66 G, Jan. 1948.

ABSTRACT: Experiments were conducted to find the preliminary measurements of the body mass supported by arm rests during seat ejection. It was found that arm rests on ejection seats are beneficial in relieving the lower back of a significant portion of the load resulting from acceleration from seat to head.

1,271

Savely, H.E. 1952 HUMAN PROBLEMS IN ESCAPE FROM HIGH-SPEED AIRCRAFT. Air Univ. Quart. Rev., 5(2): 65-67.

ABSTRACT: (1) The use of high-pressure masks, breathing helmets, and elastic vests has proven disadvantageous (painful distension of unprotected facial areas, pooling of blood in the limbs, leakages through the masks). - (2) Determinations of human acceleration tolerance by means of catapult devices revealed that an average of 20 g's for 1/10 second, or 25 g's for .01 second is withstood without injury. The rate of application of the ejecting force has an influence on the interaction between man and seat; slower application of force will make higher ejection velocities tolerable. (3) Measurements carried out on the linear decelerator (deceleration cart) have shown that man can tolerate up to 45 g's wearing a simple crash harness. The rate of application of the decelerating force determines again the effect on the human organism (shock signs were observed at deceleration rates of 1360 g/sec., while a rate of 493 g/sec. caused no ill effects at decelerations up to 40 g). Experimental investigations of decelerations of longer duration with the body rotating in one or more planes are still outstanding. (4) Wind-blast effects were measured under simulated conditions in wind-

tunnel tests on unprotected humans at wind speeds up to 425 m.p.h (normal bailouts) and up to 470 m.p.h (test seat ejections). Blasts at sonic speeds were directed at dummies wearing an A-13A oxygen mask and U.S. Air Force F-3 helmets. Tissues of the body protected from the direct force showed no ill effects. Medium-weight winter flying clothing affords ample protection against high-altitude temperatures (up to 80,000 ft.)

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Savely, H.E. 1955 THE PHYSIOLOGY OF ESCAPE
(Paper, Symposium on Escape from High Performance Aircraft, Oct. 1955.)

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Savely, H.E., & J.P. Henry 1957 A NEW LOOK AT AVIATION PHYSIOLOGY
J. Aviation Med. 28(6):531-534

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Savory, D.J. and A.E. White 1961 QUALIFICATION TESTS AND ANALYSES INITIATORS, CARTRIDGE ACTUATED, T25 and T26. (Frankford Arsenal, Philadelphia Pa.) WADD TR 59-309, ASTIA AD-258 548, March 1961

ABSTRACT: Tests were conducted to determ ine whether the miniaturized T25 and T26 initiators satisfied the performance requirements for the larger M3 and M5A1 initiators they are intended to replace. The T25 and T26 initiators were subjected to a complete qualification test program consisting of the following tests; safety pin pull, drop, low temperature ignition, locked-shut safety, performance, primer indent, environmental, and water immersion. The performance of these initiators during the tests was evaluated and compared with the performance characteristics of the M3 and M5 initiators. The average performance of the T25 and T26 initiators matches or exceeds that of the M3 and M5A1 design requirements and specifications. It is recommended (1) that the T25 and T26 inntiators be standardized for use in aircraft escape systems after modification of the T289 cartridge to meet pressure differential requirements, and (2) that the mounting ears on the initiator caps be lowered to provide a more convenient mounting surface, similar to that of the M3 initiator. (Author)

1,275

Schafer, Howard C. COLD-WEATHER ENVIRONMENTAL TESTS OF ROCKET CATAPULT MK 2 MOD 0 (AIRCRAFT EJECTION SEAT)
(U. S. Naval Ordnance Test Station, China Lake, Calif.) NAVWEPS Report 7875 NOTS TP 2858 May, 1962 ASTIA AD 275430

ABSTRACT: A series of cockpit environmental tests was conducted on one model of a rocket catapult used for pilot ejection to check winter temperature parameters. Major results are reported on the temperature environment thin the cockpit of an F9F aircraft in an arctic environment. Severe low temperatures were obtained by keeping the canopy snow- and ice-free during part of the test period, which included the coldest part of the Alaskan winter.

This report includes three tables and three graphs. Weather parameters are touched upon, as they tended to decrease minimum cockpit temperatures. Vertical temperature gradients on the rocket catapult are discussed.

1,276

Schellong, F. & M. Heinemeir 1933 ÜBER DIE KREISLAUFREGULATION IN AUFRECHTER KÖRPERSTELLUNG UND IHRE STÖRUNGEN (Concerning the Circulatory Regulation in Perpendicular Body Position and Their Disturbances)
Zeitschrift für die gesamte experimentelle Medizin (Berlin) 89: 49-60

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Scher, S. H. 1948 PILOT ESCAPE FROM SPINNING AIRPLANES AS DETERMINED FROM FREE-SPINNING-TUNNEL TESTS
(U. S. National Advisory Committee for Aeronautics, Washington, D.C.) Research Memo No. L8D28, Sept. 9, 1948

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Scher, S. H. & L. J. Gale 1949 WIND-TUNNEL INVESTIGATION OF THE OPENING CHARACTERISTICS, DRAG, AND STABILITY OF SEVERAL HEMISPHERICAL PARACHUTES.
(National Advisory Committee for Aeronautics, Washington, D. C.) NACA Tech. Note 1869.

ABSTRACT: An investigation has been conducted to determine the opening characteristics of several hemispherical parachutes and to study influence of the parachute design variables on these opening characteristics. The effects of design variables on the drag and stability characteristics of the parachutes were also evaluated

1,279

Scher, S.H. 1951 PILOT ESCAPE FROM SPINNING AIRPLANES AS DETERMINED FROM FREE-SPINNING-TUNNEL TESTS. NACA TN 2485 Oct. 1951

ABSTRACT: Procedure for pilot escape from spinning airplanes has been determined by means of tests in which pilot escape was simulated from 21 airplane models spinning in the Langley 20-foot free-spinning tunnel. The results in general indicated that the pilot should bail-out of the outboard side. Calculated centripetal accelerations acting on the pilot during a spin are presented

1,280

Scherberg, M.G., & H. Ferguson 1952 INVESTIGATION OF THE ACCELERATION AND JOLT HISTORIES DURING ESCAPE FROM HIGH SPEED AIRCRAFT (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 52 278, Oct. 1952. ASTIA AD 5010.

ABSTRACT: Accelerations having short durations (less than 5 sec) and orders of magnitude above 2 g were represented by the equation of motion, $X = K \times 2$, where $\ddot{x}$ and $\dot{x}$ are the velocity and acceleration, respectively, and K is a positive constant. Calculations of the maximum acceleration expected at a given time (t) after the initiation of escape were made to obtain upper bounds for escape acceleration histories depending only on the initial velocity of escape. Graphs of these upper bounds are given for t = 0.5 to 4.0 sec and for initial speeds at 200-mph intervals, from 400 to 1800 mph. For upper bounds from t- 0.0 to 0.5, the method was not applicable; an alternate method is given for these values. Graphs which show the rate of onset of acceleration (defined as a jolt and represented by the third derivative $\dddot{x}$)as a function of the initial acceleration are included for initial speeds from 400 to 1800 mph in 200-mph intervals. Contrary to the upper-bound results, the jolt results appeared to be valied at transonic and supersonic as well as at sub-sonic speed. However, they measured only the jolt caused by acceleration decay. The accelerations parallel and normal to the spine of a person in a tumbling escape unit were calculated for an assumed hypothetical case. These alternately increasing and decreasing accelerations caused a shaking phenomenon which may be beneficial to the escaping person.

1,281

Scherlis, S., & E.C. Andrus 1943 STUDIES ON THE INFLUENCE OF PNEUMATIC LEGGINGS UPON THE FLOW AND DISTRIBUTION OF BLOOD. CAM No. 115, 18 Feb. 1943.

ABSTRACT: Used from 4 to 34 subjects for different procedures.
(a) Inflation of leggings either with or without simultaneous inflation of an abdominal belt produces no circulatory change except a transient, significant rise in venous pressure in arms.
(b) Inflation of leggings either with or without a belt has a very favorable effect on circulatory changes produced by 1 "g" on the tilt table. (1) Fall in arterial pressure is prevented. (2) Cardiac acceleration is prevented. (3) Cardiac output is sustained.
(c) The mechanism of this action is thought to be as follows: (1) External pressure of leggings is transmitted to veins and opposes hydrostatic congesting pressure there. (2) Normal peripheral resistance in arterioles is increased, and constriction is necessary to maintain cerebral blood flow.
(d) Under gravitational forces greater than 1 "g", belts and leggings would probably be inadequate, might even prove detrimental by opposing venous return from the legs. Also under high gravitational force, more pressure is needed, theoretically, around the calves than around the thighs. This differential is not provided by leggings.
(e) It is suggested that the tilt table is a valuable testing instrument for anti- "g" devices.

1,282

Schleicher, R.L. 1947 STATIC TEST PILOT'S AND CO-PILOT'S EJECTION SEAT FOR THE MODEL B-45A AIRPLANE -NAA MODEL NO. NA-147 (North American Aviation, Inc. Los Angeles Calif.) Report NA 47-1207 ASTIA ATI- 102369, December 1947

ABSTRACT: Tests were conducted to static load the pilot's and co-pilot's ejection seat and to demonstrate that the strength of the seat was sufficient to meet the requirements as outlined in the A.A.F. Specification No. 25279. A production type pilot's and co'pilot's ejection seat fabricated per N.A.A. Drawing No. 147-53025 was used in the tests. The seat was supported at the catapult gun attachment and by the rollers. Loads were applied by hydraulic struts and metal straps except in the down load on the seat back in which case lead weights were used. In each test condition loads were applied in increments of 20, 40, 60, 66-2/3, 80, 90, and 100% of design load. Photographs were taken of each condition at 100% design load. The tests reported herein, show that the pilot's ejection seat (147-53025) meets the strength requirements of A.A.F. Specification No. 25279.

1,283

Schleicher, R.L. 1948 CASTING CLASSIFICATION - BRACKET ASSEMBLY - PILOT'S EJECTABLE SEAT ROLLER ATTACHING (147-53034 (A) FOR THE MODEL B-45A AIRPLANE -NAA MODEL NO. NA-147. (North American Aviation, Inc., Los Angeles, Calif.) Report No. NA-48-788, ASTIA ATI-114 626, July 1948

ABSTRACT: The test was conducted to establish by static test the classification for x-ray inspection of this casting in accordance with the Army Handbook for Airplane Designers, Volume I, Eight Edition, Revision 7, including Amendment #2. The specimen and set up included one magnesium alloy sand casting, Spec. AN-QQ-M-56 comp. A condition HTA tested for the conditions shown to be critical by the design stress analysis. The casting was supported in a steel jig, which simulated the airplane structure, and was loaded by means of two hydraulic struts. The tests results showed there was .005" deflection at limit load and no indication of yield after limit load of 4100# was removed. At design ultimate load of 6150 there was .010 deflection and no indication of failure.

1,284

Schleicher, R.L. 1948 CASTING CLASSIFICATION BASE ASSEMBLY - NAVIGATOR'S SEAT (147-53107 (A) FOR THE MODEL B-45A AIRPLANE - NAA MODEL NO. NA-147. (North American Aviation, Inc., Los Angeles, Calif.) ASTIA ATI 114 800, July 1948

ABSTRACT: Classification for X-ray inspection of this casting in accordance with the Army Handbook for Airplane Designers was established by static test. Test results showed a .011" deflection at limit load and no indication of yield after limit load of 1377# was removed. At design Ultimate load of 2066# there was .022" deflection and no indication of failure. Results showed this casting to be in Class A-1.

1,285

Schmidt, I. 1938 BIBLIOGRAPHIE DER LUFTFAHRTMEDIZIN. (Bibliography of Aviation Medicine)
(Berlin: J. Springer, 1938)

ABSTRACT: The first volume of an important bibliography, covering the literature in aviation medicine and high-altitude research up to the end of the year 1936. Constitutes a survey of world literature on the subjects of psychophysiology of the flier, altitude research, acceleration research (including centrifugal forces parachute jumping, and air sickness), accidents, effects of sound, fatigue, flying sickness, flying fitness and aviation hygiene.

1,286

Schmidt, I. 1943 BIBLIOGRAPHIE DER LUFTFAHRTMEDIZIN. ZWEITE FOLGE. EINE ZUSAMMENSTELLUNG VON ARBEITEN UBER LUFTFAHRTMEDIZIN UND GRENZGEBIETE, 1937 BIS ENDE 1940. (Bibliography of Aviation Medicine, Part Two). Luftfahrtmedizin Vol. 8, No. 1, March 1943.

ABSTRACT: The second volume of an important bibliography, covering the literature in aviation medicine and high-altitude research through the years 1937 to the end of 1940. Constitutes a survey of world literature on the subjects of psychophysiology of the flier, altitude research, acceleration research (including centrifugal forces, parachute jumping, and air sickness), accidents, effects of sound, fatigue, flying sickness, flying fitness and aviation hygiene.

1,287

Schmidt, I. 1948 BIBLIOGRAPHY OF AVIATION MEDICINE. VOLUME III. (Incomplete) (School of Aviation Medicine, Randolph Air Force Base, Texas)

ABSTRACT: A compilation of reports pertaining to Aviation Medicine and its borderline fields, covering the years 1941 through 1945, and including supplementary references for the year 1940.

After the present material had been supplemented above all by Anglo-American literature, it was supposed to be published as the third volume of the "Bibliographie der Luftfahrtmedizin". But the war prevented its completion. As we believe that these references will be of interest to many an aeromedical scientist they will be disseminated for public use. The references concern first of all German publications, but include also those foreign papers which have been accessible. Anglo-American references have been omitted, since they are all listed in the "Bibliography of Aviation Medicine" by E. C. Hoff and J. F. Fulton.

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Schmidt, R. V., et al. 1961 PASSENGER SAFETY AND COMFORT CRITERIA STUDY IN DYNAMIC ENVIRONMENTS. (Northrop Corp., Norair Div., Hawthorne, Calif.) PB-67, Sept. 1961

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Schneider, J. 1950 PROTECTIVE EQUIPMENT FOR THE FLIER. German Aviation Medicine, WW II (Dept. Air Force, 1950) I, 645-648

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Schneider, J. 1950 PROTECTIVE MEASURES FOR THE PREVENTION OF INJURIES, ESPECIALLY SPINAL FRACTURES IN AIRCRAFT ON SKIDS. German Aviation Medicine, WW II, pp. 612-614.

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Scholander, P.F. 1943 FINAL REPORT ON TEST OF ANTI "G" DEVICES FOR PILOTS (ANTI-BLACKOUT DEVICE) (Elgin Field, Proof Dept.,AAF Proving Ground Command) Serial No. 7-43-9., 4 Nov. 1943.

ABSTRACT: (a) The Berger Bros. gradient pressure suit and the Clark Wood arterial occulusion suit were compared by 24 experienced pilots. Both suits were effective in preventing blackout up to 8 to 9.5 "g" in planes. Both effectively prevent "g" fatigue.
(b) When 2 to 3 "g" are held continuously for two to ten minutes, the AOS produces severe pain or distracting discomfort in the limbs. No discomfort is produced by the GPS when 2 to 3 "g" are held continuously for 20 minutes. Hence the GPS is preferred by most pilots. Both suits are comfortable when worn outside aircraft and offer good flotation.
(c) The GPS pressure equipment operates satisfactorily from the standard instrument vacuum pump with special oil filter in tests up to 33,000 feet. The few failures encountered in the tests could be easily prevented in the future. The AOS requires an electric motor, pump, and switch to power it. Serious failures in the powering devices occurred. Out of 4 pumps tested, one was completely broken in the process and 2 partially broken.
(e) Very good photographs of the GPS and AOS are included, also photograpsh and diagrams of the two valves and graphs of their performance at altitude.

1,292

Scholander, P.T. 1944 TEST OF IMPROVED PILOT COMFORT IN FIGHTER TYPE AIRCRAFT. (Army AF Proving Ground Command, Eglin Field, Fla.) ASTIA ATI-83234, 26 January 1944

ABSTRACT: Four (4) test flights in a BC-1 airplane and eight (8) test flights in P-51B airplane showed that sitting in a hammock type seat, carrying parachute and dinghy, offers a considerable comfort during long sustained flights (1 to 4-3/4 hours) and is secure during acrobatics.

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Schreuder, O. B. 1951 MEDICAL RESEARCH MUST CONTINUE TO DEVELOP PROTECTIVE EQUIPMENT FOR THE HUMAN PILOT. Tech. Data Digest 16:2, May 1951.

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Schroeder, H. A. 1951 PREVENTION OF INJURIES DUE TO CRASH. J. Avia. Med. 22:306-311, Aug. 1951

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Schroers, R. 1951 SOME DEVELOPMENT FOR GREATER CRASH SAFETY IN AIRCRAFT (Civil Aeronautics Administration) Oct. 1951

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Schroers, R. J. 1952 SOME DEVELOPMENTS FOR GREATER CRASH SAFETY IN AIRCRAFT
SAE Quarterly Transactions 6:241-251, April 1952

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Schwarz, E.R., & W.J. Hamburger 1946 IMPACT INVESTIGATION ON TEXTILE MATERIALS. (Textile Div., Massachusetts Institute of Technology, Div. of Industrial Cooperation Contract #2-6343; Fabric Research Laboratories, Inc., Contract #C45589; U.S. Army Air Corps, Materiel Div., Wright Field, Dayton, Ohio, Order #N33-038 AC-12462) June 30 , 1946, ASTIA ATI No. 87219

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1,298

Schwarz, E. R., et al. 1946 IMPACT INVESTIGATION ON TEXTILE MATERIALS. (Textile Div., Mass Inst. of Technology, Div. of Indl. Cooperation) Progress Rept. No. 11, 10 Sept. 1946

1,299

Schwichtenberg, A.H. 1961 MEDICAL ASPECTS OF SPACE FLIGHT
Ann. Rev. Med. 12: 299-322, 1961

ABSTRACT: A great deal of research has been conducted in the field of space flight travel. However, the application of the knowledge gained from the research has been slow because of the lack of communication among the scientists, engineers, and physicians. There are many medical implications that can be attributed to various flight stresses. The author discusses the flight stresses as well as commenting on selection of astronauts, function of man in space, and man-machine relationships.

1,300

Seiker, H. O., E. E. Martin, O. H. Gauer & J. P. Henry 1953 A COMPARATIVE STUDY OF TWO EXPERIMENTAL PNEUMATIC ANTI-G SUITS AND THE STANDARD USAF G-4A ANTI-G SUIT.
(Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC-TR 52-317, Feb. 1953.

1,301

Self, T. M. 1951 MATS ADOPTS REARWARD SEATING
Aviation Week 54(26):59-60, June 25, 1951

ABSTRACT: Military Air Transport Service announces that all the future transport planes it orders will be equipped with seats facing the rear of the plane. MATS carried members of the Aviation Writers Association to their annual convention in New York in the first Boeing C-97 to be fitted with permanent rearward-facing seats; 20 more C-97's are to be similarly outfitted.

Thirty pairs of double folding seats, arranged in two rows, are built to withstand 16 G. Built according to designs by the Aero Medical Laboratory of the Air Force's Air Materiel Command, at first glance they seem rather

spare. They have only an inch-thick foam rubber cushion over contoured seat and back pads, and arm rests, and another small pad at the back of the head. But they actually are more comfortable and less fatiguing than the deep cushions used on commercial aircraft.

The primary object of the seats is safety. Crash deceleration is absorbed by entire back, neck, and head, and parts of the arms and legs. Laboratory tests show the body can take 40 G for short periods without injury.

Some transport manufactureres are afraid of the psychological factors involved in rearward seating. The two main arguments: (1) Passengers will wonder why all planes are not equipped with them, will be nervous about flying in ships with present forward-facing seats, and will be too crash conscious; (2) Americans are used to facing forward and will resist any change. A foreign flag carrier spokesman discounts both these arguments. The British and Australians have used rearward seating for some time with success. The Airworthiness Division of ICAO has decided to continue rearward-facing seats as a recommended project. International Air Transport Assn. feels the idea is theoretically sound but wants evidence of benefits counterbalancing the cost and effort involved.

MATS' recent switch is a result of five years' investigation and development by the Air Materiel Command in conjunction with MATS. (Journal of Aviation Medicine 23(1):88, Feb. 1952)

1,302

Sells, S.B. & C.A. Berry, eds. 1961 HUMAN FACTORS IN JET AND SPACE TRAVEL: A MEDICAL-PSYCHOLOGICAL ANALYSIS
(New York: Ronald Press)

ABSTRACT: Contents include: "Medical Aspects of Jet and Space Travel" by A. Graybiel; "Natural Environment and the Environment of Flight" by H.B. Hale; "Radiobiology and the Environment of Flight" by G.L. Hekhuis; "Basic Aspects of Skilled Performance" by W.A. Wilbanks; "Human Operator Performance Under Non-normal Environmental Operating Conditions" by W.G. Matheny; "Group Behavior Problems in Flight" by S.B. Sells; "Human Qualifications for and Reactions to Jet Flight" by C.A. Berry; "Human Requirements for Space Travel" by S.B. Sells and C.A. Berry; "Protective Medicine in Jet and Space Flight" by J.A. Norton; "Air Craft Accidents and Flight Safety" by H.G. Moseley; "Human Factors Related to Jet Aircraft" by T.G. Hanks; "The Engineered Environment of the Space Vehicle" by H.G. Clamann; "Operational Aspects of Space Flight" by A.M. Mayo; and "Speculations on Space and Human Destiny" by H.B. Webb.

1,303

CURRENT WORK PROGRAM

Senna, J. 1959 HUMAN FACTORS ANALYSIS OF PROTECTION REQUIREMENTS (BALLISTIC, CRASH, ACOUSTICAL, AND VISUAL) FOR ARMY AIRCRAFT AND AIRCREW SYSTEMS. (Current project at U.S. Army Quartermaster Research and Engineering Command, Natick, Mass.)

Description: A series of studies has been completed on systems for providing optimal protection to the pilot and aircrew against the hazards encountered in the military environment. Emphasis has been on human factors problems which must be solved to provide such protection. Particular attention is devoted to influencing the design of clothing and equipment used.

1,304

Serocki, E. L. 1959 DOWNWARD EJECTION SEAT (ECP 420) LOW ALTITUDE FLIGHT TESTS (Boeing Airplane Co., Wichita, Kansas) Doc. No. D3-2280; Contr. No. AF33(600) -32863. April 1959

Summary: The low and intermediate airspeed tests conducted on the downward ejection seat (ECP 420) at low altitude were successful although seat-dummy separations were delayed to some degree during each test. Both high speed tests were unsuccessful due to deployment failure of the recovery parachute.

The tests have shown that a separating device on the downward seats is necessary to assure rapid controlled separation of the seat and occupant after ejection. This ejection event is the primary factor in establishing the minimum altitude for safe emergency escape.

During the two low speed tests the dummy separated from the seat and the parachute was fully inflated approximately 290 feet and 350 feet below the airplane. The parachute was fully inflated approximately 220 feet below the airplane during the intermediate airspeed test. (AUTHOR)

1,305

Shannon, Robert h. 1959 USAF SEAT EJECTIONS (January 1, 1959 - December 31, 1959)
(Directorate of Flight and Missile Safety Research, Norton Air Force Base, California) No. M-10-60 July 1960 ASTIA AD 242728

ABSTRACT: The data contained in this report were compiled from questionnaires completed by crewmembers who used the ejection seat as a means of escape during inflight emergencies and from aircraft accident reports submitted on accidents

involving ejection during 1959. Intentional or inadvertent ejections subsequent to ground impact are not included.

It is the intent of this report to advise research and development agencies of current problem areas and to provide operating personnel with an up-to-date analysis of USAF ejection experience.

These data provide the background information for extensive aircrew indoctrination concerning pre-ejection, ejection, and post-ejection conditions.

1,306

Shapland, D.J. 1961 THE USE OF MATHEMATICAL MODELS TO INVESTIGATE THE EFFECTS OF PROTECTIVE SUPPORTS ON THE HUMAN BODY DURING ABRUPT ACCELERATIONS. (Stanley Aviation Corp., Denver, Colo.) Rept. No. 781, Sept. 1961.

1,307

Sharp, J. E. 1962 CONSIDERATIONS FOR A LAP-BELT-SHOULDER HARNESS ASSEMBLY (In M. K. Cragun, ed., The Fifth Stapp Automotive Crash and Field Demonstration, Sept. 14-16, 1961) Pp. 253-254.

1,308

Shaw, R.S. 1947 HUMAN TOLERANCE TO ACCELERATION IN DOWNWARD SEAT EJECTION (AMC, Wright-Patterson AFB, Ohio) Memo Rept. TSEAA 695-74C 12 Dec. 1947.

CONCLUSIONS: In downward seat ejection, velocities of 28.5 feet per second can be safely accomplished using a 24-inch stroke.

The standard safety belt and shoulder harness with the addition of toe straps provide adequate fixation of subjects in this ejection. (DACO)

1,309

Shaw, R.S. & H.E. Savely 1947 ACCELERATION-TIME DIAGRAM FOR CATAPULT EJECTION SEATS. (Aeromedical Lab. Wright-Patterson AFB, Ohio) Memo Rept. TSEAA 695-66D, 11 Feb. 1947

1,310

Shaw, R. S. 1947 TEST FIRING OF FD CATAPULT FOR DOWNWARD SEAT EJECTION. Memo Rept. No. MCREXD 695-74-I, May 1947

1,311

Shaw, R.S. & J.P. Henry 1948 THE PRESSURIZED HELMET AS A NEGATIVE G PROTECTIVE DEVICE. Aero Medical Laboratory Serial No. MCREXD4-695-74-E, Air Material Command Memo Rept. TSEAA-695-74E

ABSTRACT: In MR. No. TSEAA-660-100 entitled "Emergency Pressure Suit", dated May 5, 1946, a pressurized helmet is described, and its use as a negative g protective device is suggested. Inasmuch as most of the injury from negative accelleration of several seconds duration is related to over-distension of the blooc vessels of the head, it is reasonable that such a helmet applying counter pressure to these vessels would provide some degree of protection. This work was undertaken to determine the amount of protection such a device would afford. This report describes preliminary experiments to evaluate the pressurized helmet as a protective device against negative acceleration. The preliminary experiments suggest that: (a) Pressure breathing with a pressurized helmet does not significantly raise negative g tolerance. (b) The use of the pressurized helmet with the glottis closed raises negative g tolerance by an amount similar to the positive g tolerance increase obtained from the anti-g suit.

1,312

Shaw, R. S. 1948 TEST FIRING OF T-7 CATAPULT FOR DOWNWARD SEAT EJECTION. (Wright Air Devel. Command, Wright-Patterson AFB, Ohio) WADC MCREXD-695-741; 11 May 1948.

1,313

Shaw, R. R. 1952 NOTES ON BACKWARD FACING SEATS. (Dept. Civil Aviation, Commonwealth of Australia). July 1952.

1,314

Shaw, R. R. 1956 RELATIVE COMFORT IN FORWARD AND BACKWARD FACING SEATS. (Dept. Civil Aviation, Australia) Rept. SM-18, Issue 2; 25 May 1956.

1,315

Shea, F. 1953 CIR CALLS FOR STRONGER CABINS.
Aviation Week, 59(16):98-99. 19 Oct. 1953.

ABSTRACT: In the controversy over forward-facing versus aft-facing seats in transport planes, it is felt that there has not been enough evidence collected by investigators of air crashes to justify one in preference to the other. The crash of a DC-6 at Elizabeth, N.J., on Feb. 11, 1952, is described, and it is stated that the investigators of this accident reported that the casualty rate would have been just as high with aft-facing seats as with the forward-facing seats, which were standard on this plane. However, it is definitely recommended that seats in transports be reinforced for lateral g forces. Present seats are designed to bear only 1 and 1/2 g laterally, and it is recommended that they be strengthened to stand loads as high as 35 g laterally.

1,316

Sheffield, F.C. 1942 "G" MEN OF THE AIR ON PILOTS FLATTENING OUT: AVOIDING THE PHYSIOLOGICAL ILL EFFECTS OF VIOLENT ACCELERATION.
Flight, 41:134-135

1,317

Shepard, L.F. 1962 OMNI-DIRECTIONAL HIGH ALTITUDE HELMET
(U.S. Patent 3,030,626, April 24, 1962)

ABSTRACT: A brief description and illustration are given of a helmet attached to a pressure suit used in high altitude flying. A rotatable pressure seal is included for maintaining pressure within the suit during movement of the helmet.

1,318

Sheperdson, R.M. 1956 SPECIFICATION FOR IMPACT BAG INFLATING UNITS FOR THE GAM-67 MISSILE. (Radioplane Co., Van Nuys, Calif.)
Contract No. AF33(600)-23893, Rept. No. 1123, 15 March 1956.
ASTIA AD 89 711

1,319

Siegel, A. I. & R. H. Tabor 1958 STUDY TO ASSESS THE EFFECTIVTNESS AND UTILIZATION OF FULL PRESSURE SUITS. (Applied Psychological Services, Villanova, Pa.) Rept. No. NAMC ACEL-373; ASTIA AD 200 528.

ABSTRACT: The Mk II full-pressure suit assembly was investigated in the F8U-1 aircraft. Control access in the suit was marginal. Some controls were unreachable or inoperable at various suit pressurization. Head mobility was restricted but the helmet was considered generally comfortable. The intelligibility of the communication system was acceptable. Suit donning was accomplished in 10 to 18 min. Increased ventilation for the pilot particularly before becoming airborne was necessary. Some pilots were unable to complete the airstart, spin recovery, and ejection procedures. Aircraft abandonment under simulated conditions ranged from 20 to 85 sec.

1,320

Siegel, A. I., J. Bulinkis, R. Hatton, & K. Crain 1960 STUDY TO ASSESS THE EFFECTIVENESS AND UTILIZATION OF FULL PRESSURE SUITS: A Technique for the Evaluation of Operator Performance in Pressure Suits and Other Flight Apparel. (Naval Air Materiel Ctr., Philadelphia, Pa.) NAMC-ACEL-435; 29 April 1960

ABSTRACT: The need for a rigorous method for evaluating perceptual and motor performance in full pressure suits and other flight apparel has been a continuous one in Naval aviation. The present report describes a method, based on a series of generally accepted measurement techniques, for meeting this need. The scheme is based on determinations of performance capability of the following types: rate of movement, psychomotor coordination, manual dexterity and light manipulatory performance, work space requirements, visual field, anthropometric flexibility, manipulative area, and effort required for task performance.
In addition, the design of an apparatus which will allow for the accomplishment of standardized measurements in each of these areas is described. (AUTHOR)

1,321

Sieker, H.O. 1952 DEVICES FOR PROTECTION AGAINST NEGATIVE ACCELERATION (Aero Medical Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TR 52-87, Part I, June 1952. ASTIA AD 2135

ABSTRACT: Previous experimental work has shown that negative acceleration is tolerable within certain physiological limits. This report summarizes studies in which human subjects were exposed to negative acceleration with and without

protection. The tolerance limit for negative acceleration in unprotected subjects in the upright seated position was found to be 2.5 g. The acceleration was limited to this level by the subject's discomfort and the bradycardia noted in the electrocardiogram. At 3 g, in addition to marked discomfort, conjunctival hemmorrhages and cardiac asystoles were noted. When the subject in the upright seated position was protected by means of counterpressure about the head and neck, the tolerance to negative acceleration was increased to 5 g. The tolerance limit for negative acceleration was found to be 4 g in the negative g aspect of the USAF prone position bed.

1,322

Sieker, H. O. 1952 DEVICES FOR PROTECTION AGAINST NEGATIVE ACCELERATION. PART II: FLIGHT STUDIES (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 52-87, Pt. 2; ASTIA AD-6891; Nov. 1952

ABSTRACT: Each of 6 subjects wearing neck-sealing full-pressure helmets flew 5 to 15 maneuvers involving from -1.0 to -3.0 g for 5 to 40 sec. An M-7 negative-g valve mounted on the F-84E aircraft in place of the standard positive-g valve automatically provided a helmet pressure of 25 mm of Hg for each negative g obtained. Maneuvers limited to -2 g were also flown by 3 pilots without pressure in the helmet. All pilots agreed that the pressurization improved their comfort during the maneuvers. The helmet restricted peripheral vision, and some pilots felt that the helmets were hot and stuffy. Negative-g maneuvers were estimated to be of the most value only in evasive tactics of fighter vs fighter; however, accelerations above -3 g require extensive aircraft modifications. (ASTIA)

1,323

Sieker, H.O, E.E. Martin, O.H. Gauer, & J.P. Henry 1953 A COMPARATIVE STUDY OF TWO EXPERIMENTAL PNEUMATIC ANTI-G SUITS AND THE STANDARD USAF G-4A ANTI-G SUIT. (Wright Air Development Center, Air Research and Development Command, Wright-Patterson AFB, Ohio) WADC TR 52-317, Feb. 1953. ASTIA AD 12716.

ABSTRACT: Two new types of pneumatic anti-g suits have been examined which apply pressure to a greater portion of the lower part of the body than the standard G-4A suit. The two suits consist of (1) complete coverage trousers composed of a connected system of circumferential bladders and (2) full pressure trousers. These two types of anti-g suits provide 0.7 to 0.9 more

protection against acceleration than the standard G-4A anti-g suit which afforded 1.8 g protection. A comparative study of the effect of the three types of protection on arterial pressure, venous pressure and vertical heart-to-head distance was undertaken on human subjects. During acceleration the inflation of the two experimental suits maintained mean arterial pressure at eye level and venous pressure at heart level higher than did the G-4A suit under the same conditions. The shortening of the heart-to-head distance was not significantly different with the three types of protection. It is believed that greater protection is afforded by the experimental anti-g suits because they apply greater pressure evenly to a larger portion of the lower part of the body than the G-4A suit is able to do. By this means they increase peripheral arterial resistance and venous return to the heart more effectively than the G-4A anti-g suit.

The two experimental suits have been shown to be an effective and comfortable type of protection against acceleration. Within the limits of blackout or comfort tolerance of the subject, these suits have been demonstrated to be safe for human use. Moreover, they may be incorporated into a combination altitude, anti-g and exposure suit. These new anti-g suits have the disadvantage of being bulky, poorly ventilated and in the case of the full pressure suit, difficult to don. It is concluded that further study, testing, modification and development of these anti-g suits should continue.

1,324

Sierra Eng. Co. c.1955 A TECHNICAL DESCIRPTION OF SIERRA SAM AND FAMILY THE ANTHROPOMETRIC (ANTHROPOMORPHIC) TEST DUMMIES.
(Sierra Eng. Co., Calif.)

1,325

Sierra Engineering Co. 1955 SIERRA SAM AND FAMILY - ANTHROPOMETRIC TEST DUMMIES.
(Serra Engineering Co., Serra, Calif.)

1,326

Sierra Engineering Co. 1959 GENERAL DESCRIPTION OF THE SIERRA SAM MODEL 263 95th PERCENTILE ANTHROPOMETRIC (ANTHROPOMORPHIC) TEST DUMMY.
(Sierra Eng. Co., Sierra, Calif.)

1,327

Sifuentes, S.S. 1958 SEAT BACK-PASSENGER-IMPACT ABSORPTION CHARACTERISTICS DEVELOPMENTAL TEST MODEL 22. (Convair, San Diego, Calif.) Rept. #SL58-177, 16 June 1958.

1,328

Silkey, F.R. & Michael Rickards 1955 INVESTIGATION OF A METHOD FOR IMPROVING THE PERFORMANCE OF UPWARD EJECTION SEATS (Wright Air Development Center, Air Research and Development Command, United States A.F., Wright-Patterson AFB, Ohio) Contract No. AF 33(616)-3025, Task No. 13437, December 1955, ASTIA AD-105255

ABSTRACT: The rapid increase of the maximum speed of USAF aircraft designs has resulted in a situation where, utilizing available seat thrust devices, sufficient clearance between the ejected seat-man combination and the aircraft vertical stabilizer cannot be guaranteed. The objective of this report is to present an investigation of one method for solving the tail clearance problem. The method is to increase the vertical height of the ejection seat trajectory by means of stabilizing the seat in a high lift attitude as soon as possible after the seat is separated from the aircraft. This report presents an analysis of the problems involved for stabilized high lift upward ejection seats. It is concluded that stabilizing the upward ejection seat produces definite improvement in the seat performance. It must be noted however that the stabilized high lift seat configuration will not be the same for large and small aircraft.

1,329

Silverman, A. J., S. I. Cohen, G. D. Zuidema & L. L. Vickery 1958 PSYCHOLOGIC BIOLECTRIC ASSESSMENT OF G-SUIT PROTECTION. (USAF, Wright Air Dev. Div., Wright-Patterson AFB, Ohio) WADC TN 56-400. ASTIA AD 97 278.

ABSTRACT: Performance of a psychomotor task and arousal as measured by GSR were assessed on six subjects who were centrifuged at 3 g for ten rides, while protected and again while unprotected by an anti-g suit. Results suggested less arousal and better sustained performance when protected by the suit.

1,330

Simmons, C.F. 1950 WINDBLAST PROTECTIVE VISOR ASSEMBLIES FOR USE WITH HELMETS AND OXYGEN MASKS. USAF Technical Report 6037, Sept. 1950. ASTIA ATI 87407

ABSTRACT: Problems incident to the development of wind blast head-protection equipment for use by aircrew men during seat ejection were studied. The equipment was tested by using both live subjects and dummies ejected from airplanes flying at speeds up to 485 mph. Tests were also made with wooden model heads using an altitude chamber to produce air blast in excess of 500 mph. It was determined that a modified P-1 helmet and a modified A-13A oxygen mask plus a visor mechanism will remain on the wearer at 485 mph.

1,331

Simmons, C.F. 1953 HUMAN FACTORS IN PERSONAL EQUIPMENT FAILURES. (Aero Medical Lab., Wright-Patterson AFB, Ohio) WADC Technical Rept. 53-244, December 1953 ASTIA AD 25 507

ABSTRACT: In-service conditions pertaining to the effectiveness of standard AF personal equipment are reviewed; type p-3 protective helmet is used as an example. Loss of the helmet before and during seat-ejection escape resulted in some fatalities. Poor fitting of the helmet prevented proper functioning of the oxygen masks. Some helmets employed were too weak and flexible to withstand wind-blast forces. These and other conditions were considered to result from ignorance of the available instructions concerning installation of visor mechanisms and P-3 helmets. Corrective action for achieving the maximum protection from the equipment is outlined.

1,332

Simons, A. K. 1951 TRACTOR RIDE RESEARCH
Paper; Society of Auto. Engineers National Tractor Meeting, 10-13 Sept. 1951. S.A.E. Prepringt 653.
See also Society of Automobile Engineers Transactions, April 1952, Pp. 357-364.

ABSTRACT: It cannot be over emphasized that the job the tractor must do, the position of the seat on the tractor, and the posture of the body in the seat will all affect tractor seat suspension design. One scientific approach to the problem is to (1) record the absolute tractor motion in all 3 directions simultaneously while the firld operation is in progress, (2) subsequently analyze those records in the light of human tolerances and (3) design the seat suspension

to isolate against the objectionable part of this motion. The use of such electronic equipment opens up new fields of investigation to the suspension engineer and the medical profession to determine physical and human responses to all conditions of motion. The challenge is to the seating engineer to try to devise a seat suspension that will do as good a job in isolating vibration and supporting his body as do his own legs without that unfortunate adjunct of becoming fatigued.

1,333

Simons, A. K. 1955 HEALTH HAZARDS OF ROUGH RIDING VEHICLES.
(Report to Commission on Accidental Trauma, Armed Forces Epidemiological Board, Dept. of Defense. 8 July 1955)
NOTE: CARI P&S 30.1
See also; Brostrom Research Laboratories Rept. No. 113.

ABSTRACT: In spite of mounting evidence that truck and tractor riding conditions are undesirable, investigations studying human reactions in the vibration range above the so-called "intolerable limits" have not been made. The designers of military and commercial vehicles need to know the consequences and safe limits of operation of "rough riding" on man before they will improve vehicle suspension and driver seat design. To satisfy this need, it is essential that medical and engineering research be alerted and focused to study the effects on health, safety, and human efficiency of exceeding the subjective "intolerable" limits of shock and vibration in rough riding vehicles. This frequency range is between 1 - 8 cps. with intensities up to accelerations of 10 G's on the driver. As a preliminary and constructive step, it is suggested that an objective group conduct a scientific inquiry into the overall economic, health and safety aspect of the problem and publish its results.

1,334

Simons, A.K., A.O. Radke & W.C. Oswald 1956 A STUDY OF "TRUCK RIDE" CHARACTERISTICS OF STANDARD CUSHION VS. SUSPENSION TYPE SEATS IN MILITARY VEHICLES
Detroit Arsenal and Aberdeen Proving Ground Contract No. DA-11-022-ORD-1999; ORD Project TT1-696; DA Project 5T7201001; Sub-Directive 60405330-11-80802. Rept. No. 118, 16 March 1956

ABSTRACT: The purpose of this study was to electronically record and compare the "truck ride" (1-8 cps) felt by the truck driver in a standard seat cushion assembly and suspension seats installed in a rubber-tired military truck and driven over permanent test courses at the Aberdeen Proving Ground.

Truck acceleration levels in the vertical, transverse and longitudinal directions were found to exceed the "intolerable" and "uncomfortable" limits suggested by vibration table studies in Europe and the U.S.A. The standard driver's cushion seat amplified vertical basic truck motions (1½-6 cps), transmitting an average of 124% of the vehicle vibration intensity to the driver's belt on the Belgian block and staggered bump courses. The assistant driver's seat averaged 139% transmission. The suspension seats attenuated the basic truck motions (1½-6 cps) to the extent of transmitting an average of 80% of the truck vibration intensity to the driver's belt for suspension A (69% for suspension B), over the same test courses. These field test results correlate with performances determined in laboratory vibration table studies of man on the standard and suspension type seats. This correlation is important because laboratory vibration table studies are easier to make and are subject to greater experimental controls.

Laboratory vibration studies on man in a rigid seat were made (0-6 cps) which show the different responses of man's head, neck and belt and the gross effects of variation in muscle tension.

Some theories are presented on man's expenditure of energy in holding onto steering wheel and pushing into back cushion to reduce the amplifying effect of conventional cushions. The serious lack of data throughout the world on man's short and long term reaction to vibrations in the 1-8 cps range is emphasized.

1,335

Simons, D. G. 1954 METHODS AND RESULTS OF ONE YEAR OF BALLOON FLIGHTS WITH BIOLOGICAL SPECIMENS. J. Avia. Med. 25:380-387

1,336

Sinnamon, Edwin G. & W.S. Wray 1962 BIBLIOGRAPHY OF AVIATION MEDICAL ACCELERATION LABORATORY PUBLICATIONS, 1950-1960
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-6211 Sept. 27, 1962

ABSTRACT: A bibliography with abstracts and indices is presented which covers all of the published work of the Aviation Medical Acceleration Laboratory during its first decade, 1950-1960. The primary facility at this laboratory is the 50-foot radius human centrifuge with its gimbal-mounted gondola. This device is capable of producing acceleration levels up to 40 G and with computer control can realistically simulate flight profiles of air and space vehicles. Ths subject matter covered by the publications includes aviation and space medicine, the effects of acceleration on the animal and human organism, human performance under acceleration stress, dynamic stimulation of aircraft and space vehicles, biochemistry, physiology, psychology, and engineering. Included are formal reports, progress reports and articles which appeared in the open literature. The material is coded and grouped under subject headings and indexed by author, title and report number or journal citation. ASTIA numbers are given for all reports available under that system.

1,337

Sisakyan, N.M. 1961 BIOLOGIIA I KOSMICHESKIE POLETY (BIOLOGY AND SPACE FLIGHT) Priroda (1): 7-16, 1961
See also: "Soviet Literature on Life Support Systems", Air Information Division, Wright-Patterson AFB, Ohio. AID Report 61-59 April 28, 1961 ASTIA AD 256 235

ABSTRACT: Soviet experiments with animal-bearing rockets show that at heights of 78-85 km and speeds of 2,000 km/hr or at 39-46 and 4,100 km/hr catapulting is the reliable emergency escape method and causes no great functional disturbances in the animal. It has also been found that 3-10 minutes of weightlessness causes no great functional lesions to the animals cardiovascular or respiratory system. Experiments indicate that the body can more easily withstand the transition from acceleration to weightlessness than the reverse. No changes, genetic or otherwise, have so far been noted in the bacteria and phages contained in the second Soviet space ship. (CARI)

1,338

Skogland, H. 1958 T33 AIRCRAFT EJECTION SEAT TRIALS STATIC EJECTIONS-MODIFIED SEAT
(Royal Canadian Air Force) CEPE Report No. 1354 September, 1958 ASTIA AD 201397

ABSTRACT: Findings to date concerning catapult tube bending and tail clearance during ejections from a T33 aircraft are summarized.

A standard and a modified T33 Aircraft Ejection Seat were compared for rate of tumbling, tail clearance and tube bending. The results of the static test indicate that: (a) the maximum tube bending, 1 g ejection, may occur at aircraft attitudes of 0° to 10° nose down, and (b) the modified seat attained trajectory heights 11% to 35% higher than the standard seat with approximately 30% reduction in tumbling.

Recommendations are submitted to modify all T33 and Sabre aircraft ejection seats.

1,339

Skopp, G. H., & A. E. White 1961 DESIGN, DEVELOPMENT, AND QUALIFICATION TESTING OF THRUSTER, CARTRIDGE ACTUATED, T31. (Pitman-Dunn Labs. Group, Frankford Arsenal, Philadelphia, Pa.) FA Rept. No. R-1598; Proj. 1362; ASD TR 61-444; ASTIA AD-270 737; Oct. 1961

ABSTRACT: A summary and an evaluation are given of the ballistic and mechanical development of Thruster, Cartridge-Actuated, T31. The thruster, weighing 5.7 lb, was developed to unlock the canopy of the F105E aircraft during emergency escape, and to provide sufficient bypass pressure to initiate the action of the canopy remover. In operation, the thruster piston retracts and displaces a mass of

310 lb in. the horizontal plane for a min distance of 2.0 in. over a temperature range of -65 to 200 F. The thruster movement is horizontally opposed by a resistive force of 6200 lb. The thruster piston locks in position upon completion of its stroke, and bypasses a min of 1000 psi at the end of 42 in. of MS 28741-4 hose assembly. The final lock keys are capable of withstanding a 26,000-lb push or pull. It is pointed out that the development program for this item was curtailed after cancellation of the F105E airplane, and the thruster did not undergo a complete qualification test program. (AUTHOR)

1,340

Slater, E.T.O., A.E. Slater & H.E. Ross 1950 SYMPOSIUM OF MEDICAL PROBLEMS ASSOCIATED WITH SPACE FLIGHT
Brit. Interplanetary Soc. J. 9(1): 14-37 Jan. 1950

ABSTRACT: Three papers are presented: "Psychological Problems of Space-Flight" by E.T.O. Slater; "Balancing Mechanisms of Inner Ear" by A.E. Slater; and "Lunar Spacesuit" by H.E. Ross.

1,341

Slechta, R. F., E. A. Wade, W. K. Carter, & J. Forrest 1957 COMPARATIVE EVALUATION OF AIRCRAFT SEATING ACCOMMODATION. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 57-136; Apr. 1957; ASTIA AD-118 097
NOTE: CARI P&S 4.23aa

ABSTRACT: Three inter-related purposes were accomplished: (1) A series of seats currently in use in operational aircraft were comparatively tested for adequacy in limiting pilot and crew fatigue and discomfort. (2) Several subjective methods of comfort testing were devised and evaluated to determine efficient and economical means of seat evaluation. (3) The test data were analyzed for basic information about the nature and progression of seating discomfort. The approach was experimental, using techniques and orientations of an inter-disciplinary research team. Eighteen subjects, selected to represent a wide range of body sizes in the Air Force population, were seated in each of six seats for tests up to 7 hours in duration. Six by six Latin Squares were utilized for purposes of counterbalancing Summaries of data and discussions of statistical techniques are presented in appendices. Results are summarized in an introductory overview and in the conclusions section. Results of several comfort testing techniques were found consistent one with the others. Statistical separation of the seats was demonstrated in analyses of data from voluntary sitting time and other techniques.

Statistical treatment of sitting time data from twelve subjects gave essentially the sare results as those obtained with 18 subjects. Localized discomfort in the back and buttocks was found more important than discomfort in the thighs, neck, shoulders, and lower legs in producing general discomfort. Seat parts were analyzed for their relative importances in achieving comfortable seating.

1,342

Slechta, R. F. & E. A. Wade 1959 COMPARATIVE EVALUATION OF AIRCRAFT SEAT CUSHIONS.
(Wright Air Development Command, Wright-Patterson AFB, Ohio) Tech. Rept. No. 58-311.

1,343

Slechta, R. F., & J. Forrest 1959 COMFORT EVALUATION OF THE C-118 PILOT SEAT (AEROTHERM) (Wright Air Development Division, Wright-Patterson AFB, Ohio)
WADD TR 58-312; ASTIA AD-212 559; March 1959
NOTE: CARI P&S 4.23

ABSTRACT: This study was undertaken in order to evaluate certain design characteristics of the C-118 Pilot Seat (Aerotherm) in terms of their adequacy for the maintenance of human comfort. The method of evaluation consisted primarily of subjective and behavioral laboratory tests administered by means of hourly questionnaires presented to seventeen subjects during a voluntary sitting period of seven hours maximum duration. On the basis of test data and specific comments made by the subjects, recommendations for seat design improvements were made.

1,344

Slechta, Robert F. and J. Forrest 1959 COMFORT EVALUATION OF THE C-97A/KC-97E PILOT SEAT (WEBER)
(Bio-Mechanics Laboratory, Department of Sociology, Tufts University)
WADC Technical Report 58-313 Contract No. AF 33(616)-3068, Novermber 1959
Project No. 7215 Task No. 71724 ASTIA AD 235130

ABSTRACT: Certain design characteristics of the C-97A/KC-97E Pilot Seat (Weber) are evaluated in terms of human comfort. Evaluation consisted primarily of a battery of subjective and behavioral lab tests administered through hourly questionnaires presented to 16 subjects during a voluntary sitting period of 7 hours max duration. The max duration of sitting time permitted was

420 min, the voluntary time was 365.6 min. With intolerable discomfort rated (-10) and ideal comfort (+10), the average was +3.57. Hourly scale evaluations revealed that comfort decreased with time, but that at no point during the first 5 hours did the rating fall into the discomfort zone. For all body regions the average onset of discomfort was 198.0 min and that most discomfort was experienced in the buttocks, back and neck, in that order. Individual seat parts revealed certain inadequacies in the seat and back cushions, armrests, headrest, and manipulation of controls. Recommendations for seat design improvements are included.

1,345

Slecht, R. F., J. Forrest, W. K. Carter, et al. 1959 COMFORT EVALUATION OF THE C-124A PILOT SEAT (WEBER) (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 58-314; ASTIA AD 233 462; Nov. 1959

ABSTRACT: Certain design characteristics of the C-124A Pilot Seat (Weber) were evaluated in terms of their adequacy for the maintenance of human comfort. The evaluation method consisted primarily of subjective and behavioral laboratory tests through the use of hourly questionnaires presented to 18 subjects during a voluntary sitting period of 7 hours maximum duration. Although the maximum permitted sitting time was 420 minutes, the average voluntary time was 375.5 min. On a comfort scale ranging from intolerable discomfort (-10) to ideal comfort (+10), the average was +5.24. Hourly scale evaluations revealed that comfort began to decrease after 2 hours, but that the average rating did not fall into the discomfort zone during the first 5 hours. The average time of onset of discomfort for all body regions was 189.2 minutes, and that most discomfort was in the buttocks and the back. Individual seat part evaluation revealed inadequacies on seat and back cushions, armrests, headrest, and manipulation of controls. Recommendations for seat design improvements are included. (ASTIA)

1,346

Slingland, C. E. 1957 THE FITTING OF OUTER CLOTHING OVER THE MC-3 AND MC-4 PARTIAL PRESSURE SUITS.
(Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC Tech. Note 57-306. ASTIA AD 131 005

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Sloane, M. 1963 EVALUATION OF PROPOSED GEMINI ENVIRONMENTAL PROFILE.
(Air Crew Equipment Lab., Naval Air Material Center, Philadelphia, Pa.) NAEC ACEL 504, 18 June 1963. ASTIA AD 409 463L.

1,348

Slowik, J. and W. Weir 1963 INVESTICATION OF CREW ESCAPE SYSTEM SURFACE IMPACT TECHNIQUES FOR ADVANCED AEROSPACE VEHICLES
(Flight Dynamics Laboratory, Aeronautical Systems Division, Air Force Systems Command, Wright-Patterson AFB, Ohio)
Proj. No. 1362 May 15, 1963 ASD-TDR-63-173

ABSTRACT: This report describes the results of a four-part study related to the parachute landing impacts of a manned capsule. A survey of literature, with the objective of establishing human tolerance to rapidly applied acceleration, revealed a substantial discrepancy among the data published by investigators in this area. The tolerance limits published in HIAD were accepted as the parametric limits for the present study, pending the completion of advanced studies in this area. Analyses of typical parachute landings revealed that horizontal velocities of up to 56 fps and vertical velocities of up to 33 fps are possible. Secondary impacts resulting from toppling are likely. Active and passive attenuation methods were quantitatively evaluated in an effort to determine an optimum attenuator. From the results of this evaluation, it was recommended that an active type system be developed to negate the horizontal velocity and that a conventional passive type system be employed to alleviate the vertical impact. A study of experimental techniques indicated that part-scale model testing is feasible and advantageous for a program in which prototype attenuators are validated. Methodologies were derived for dynamic scaling of the results obtained from small model experiments to permit prediction of full-size model performance.

1,349

Smedal, H. A., Stinnett, G. W. & R.C. Innis 1960 A RESTRAINT SYSTEM ENABLING PILOT CONTROL UNDER MODERATELY HIGH ACCELERATION IN A VARIED ACCELERATION FIELD
(National Aeronautics and Space Administration, Washington, D. C.)
NASA TN D 91, May 1960.

ABSTRACT: A pilot restraint was described which was used in a centrifuge program. The pilot was subjected to varied and relatively high accelerations up to seven g from two- to five-min. duration in the vehicle simulator while he performed complex tracking problems. In order to conduct these tests, it was necessary to design a special restraint system which combined a modified posterior mold or couch with an anterior restraint fabricated from nylon straps and nylon netting and incorporated head and face supports. (Tufts)

1,350

Smedal, H.A., H.C. Vykukal, R.P. Gallant, & G.W. Stinnett 1961 CREW PHYSICAL SUPPORT AND RESTRAINT IN ADVANCED MANNED FLIGHT SYSTEMS. American Rocket Society J. 31(11):1544-1548, Nov. 1961

ABSTRACT: A new concept in physical support and restraint for pilot and crews of motion flight simulators or advanced manned flight vehicles has been described. The principle of a wear-in restraint which is easily secured to or released from the support structure, which is part of the vehicle, is the basic concept in this support and restraint system. Its capability as a functional support and restraint for vehicle control studies during sustained accelerations has been established by its use in 3 human centrifuge programs. Its capability for tolerance to impact accelerations is unproven. Further improvements and testing is required in order to qualify it as an omnidirectional support and restraint system adequate for sustained and impact accelerations of high magnitude. (Authors)

1,351

Smiley, J. R. 1963 RCAF EJECTION EXPERIENCE: DECADE 1952 - 1961 (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 28 - May 2, 1963)

ABSTRACT: The first RCAF ejection was a successful escape from an F86 aircraft, 9 April 1952. In the ensuing decade 218 ejections took place out of which 165 aircrew survived. Each of the 165 has made a report on his experience, procedures and equipment. Where possible these data have been summarized or coded for analysis. This report shows the general background giving rise to ejections and the trend of survival rates by years. A review is then made of the circumstances surrounding fatal and successful ejections together with relationship between altitude, attitude and airspeed. The descent phase is examined in terms of retnetion of equipment, control, and problems of ladning. A summary of survival and rescue experience is then presented together with a summary of water landing. Of major interest is the study of injuries by type and site according to aircraft, phase of escape, preparation for ejection, control of descent and landing conditions. It has been found that the Martin-Baker seat does not ,ive rise to so high a spinal fracture rate relative to other ejection systems as commonly thought.

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Smit, T. A. 1961 DYNAMIC CALCULATION ON AIRCRAFT SEATS. (Royal Netherlands Aircraft Factories Fokker) Rept. No. FS-9, 25 May 1961

1,353

Smith, A. C. 1954 THE HUMAN PACKAGING PROBLEM.
(Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.)
Research Trends 2(2):1-6.

ABSTRACT: "Safer packaging" of the human occupant of an automobile may be achieved by either one of two methods; body restraint which prevents damaging impact with interior components of the automobile of reduction of the lethal or injury potential of the objects which the body (with principal emphasis on the head) might strike. Maximum protection is afforded by a combination of the two. Research is being condicted relative to both methods. This report deals with the body restraint methods available for protection of automobile passengers. The seat belt is discussed as the main body restraining device. Crash experiments using seat belts and dummies are also reviewed.

1,354

Smith, A. C. 1954 AN INVESTIGATION OF CRASH HAZARDS OF AUTOMOTIVE INTERIOR COMPONENTS FORWARD OF THE OCCUPANTS.
(Cornell Aero. Lab., Inc., Cornell University, N. Y.) Rept. No. YB-866-D-1

1,355

Smith, E. A. & R. W. Connor 1960 SURVIVAL CONSIDERATION FOR INTERPLANETARY MISSIONS
(Paper, SAE National Aeronautic Meeting, Los Angeles, Calif., Oct. 10-14, 1960) (Society of Automotive Engineers, Inc., New York, N. Y.) Rep. 244A, Oct. 1960.

ABSTRACT: The problem of survival during interplanetary flight is briefly examined for a round-trip Mars mission. The effects of performance and payload requirements on the philosophies of escape and on-board survival are examined for a particular vehicle concept, and the resulting selection of on-board survival is discussed. Representative vehicle subsystems are described from the standpoint of three basic design techniques: duplication of vital systems, multiple uses of vital systems, and repair capability. (Tufts)

1,356

Smith, E. W. 1959 THE DEVELOPMENT OF A ZERO ALTITUDE ESCAPE SYSTEM FOR SUBSONIC AIRPLANES. (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, 27-29 April 1959)

ABSTRACT; Zero altitude, subsonic escape system design objectives were established as follows: (1) single stage initiation, (2) system reliability fully automatic, (3) automatic torso retention and release, (4) predictable aerodynamic stability, (5) sustained vertical thrust to gain maximum altitude above airplane flight path, (6) addition of drag to the ejected mass to reduce deceleration time at higher speeds, (7) non-separation of man and seat above 10,000 feet to control free fall stability, (8) parachute ripcord pull by separation of seat and man (elimination of long-time delays in automatic parachute openers). A three-stage thrust system was incorporated consisting of: (1) ballistic catapult to eject mass from airplane, (2) rocket to apply sustained thrust to the seat-man in the airstream, and (3) gas expanded bladder to eject airman from seat at separation. Weight studies disclosed a 1.25 inch differential between the 5 and 95 per cent seat-man with respect to the rocket thrust line. Weight and space considerations prohibited the use of aerodynamic aids or elaborate timing systems. Dynamic studies revealed the need for larger head plate area for the 95 per cent man in order to obtain the proper eye position. This was accomplished by holding the headrest stationary and varying the bucket height. All functions of the system are automatic after initiation, including separation. This system was developed for the Navy T2J Trainer. (J. Aviation Med. 30(3):203-204, March 1959)

1,357

Smith, E. W. 1959 DEVELOPMENT OF ZERO ALTITUDE ESCAPE SYSTEM FOR SUBSONIC AIRPLANES.
(North American Aviation, Columbus, Ohio) Rept. No. 59H-213; April 1959.

ABSTRACT: The escape system for the T2J-1 aircraft has been successfully tested. The system including the Command Selector provisions, provides stabilized, controlled acceleration trajectories with optimum recovery characteristics for both crewmen from ground level to maximum altitude at all flight speeds. T2J-1 airplanes will be in service by the U.S. Navy in the summer of 1959 with this escape system providing the widest range of capabilities for emergency escape ever supplied flight personnel.

1,358

Smith, E. W. 1959 THE DEVELOPMENT OF A ZERO ALTITUDE ESCAPE SYSTEM FOR SUBSONIC AIRPLANES.
(North American Aviation, Inc., Columbus, Ohio) Rept. No. NA59H-215

1,359

Smith, F. K. 1961 CENTRIFUGE METHODS AND TECHNIQUES IN THE U. S. NAVY In Bergeret, P., ed., Bio-Assay Techniques for Human Centrifuges and and Physiological Effects of Acceleration. (London, New York, Paris: Pergamon Press, 1961.) AGARDograph 48. Pp. 52-58.

ABSTRACT: A description is given of the human centrifuge at the Naval Air Development Center, Johnsville, Pa. This facility affords an excellent means of evaluating new restraint systems, of investigating pilot performance and physiological response under severe acceleration stresses, and of assisting in the exploration of new techniques which may aid man in his effort to conquer space. (EDITORS CONCLUSION)

1,360

Smith, L.D.T. & M.S. Baker 1950 SAFETY SHOULDER HARNESSES, TYPES G-1, G-2, AND G-3.
(USAF Air Material Command, Wright-Patterson AFB,Ohio) MCREXD-666-25B

ABSTRACT: Reports from aircraft contractors indicated that the standard Type B-16 shoulder harness was unsatisfactory for use due to its inability to integrate with various types of aircraft ejection seats currently in use. As a result of this deficiency the limited standard type B-15 shoulder harness was being substituted. The Type B-15 shouider harness was not considered to be satisfactory because of its inferior strength characteristics, metal end fittings and impracticability for use with ejection seats. In view of the above, action was taken to design a new type or nodify the present type shoulder harness in order that the correct fit and adequate strength would be obtained for maximum protection of flying personnel. It was concluded that the Type G-1 shoulder harness can be used in conjunction with various types of non-ejection seats. The Types G-2 and G-3 shoulder harnesses are correctly designed to integrate with various types of ejection seats.

1,361

Smith, L. D. 1951 ANTI-BLOWOUT RESTRAINT FOR USE BY AIRCREW PERSONNEL
(Wright Air Dev. Center, Wright-Patterson AFB, Ohio) Rept. WCRDC-666-25C

ABSTRACT: Experiments were conducted to design and develop a safety restraint harness sutiable to protect aircrewmen from the effects of explosive decompressions in pressurized aircraft. A harness fulfilling these requirements would eliminate the diversified standard harnesses which were designed for a specific position on certain aircraft. It was concluded from the reaction of the harness under test that: (a) The design is satisfactory for the purpose intended. (b) The harness was designed with the aforementioned materials is superior to the present standard restraint harness used for the referenced positions.

1,362

Smith, L. D. 1951 CRASH OR DITCHING SEAT FOR B.47 AIRCRAFT. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) Memo Rept. WCRDC-666-25D, 31 Oct. 1951.

ABSTRACT: To design and develop a safety restraint device suitable for the protection of aircrew personnel in the event of crash or ditching. The crash ditching seat as described in the aforementioned report is a more satisfactory item for the use of aircrew personnel, other than pilot or co-pilot on the Type B-47 aircraft in the event of crash or ditching operations than the Ditching Vest, Drawing.

1,363

Smith, M. D. 1954 EVALUATION OF "ENSOLITE" AS A PROTECTIVE PADDING MATERIAL AND THE DEVELOPMENT OF A "BEAM-PAD" INSTRUMENT CONTAINER. (Cornell Aero. Lab., Inc., Cornell University, N.Y.) Rept. No. YB-853-D-1.

1,364

Smith, W.A. 1951 PERSONAL PROTECTIVE EQUIPMENT. In THE HUMAN SIDE OF AIRCRAFT ACCIDENTS (Directorate of Flight Safety Research, Norton AFB, California) Publication M-36; 16-19 October, 1951, ASTIA ATI-197 463

ABSTRACT: This report is an evaluation of a study on ejection seats made by the author. Information of the suitability of ejection seats was obtained through questionnaires sent to all pilots who have intentionally used the ejection seat as a means of emergency escape from aircraft. It was found that ejection of the seat at too low an altitude is the greatest difficulty encountered and this will be much improved when automatic means of release from the seat is installed. This paper also reports of the availability and acceptability of oxygen equipment, survival equipment, and parachutes.

1,365

[illegible] 1957 [illegible]
[illegible] (Civil [illegible] Section, [illegible]
[illegible] Region, Sports Car Club of [illegible])
1957.

1,366

Snell Memorial Foundation 1959 SNELL MEMORIAL FOUNDATION STANDARDS FOR RACING CRASH HELMETS.
(Snell Memorial Foundation, San Francisco, Calif.)

1,367

Snively, G.G. & C.O. Chichester 1959 STUDIES IN HEAD PROTECTION
Sports Car 16:37. Dec. 1959.

1,368

Snively, G.G. & C.O. Chichester 1962 EVALUATION AND DESIGN CRITERIA OF PROTECTIVE HEADGEAR. In M.K Cragun, ed., The Fifth Stapp Automotive Crash and Field Demonstration Conference, Sept. 14-16, 1961
Pp. 182-190

1,369

Snively, G.G. & C.O. Chischester 1962 SAFETY IN RACING, PART II
(Personnel Restraining Systems in Automotive Safety, work supported in part by Research Grant no. AC-51 of the U.S. Public Health Service. May 1962.)

1,370

Snodgrass, R.P. 1947 STATIC FIRING OF PILOT'S EJECTION SEAT INSTALLATION -MODEL XP-81. (Consolidated Vultee Aircraft Corp., Vultee Corp., Vultee Field, Calif.) Report DEVF 3067, ASTIA ATI-56954, April 1947

ABSTRACT: Operational tests were made of a pilot's ejection seat installation from the XF-81 fighter to determine the trajectory of the seat following ejection, and to test the ejection seat assembly, the catapult, and the fuselage for structural integrity under the loads imposed by the seat ejection. The operation of the seat installation was satisfactory. The center of gravity of the seat prior ejection was 8 ft above the ground. The seat cleared the cockpit and vertical tail satisfactorily, landing a distance of 68 ft aft of the main wheel axles (74 ft aft of the CG position of the seat when installed in the cockpit), and one foot to the center line of the airplane. Maximum height reached by the seat in its trajectory was 43 ft above the ground. An interval of 3.6 sec elapsed from initial motion of the seat to its contact with the ground.

1,371

Snyder, R G. 1959 A NEW APPROACH TO THE PROBLEM OF INCREASING HUMAN TOLERANCE TO HIGH DECELERATION FORCES.
Journal of the Arizona Academy of Science 1(2):68-71

SUMMARY: Preliminary design and theory of a full back brace restraint system intended for wear under flight clothing by pilots of high performance aircraft is briefly described. It is hypothesized that such a protective device might not only decrease physical fatigue on long flights, but due to its individual support characteristics might offer a method of substantially increasing human tolerance to abrupt multi-directional deceleration forces. Such a system might have an immediate usefulness in reduction of the present high incidence of vertebral fractures incurred by pilots of high performance aircraft, and might be utilized by personnel of space vehicles. (Author)

1,372

Snyder, R.G. 1959 BRACING MAN FOR SPACE FLIGHT.
(Paper, American Anthropological Assoc. and Sociedad Mexicana de Antropologia, Mexico City, Dec. 1959)

ABSTRACT: The author of this paper discusses a frequently encountered aspect of abrupt deceleration which occurs in the field of aviation--that of the vertebral injury. Vertebral fractures are of particular concern due to the increasing incidence of this type of injury resulting from high impact situations. A major explanation for the increasing incidence of vertebral injuries appears to be due to the increase in the vertical component of deceleration force diagrams. Present restraint systems do not give adequate support because they are basically designed for lineal deceleration protection only. Recognition of this point is observed in the recent modification of the shoulder harness inertial reel locking device in fighter type aircraft. The proposed bracing restraint is designed to keep the back in optimal position for high deceleration loads. Use of a bracing restraint would tend to keep the back in optimal position for such loads. In regard to comfort it is believed that if this support were properly fitted and snugged, it would provide the pilot with support which he does not have at present. The most important consideration in such a system is the degree of additional protection which could be obtained. In instances of abrupt deceleration while wearing such a device, the force normally borne by the lumbar area of the vertebral column would be partially absorbed by the bracing system.

1,373

Snyder, R. G. 1961 MANNED SPACE FLIGHT VEHICLES AND THE PHYSICAL ANTHROPOLOGIST
Amer. J. phys. Anthrop. 19(2):185-194, June 1961.

ABSTRACT: This paper briefly considers a number ot the current and future areas of aerospace research which are of primary interest to the physical anthropologist. Some are: seating and restraint systems for aircrew members (including studies of human tolerance to various forces, e.g., acceleration, deceleration, multidirectional, and negative and positive g, and development of a restraint system to protect against these forces), anthropomorphic simulation devices and techniques for basic research (e.g., dummies), biomechanics under partial or zero g (e.g., initiating self-locomotion), and physical responses under extreme vibration or buffeting. (Tufts)

1,374

Snyder, R.G. 1961 A BIBLIOGRAPHY OF ANTHROPOMETRIC DATA.
(SAE Meeting #14, Santa Monica, Calif. 20-21 April, 1961) Physical Anthropology, Protection and Survival Branch. Civil Aeromedical Research Inst., Fed. Aviation Agency, Okla,.City, Okla.

1,375

Snyder, R.Z. & E.T. Kephart 1956 ESTABLISHMENT OF A QUALIFIED PRODUCTS LIST FOR TYPE Z-2 AND TYPE Z-3 ANTI-BLACKOUT SUITS, CONFORMING TO MIL-S-5085 (Aer)-3 SUBMITTED BY SEYMOUR WALLAS AND COMPANY
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR16 Jan. 9, 1956

ABSTRACT: This report includes the procedures and results of qualification tests performed on the Z-2 anti-blackout suit manufactured by Seymour Wallas and Company, St. Louis, Missouri. The Z-2 suit conformed to all specifications listed in MIL-S-5085 (Aer)-3. It is recommended that the suit be entered on the Qualified Products List.

1,376

Snyder, R.Z. 1958 CONVENTIONAL AND NEW TYPE FLIGHT RESTRAINT EQUIPMENT (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR43 March 26, 1958

ABSTRACT: The integrated anti-blackout suit was evaluated for its restraint characteristics. It had been noted that the single point shoulder harness used in past centrifuge simulations of flight accelerations allowed excessive lateral movement of the body when exposed to lateral force. It is recommended that both the conventional and integrated suit shoulder restraints have a two-point attachment, one directly in back of each shoulder so that each shoulder is restrained to provide the pilot adequate support against lateral movements.

1,377

Snyder, R.Z. 1958 FIRE RESISTANT Z-2 ANTI-BLACKOUT COVERALL SUIT MANUFACTURED BY DAVID CLARK CO.; QUALIFICATION TEST OF (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR38 Jan. 31, 1958

ABSTRACT: This report includes the results of qualification tests performed on the David Clark fire-resistant Z-2 suit. The tests performed were in accordance with para. 4.6.2, 4.6.3, 4.6.4, 4.6.5, and 4.6.6 of specification MIL-S-5085 A (Aer). Conformance to para. 4.6.2, 4.6.3, 4.6.4, and 4.6.6 was indicated but not conformance to para. 4.6.5. It is not recommended that the suit be put on the Qualified Products List until the nonconformance is remedied.

1,378

Society of Automotive Engineers 1955 S.A.E. RECOMMENDS TEST PROCEDURES FOR MOTOR VEHICLE LAP BELTS. S.A.E. Journal 63(12):45-47, Dec. 1955.

1,379

Soong, W. E. 1951 DESIGNING HYDRAULIC DAMPERS Machine Design 23(8): Aug. 1951

1,380

Sorin, B. A. n.d. BACKWARD VS. FORWARD FACING TRANSPORT SEATS (Bureau of Weapons, U. S. Navy)

1,381

Sorin, B.A. 1955 THE RELATIVE CRASH PROTECTIVE QUALITIES AND DEFICIENCIES OF MIL-S-7877 PASSENGER SEATS IN FORWARD AND AFT FACING POSITIONS. (BuAer, Flight Safety Foundation, Inc.)

1,382

Sorin, A. B. 1957 THE RELATIVE CRASH PROTECTIVE QUALITIES AND DEFICIENCIES OF THE MIL-S-7877 PASSENGER SEATS IN FORWARD AND AFT FACING POSITIONS (Paper, American Medical Association Convention, May 7, 1957)

1,383

Soule, C. W. 1956 SAFETY SEAT LOWERING DEVICE FOR AIRCRAFT PASSENGER. U. S. Patent 2,749,065, June 5, 1956

ABSTRACT: A safety lowering device for aircraft passengers is described and illustrated whereby one or more passengers may be released from an airplane in flight and be safely delivered to the ground. He may be released singly and selectively at the will of the pilot or other attendant. The passenger being discharged has no control. Each device is equipped with a parachute that will not open until such time as the person is free of the airplane a sufficient distance to prevent entanglement with the aircraft. The device consists of a collapsible seat, surrounded by hinged hollow walls, collapsible passenger-receiving bag-like member, and hinged doors

1,384

Spalholz, R.R. 1950 AN EXPERIMENTAL INVESTIGATION OF THE STABILITY CHARACTERISTICS OF A 1/5 SCALE MODEL CREW EJECTION SEAT
(Engineering Research Section, Republic Aviation Corporation) Report No. ERF-53 June 16, 1950 ASTIA ATI 90 328

ABSTRACT: Wind tunnel tests were conducted in the Duct Test and Heat Exchange Laboratory on a 1/5 scale model crew ejection seat. Points of stable equilibrium about both pitch and yaw axes were determined, as well as the magnitudes of the

restoring moments.

This investigation consisted of model seat tests with and without flaps and parachute. A series of stabilizing flaps was tested and a design developed that satisfactorily meets the requirements set forth in reference.

1,385

Spells, K. E. 1956 THEORETICAL MODEL OF THE AIR VENTILATED SUITS: SOME CALCULATIONS OF HEAT TRANSFER AND TEMPERATURE DISTRIBUTION WHEN AIR FLOWS THROUGH A PERMEABLE MATERIAL. (Inst. Aviation Med., R.A.F., Farnborough) FPRC Rept. 975, July 1956.

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Spells, K. E. 1961 THEORETICAL MODEL OF THE AIR-VENTILATED SUIT: THE CASE WHEN THE BOUNDARY CONDITION AT THE OUTER SURFACE IS THAT OF HEAT FLUX DEPENDENT ON A HEAT TRANSFER COEFFICIENT. (RAF, Institute of Aviation Medicine, Farnborough) FPRC No. 1137, Jan. 1961

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Sperry, E.G., H.P. Nielsen, I.M. Barash, 1955 DOWNWARD EJECTIONS AT HIGH SPEEDS AND HIGH ALTITUDES. J. Aviation Med. 25(5):356-372

SUMMARY AND CONCLUSION: The instances of delayed separation from the seat in which the subject was thrown from the seat by the recovery parachute warrant discussion. In each case the subjects were in the seat for approximately ten seconds following ejection. They were experienced parachutists and had each made at least one previous ejection test. They were instructed shortly before take off to open manually the lap belt at the first opportunity, it being assumed that they could never beat the automatic function of the belt release. In each case, interrogation disclosed that they had maintained an alert and observing mind. This was proved by checking their description of events against the photographic results. However, there was apparently no sense of time, in that each man had no idea that ten seconds had elapsed. When thrown from the seat, they were just beginning to take corrective action. This may explain reports of fatal emergency ejections in which apparently successful ejections have been completed at moderate altitudes, but with no subsequent attempt to clear the seat or pull the rip cord.

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Stanfield, R. I. 1957 USAF REPORTS REARWARD SEATING SAFER. Aviation Week 66(6):91, 11 Feb. 1957.

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Stanley Aviation Corporation 1952 STANLEY AVIATION INTEGRATED CRASH AND SURVIVAL GARMENT. Contract AF 33(038)-22934.

1,390

Stanley Aviation Corporation 1960 FOOTBALL, HUMAN FACTORS, AND THE B-58 Machine Design, News Report - July 7, 1960

ABSTRACT: After being awarded an Air Force contract to build escape capsules for Convair's three-man B-58 Hustler, Stanley Aviation Corporation conducted several acceleration tests using football players from Colorado University. Accelerometers mounted on their shoulder pads recorded the startling information that they had absorbed from three to five times as much shock as the Air Force believed feasible.

Because of these tests, crew members of combat aircraft will again enjoy the freedom of "shirtsleeve" flight. The escape capsule for the B-58 not only eliminates the need for clumsy pressure suits but promises crewmen infinitely safer separation from a stricken aircraft at any speed and altitude.

An assortment of gas-initiated devices controls the ejection sequence. Leg and torso positioning, door closure, pressurization, and rocket powered departure from the aircraft occur in a matter of a few seconds (the capsule's three doors rotate closed within 1 second).

If the pilot chooses, he can fly the aircraft after encapsulation--the control stick is inside the capsule and essential flight instruments are visible through a window.

If the capsule should land in water, an immersion valve releases pressurized air to inflate flotation ballons attached to the ends of four outrigger booms. The crew member can safely stay afloat in Beaufort Scale 5 seas (19-24 mph) for at least 72 hours.

The capsule, by specification, will have an over-all reliability of at least 97 percent at an 80 percent confidence level)

1,391

Stanley Aviation Corp. 1960 PROPOSAL, LIGHT OBSERVATION HELICOPTER SEATS (Stanley Aviation Corp., Denver, Colo.) 9 Dec. 1960

1,392

Stanley Aviation Corp. 1960 REVISED GROUND LANDING SYSTEM FOR THE PROJECT MERCURY CAPSULE (Proposal, Stanley Aviation Corporation, Denver, Colo.) No. 756, Sept. 1960.

1,393

Stanley, R.M. 1960 DESIGN FEATURES OF THE B-58 ESCAPE CAPSULE Aero/Space Engineering 19(1):42-45

ABSTRACT: The world's first supersonic bomber, the USAF's B-58 Hustler, required a supersonic ejection seat and related equipment that did not interfere with normal cockpit activities. The ejection capsules developed by the Stanley Aviation Corporation make "shirtsleeve" flight in combat planes a reality for the first time in 15 years. The seat encapsulation and automatic pressurization features, the inherent protection from wind blast effects, and the provisions for landing in the capsule contribute most to this result. The B-58 escape capsules have been designed also to provide capability for saving the pilot and crew at low altitudes and low speeds. Acceleration loads upon ejection at high or low speeds and upon impact with the ground or water will be within human tolerance limits.

1,394

Stapp, J.P. 1948 ANALYSIS OF INJURIES SUSTAINED AND EVALUATION OF PROTECTIVE EQUIPMENT USED BY PILOT IN TF 80-C, no. 48-358 MAJOR ACCIDENT OF 8 SEPTEMBER 1948. (Engr. Div., USAF Air Materiel Command, Muroc AFB, Calif.) Memo. Report MBEC-1303, 22 Nov. 1948.

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Stapp, J.P. 1951 HUMAN EXPOSURE TO LINEAR DECELERATION FORCES IN THE BACKWARD FACING SEATED POSITION. Mil. Surgeon 109:106-108

1,396

Stapp, J.P. 1951 HUMAN EXPOSURES TO LINEAR DECELERATION II. THE FORWARD-FACING POSITION AND THE DEVELOPMENT OF A CRASH HARNESS. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 5915, Dec. 1951.

ABSTRACT: Human volunteer subjects have sustained exposure to 45.4 g at 493 g per second rate of onset of deceleration and up to 38.6 g at 1370 g per sec rate of onset of deceleration in the forward facing seated position, and up to 35.0 g at 1150 g per second rate of onset in the backward facing seated position without exceeding the limits of voluntary tolerance.

The two factors limiting voluntary tolerance were the configuration of restraining harness and the rate of change of deceleration at higher than 35.0 g peaks.

The minimum modification of the existing USAF standard lap belt and shoulder harness for adequate protection up to 45.0 g and 36 psi consists in adding the inverted-V leg strap and using No. 13 nylon in place of no. 8 nylon in the shoulder straps.

No evidence of cumulative effects due to repeated exposures to decelerative forces has been found in any of the twelve subjects, one of whom sustained 26 exposures in a period of 50 months.

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Stapp, J.P. 1951 IMPROVED PILOT SHOULDER HARNESSES WITHSTAND 38.6 G CRASHES. Technical Data Digest, Jan. 1951

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Stapp, J.P. 1952 BACKWARD FACING POSITION. (Letter, To Col. Ralph E. Switzer, USAF (MC, Chief, Medical Safety Div. 5 November 1952

1,399

Stapp, J.P. 195? CRASH PROTECTION IN AIR TRANSPORTS. Aeronaut. Eng. Rev., 12(4):71-78

ABSTRACT: In 1947, tubular steel sled slipper with one to four solid fuel rockets for propulsion was mounted on a standard gage track. Peak decelerations exceeding 100 g would thus be reproduced. Parachute dummies, chimpanzees, and

human subjects were used in these experiments. Later a standard ejection seat catapult was developed which was suspended from a monorail. The carriage was decelerated by impinging against a lead cone at the end of the rail. With anesthetized pigs as subjects, motion pictures, instrument readings, and autopsy data provided the bases for analysis. Time-displacement data for human subjects are given in the paper. It was found that humans show the most severe transient physiological effects when subjected to a rate of change of deceleration of 1,370 g per sec. and a peak acceleration of 38.6 g. Protection of human occupants is limited by such factors as dynamic stress limitations of the aircraft, relative positions of seats, specifications of life belts, and sex and age factors.

1,400

Stapp, J.P., & H.P. Nielsen 1953 PROPOSED TESTS FOR ESCAPE FROM VERY HIGH VELOCITY AIRCRAFT. (Holloman Air Development Center, Holloman AFB, New Mex.) ASTIA AD 26 626

SUMMARY: The hazards faced by crew members when they escape from high-speed aircraft at high altitudes are described. At 15,000 ft. problems arise from the low temperature, low atmospheric pressure, tumbling and spinning, wind blast, and deceleration. The literature concerning the effect of such factors on human physiology is reviewed. In the study of the effects of deceleration on the human body, a highspeed sled, track, and water braking system are considered.

1,401

Stapp, J.P. & S.T. Lewis 1956 CRITERIA FOR CRASH PROTECTION IN ARMED FORCES GROUND VEHICLES. (Holloman AFB, New Mex.) HADC TN, April 1956

ABSTRACT: An evaluation of the problem of crash protection for ground vehicle occupants involved in accidents is presented. Modification of ground vehicles in order to improve their crash protection characteristics is recommended. Specifications for lap belts and lap belt installations are described and the use of these belts on a trial basis with the Office of Ground Safety as the monitoring agency is recommended. This report will assist in solving the problem of reducing injuries to occupants of vehicles involved in accidents.

1,402

Stapp, J.P. 1956 HUMAN FACTORS OF SUPERSONIC ESCAPE
Preprint no. 748 (SAE 1956)

1,403

Stapp, J.P. 1956 MEASUREMENT FOR SURVIVAL
Ordnance 40(216):975-979, May- June 1956
(Paper, presented before the American Ordnance Association, Watervliet Arsenal, Watervliet, New York, Jan 1956)

ABSTRACT: The propulsion, braking, and instrumentation systems of several high speed linear decelerators designed for the investigation of problems of tolerance to forces incurred in aircraft crashes and during ejection from high-speed aircraft are described. The decelerators include (1) a rocket-propelled sled braked by pressurized gripping units, on which tolerance limits for primates have been established for avarious body positions, and harness configurations developed; (2) a monorail suspended decelerator braked by collision, on which high tolerance limits to impacts of high rate of onset and short duration have been established for hogs, and the comparative vulnerability of body parts to impingement by simulated cockpit components evaluated; and (3) a high performance rocket sled with water brakes, in which human velocities up to 632 mph have been obtained.

1,404

Stapp, J.P., 1958 USAF HIGH ALTITUDE RESEARCH PROGRAM.
(University of Minnesota Parachute Engineering Course)
July 18, 1958.

1,405

Stapp, J.P., R.J. Heymans, & R.M. Stanley 1956 PROGRESS IS STEADY TOWARD SOLUTION OF ACUTE PILOT-ESCAPE PROBLEMS. SAE J. 64(13):44-48, Dec. 1956

ABSTRACT: Considerations of importance in the development of pilot escape devices from disabled aircraft at high speeds and altitudes include the possibility of incapacitation resulting from fear, injury, hypoxia, or tumbling; the necessity for a high escape velocity to avoid collision with aircraft parts and the possibility of attendant spinal injury; the effects of air blast and

acceleration; the necessity for oxygen and perhaps pressure during descent; the danger of injury during parachuting either from enemy action or from impact; and the problem of the storage of survival equipment. It is suggested that a capsule or pod-type ejection device would provide protection against most dangers, but would present serious engineering difficulties, require a greater escape acceleration, and be more susceptible to survivable battle damage (with the necessity for a further escape system).

1,406

Stapp, J.P. & S.T. Lewis 1957 HUMAN FACTORS OF CRASH PROTECTION IN AUTOMOBILES. SAE Transactions 65:488-492

1,407

Stapp, J.P. 1957 HUMAN TOLERANCE FACTORS IN SUPERSONIC ESCAPE J. Aviation Med. 28(1):77-82

1,408

Stapp, J.P. & S.T. Lewis 1957 EXPERIMENTS CONDUCTED ON A SWING DEVICE FOR DETERMINING HUMAN TOLERANCE TO LAP BELT TYPE DECELERATIONS. (Air Force Missile Development Center, Holloman AFB, New Mexico) Tech. Note AFMDC TN 67-1, Dec. 1957. ASTIA AD 135005

1,409

Stapp, J.P. 1957 AUTOMOBILE SEAT BELTS: HEARINGS BEFORE A SUBCOMMITTEE OF THE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE, HOUSE OF REPRESENTATIVES (Washington, U.S. Government Printing Office, 85th Congress, 1st Session)

1,410

Stapp, J.P., & D L. Enfield 1958 EVALUATION OF THE LAP-TYPE AUTOMOBILE SAFETY BELT WITH REFERENCE TO HUMAN TOLERANCE. (Paper, SAE Summer Meeting Chalfonte-Haddon Hall, Atlantic City, N.J., 8-13 June 1958)

1,411

Stapp, J.P., S.T. Iewis, & J.J. Ryan 1958 PRELIMINARY INVESTIGATIONS OF A HYDRAULIC BUMPER AND ROLL-OVER STRUCTURE. (Air Force Missile Development Center, Holloman AFB, New Mexico) Tech. Note AFMDC TN 58-5 ASTIA AD 135007, Feb. 1958.

1,412

Stapp, J.P. 1959 ESCAPE FROM AIRCRAFT.
In Medical Aspects of Flight Safety AGARDograph 30, Pp. 213-221. (New York: Pergamon Press, 1959)

ABSTRACT: Combat mission is the primary basis for design requirements; that safety takes precedence over salvage, in terms of keeping the situations of flight requiring salvage to an absolute minimum; and that the salvage operation be as effective as possible over the entire spectrum of accident probabilities.

1,413

Stapp, J. P. & B. Nutt 1961 CRASH PROTECTION OF AIR TRANSPORT PASSENGERS BY IMPROVED SEAT MATERIALS DESIGN.
Paper, 1961 Meeting of Aerospace Medical Assn., Chicapo, April 24-27.

ABSTRACT: USAF and RAF crash experience data with forward- and aft-facing passenger seats are reviewed. Human tolerance data derived fro quantitative human and animals crash experiments are presented for both forward- and aft-facing seated exposures. A new type of aft-facing seat made with nylon netting in a tubular steel frame is described, in which optimum comfort and protection are combined with minimum weight. Passenger safety requirements of present and future air transports are discussed for both military and civilian operations. Recommendations are made for optimum acceptable protective measures.

1,414

Stapp, J.P., & S.E. Neely 1961 EVALUATION OF HIGH SPEED AND THUNDERSTORM EFFECTS ON USAF EJECTIONS. (Data for this study were compiled from the records of the Deputy Inspector General for Safety, USAF, Norton AFB, Calif., 15 Feb. 1961)

1,415

Stapp, J.P. 1962 AFTER SEAT BELTS.....WHAT?
In Cragun, M.K., ed., The Fifth Stapp Automotive Crash and Field Demonstration, Sept. 14-16, 1961, Pp. 259-263

1,416

Stapp, J. P., J. D. Mosely, & C. F. Lombard 1962 "MEGABOOM" LINEAR WINDBLAST TESTS ON SUBJECTS AND PROTECTIVE EQUIPMENT. (Northrop Space Laboratories, Hawthorne, Calif.) Contract AF 41(657)405, Proj. No. 7930; NSL 62-52; 15 March 1962

ABSTRACT: Rocket sled experiments exposed five chimpanzees and one dummy to windblast up to Mach 1.68. Standard restraints and garments proved inadequate and extensive injuries established the need for improvement. Stagnation pressures up to 42 psi resulted in injuries from violent displacements within inadequate restraints. Stagnation temperature up to 424 degrees F caused second degree burns to exposed body surface. High velocity air penetrated wounds and body apertures, causing extensive trauma. Experimental restraints and garments proved adequate for stagnation pressure of 36 psi and temperature of 336 degrees F. (AUTHOR)

1,417

Stark, & Roth, tr., J.B. Bateman 1945 REVIEW: CATAPULT SEAT Do 335 (Dornier-Werke G. m. b. H., Friedrichshafen a. B., Div. of Research) Research Rept. 3240, Pages A-17206 to A-17240, 23 May 1944. Translated as Appendix 13 to Lovelace, W.R., E.J. Baldes, & V.J. Wulff, The Ejection Seat for Emergency Escape from High Speed Aircraft, ASTIA ATI No. 7245

SUMMARY: The catapult arrangement was used 200 times in all. No important drawbacks were apparent in these tests. The ejection velocity can be significantly improved by greasing the piston. According to wind tunnel measurements at D W (see Research Report No. 138 and investigations at the Heinkel factory, report No. EN5- 88/43) with a total weight of 120 kg. an ejection velocity of about 17 meters per second is necessary in order to insure sufficient clearance of the tail. Such a velocity of ejection requires three compressed air reservoirs each two liters in capacity, a pressure of 120 atmospheres, and a greased piston in the cylinder. In the appendix will be found further theoretical deductions from these experiments made on the ground, from the measurements in the wind tunnel at the Dornier factory and from the measurements made by the Heinkel factory.

The experiments on human subjects showed that the D W- catapult device can also be discharged at 120 atmosphere without endangering the person ejected. The subjects found the seat equipped with arm rests, head cushion, and upholstered back to be very comfortable. It is, however, recommended that the pads along the edges of the arm rests should be raised somewhat in order to prevent the arms from being jerked off the rests. The arm rests probably support a considerable fraction of the body weight and thus make possible ejection with the use of such high reservoir pressures. Dr Wiesehofer, D VL, is still carrying out exact investigations. The position of the operating levers with respect to the arm rests is satisfactory. Injury to the forearm and hand was never produced. It would be a good idea to provide a bumper on the arm rest or on the seat in order to prevent the elbow from jerking back too far when the catapult lever is pulled. From the point of view of its mechanical properties, its mode of action and its physiological effects the D W catapult device fulfills the standards set up. (Author)

1,418

Starkey, D.G. 1959 BASIC HUMAN FACTORS CONSIDERATIONS FOR MAN-MACHINE SYSTEMS (Chance Vought Aircraft, Inc., Dallas, Texas) CVA E9R-12114.

1,419

Starkey, D. G. 1959 PHYSIOLOGICAL AND PSYCHOLOGICAL CONSIDERATIONS FOR MANNED SPACE FLIGHT. (Chance Vought Aircraft, Inc., Dallas, Texas) CVA Rept. E9R-12349, 1 June 1959, revised 7 July 1959, pp. 87-99

1,420

Stasevich, R.A. 1947 K VOPROSU O BEZOPASNOSTI EKIPAZHA PRI AVARII (Safety of the Crew in Aircraft Crashes)
Tekhnika vozdushnogo flota 5: 18-23

1,421

Stauffer, F.R., & L.B. Cochran 1951 PRELIMINARY STUDIES ON THE EASE WITH WHICH PILOTS CAN GRASP AND PULL THE EJECTION SEAT FACE CURTAIN HANDLES. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-4002. 2.2., 6 Nov. 1951.
See also Project NM001.059.22.02, 8 Nov. 1951. ASTIA ATI 135023

ABSTRACT: Determinations were made of the level of g force at which the average pilot can perform the muscular actions necessary to reach and pull the face-curtain handles, thus simulating the procedure required to actuate the ejection seat firing mechanism. Twelve naval fighter pilots of various physical build were tested on the Pensacola human centrifuge for the ability to actuate the Martin-Baker (model F2h-2) ejection-seat mechanism. The subjects were protected with anti-g suits and exposed to levels of positive radial acceleration about 2.0 g. Above their relaxed black-out tolerance level. The mean black-out level of the subjects' control runs for 10-sec. exposure was 4.7, with a range of 3.3 to 5.8 g. Eleven of the subjects were able to actuate the ejection-seat mechanism at 6.6 g (range of 5.2 to 7.4 g), and within an average time of 4.6 sec. (varying from 2.5 to 8.0 sec.). The failure of the twelfth pilot was attributed to fatigue. The results suggest that most suit-protected pilots should be able to actuate the mechanism at 2.0 g above their control black-out level, providing that the g levels are constant. Proper indoctrination on the effects of g forces is recommended.

1,422

Stauffer, F.R. 1951 CURRENT STUDIES ON DEVELOPMENTAL ANTI-BLACKOUT EQUIPMENT. (Naval School of Aviation Medicine, Pensacola, Fla.) MR005.12-0006.1.2, Feb. 5, 1951

1,423

Stauffer, F.R. 1951 STUDIES ON THE EFFECTIVENESS OF AUTOMATIC SUPINATION IN PROTECTING MAN AGAINST HIGH RADIAL ACCELERATION. (U.S. Naval School of Aviation Medicine., Pensacola, Fla.) Project NM 001 059.02.07. 29 Jan. 1951. ASTIA ATI 108815.

ABSTRACT:
1. Seventeen adult males have been subjected on the Pensacola Human Centrifuge to radial acceleration stresses up to 12 G for five seconds.
2. At the beginning of these exposures the subjects were in a conventional seated position, i.e., subject to positive acceleration effects.

Protection against blackout and associated positive acceleration effects was provided by a changeable seat automatically controlled by G forces acting in the direction head to hips of a seated individual. When the G force exceeded 3.9 G the back rest of the seat rotated backward to place the subject in a modified supine position. The position was maintained until the G force had dropped below 2.7 G at which time the back rest and subject returned to their original positions.

3. The physiological changes during such stresses have been discussed from the standpoint of the practicability of using such a protective device for pilots exposed to positive acceleration in aircraft.

1,424

Stauffer, R.F. & R.E. Kelly A DEVICE FOR THE AUTOMATIC CONTROL BY G-FORCE OF THE POSITION OF THE CONTROLLABLE SUPINE SEAT. SDC PROJECT 9-U-37a. (School of Aviation Medicine, U.S. Naval Air Station. Pensacola, Fla.) Project NM 001 059.02.05

1,425

Steinhoff, , Fehlke, & Buss, tr., J.B. Bateman, & V.J. Wulff 1945 FUNCTIONAL AND FLIGHT TESTS OF THE COMPRESSED AIR EJECTION SEAT INSTALLATION OF THE He 219. (Rechlin Testing Ground) Interim Rept. No. 1, 3 Aug. 1944. Translated as Appendix 11 to Lovelace, W.R., E.J. Baldes, & V.J. Wulff, The Ejection Seat for Emergency Escape from High Speed Aircraft ASTIA ATI 7245

SUMMARY: The function of the compressed air emergency catapult seat installation of the He 219 was tested on the ground and during flight. Forty ejections were made with dummies and three with human beings during flight. The assembly is fit for operation. Maximum permissible ejection pressures determined from the results of ejection experiments on ten human beings on the ground are as follows: For the pilot's seat, 100-105 atm.; For the observer's seat, 85-90 atm. With these pressures it is certain that the tail can be cleared at velocities of flight up to 500 km/h and at any altitude. (Author)

1,426

Stencel Aero Engineering Corp. 1962 RCD-MS SYSTEMS ROCKET CUSHIONING DEVICE APPLIED TO MODULAR SEAT.
(Stencel Aero Engineering Corp., Asheville, N.C.) Rept. No. 2; 3 May - 2 June 1962. ASTIA AD 288 155.

1,427

Stencel Aero Engineering Corp. 1962 RCD-MS SYSTEMS ROCKET CUSIONING DEVICE APLIED TO MODULAR SEAT (Stencel Aero Engineering Corp., Asheville, N.C.) Rept. no. 2, 3 May -2 June 1962, 6 June 1962, Contract NOw 62-0561-c, ASTIA AD-288 155

ABSTRACT: The mock-up studies are progressing on schedule with parallel work being done on mock-up hardware and on system analysis.

1,428

Stencel Aero Engineering Corp. 1962 APPLICATION OF MODULAR RESTRAINT, RECOVERY AND SURVIVAL SYSTEM (MS) TO SPECIFIC EJECTION SEATS. (Stencel Aero Engineering Corp., Asheville, N. C.) Rept. No. 1 for May 1962 - 6 June 1962. Contract NOw 620587. ASTIA AD 288 179.

ABSTRACT: The T2J seat pan is being redesigned for the Modular Seat application and mock-up studies are underway.

1,429

Stencel Aero Engineering Corp. 1962 RCD-MS SYSTEMS ROCKET CUSHIONING DEVICE APPLIED TO MODULAR SEAT (Stencel Aero Engineering Corp., Asheville, N.C.) Rept. no. 1, 3 Apr-2 May 1962, 8 May 1962, Contract NOw 62-0561, ASTIA AD-288 180

ABSTRACT: Analysis of the task requirements has resulted in a revised phasing breakdown. Mock-up studies of a new seat pan have begun to firmly establish the design. Preliminary negotiations with the rocket vendor have been made.

1,430

Stencel Aero Engineering Corp. 1962 MODULAR RESTRAINT, RECOVERY, AND SURVIVAL SYSTEM. (Stencel Aero Engineering Corp., Asheville, N.C.) Final Engng. Rept. Aug. 1962. ASTIA AD 292 761

ABSTRACT: A modular system, consisting of a seat back and bottom with a parachute bridle connected to the structure, provides greatly increased pilot restraint, comfort, and convenience by sue of a combined flight and parachute

harness. The system offers a survival capability which carries full escape automation beyond the point of either land of water. Development of the modular seat included; bridle geometry studies, opening shock studies, para-raft inflation studies, deceleration device development, various special tests, a system test series, and restraint development yielding a superior restraint development yielding a superior restraint system complete with hardware. Operational modes provided for were: automatic water entry with man in inflated raft, seated land touchdown, foot-first land touchdown, over-side bailout, and ditching. Further development, already underway with a rocket cushioning device; and later, the addition of the ballistic parachute should give a more highly refined escape system than any presently in use. (Author)

1,431

Sternick, S., D.T. Stimmel, & I.J. Sattinger 1961 HUMAN REACTION TO MILITARY VEHICLE RIDE (Institute of Science and Technology, University of Michigan, Ann Arbor, Michigan) Report No. 2889-17-F, Jan. 1961. ASTIA AD 250 099

ABSTRACT: The results of an investigation conducted at Willow Run Laboratories (Now Institute of Science and Technology), of The University of Michigan, into the effects of ride on both passengers and crewmembers of military ground vehicles are described. A general analysis of these effects is given as a basis for defining the problems associated with vehicle ride and of recommending an experimental program to obtain quantitative information on the effects of ride on comfort and performance. Test techniques and test equipment requirements for comfort tests using the Method of Adjustment and for performance tests using tracking, driving, visual recognition, and information handling tasks are outlined. These tests are based on the use of a vehicle-motion simulator which would subject human beings to prescribed sinusoidal and transient motions. As an example of how the various test phases can be performed, a suggested first year's test program is developed to obtain data on the subjective evaluations of sinusoidal and and nonsinusoidal motions in pitch and roll

1,432

Stewart, G.H. 1949 EJECTION TESTS OF PILOT'S AND SHORAN OPERATOR'S SEATS - MODEL XB-51 (BOMBER) (ENGINEERING TEST REPORT) (Glenn L. Martin Co., Baltimore, Md.) USAF Contr. No. W33-038-ac-14806 Engineering Test Report No. 1034 Dec. 28, 1949 ASTIA ATI 69 365

ABSTRACT: Tests were made of the pilots' and Shoran operators' seats for the XB-51 bomber to establish the structural integrity and functional characteristics

during ejections using the M-1 an T-5 type catapults. One successful ejection of each seat with each type of catapult was required. All ejections were made satisfactorily. The maximum vertical height for the pilots' seat was 59.6 ft (M-1) and 75.1 ft (T-5), while the maximum horizontal distance was 34 ft (M-1) and 35.5 ft with a horizontal distance of 39.3 ft (M-1) and 46.5 ft (T-5). In all ejections, the vertical height was similar to that calculated, but the horizontal distance was considerably smaller, which is believed to be caused by the forward tumbling of the seat, and which will be counteracted somewhat in flight by the air load.

1,433

Stewart, W. K. 1941 PROGRESS NOTE ON THE FRANKS SUIT (National Research Council, Canada) Report #C-2852, 20 December 1941.
Also (RAF Flying Personnel Research Committee) FPRC 390.

ABSTRACT: Comments are made on progress in the design of the Franks Flying Suit in relation to the latex filling units, covering materials, filling shoes, coverage of thighs and other areas.

1,434

Stewart, W. K. 1942 NOTE ON SPENCER ACCELERATION BELT AND LEGGINGS BY FIRM OF SPENCER, U.S.A.
(RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. #458.

1,435

Stewart, W.K. 1940 AN INVESTIGATION INTO THE EFFECT OF A RECLINING POSTURE ON THE ABILITY TO WITHSTAND HIGH "G" (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. No. 212, 10 Dec. 1940.
ASTIA ATI 206318

ABSTRACT: One subject made experimental runs exceeding 5 "g" for 10 to 20 seconds, Peak run was 6 "g" for 6 to 9 seconds. This resulted in unconsciousness when subject was unprotected. When cockpit seat was inclined 45 degrees from vertical and feet raised to level of seat, complete visual protection was obtained.

The venous and arterial hydrostatic levels were reduced only one inch by this maneuver, but the decrease in the leg-thigh and thigh-spine angles promoted venous return. Visual fields were not markedly reduced by this procedure, but tilting sufficient to protect from higher values of "g" would produce definite visual impairment

1,436

Stewart, W. K. 1940 EFFECT OF RECLINING POSTURE ON ABILITY TO WITHSTAND HIGH G. (RAF, Institute of Aviation Medicine, Farnborough) FPRC Report 212, Dec. 1940.

1,437

Stewart, W.K. 1940 OBSERVATIONS ON THE EFFICIENCY OF ABDOMINAL BELTS IN THE PREVENTION OF BLACKING OUT. (Farnborough) FPRC No. 176. ASTIA ATI 206389

ABSTRACT: All tests conducted in planes by a small number of subjects.
(a) Elastic belts do not raise blackout threshold, may shorten period between blackout and unconsciousness. Although they produce a feeling of confidence at low values of "g", they are potentially dangerous.

(b) Pneumatic belts inflated at pressures exceeding 50 mm Hg prevent fastening of Sutton harness. Even pressures of 80 to 100 mm Hg (of therapeutic value according to Armstrong) do not elevate blackout threshold.

(c) Hydrostatic belts are uncomfortably cold even at altitudes as low as 10,000 feet. At 6 "g" belts are a serious hindrance due to increased effective weight. Water does not drain out of belts after exposure to "g" and is very uncomfortable. Hydrostatic belts elevate "g" threshold at least 0.5 "g", but disadvantages outweigh the gain. It is recommended that experiments on belts as anti "g" devices be discontinued.

1,438

Stewart, W.K. 1941 REPORT ON BLACKING-OUT (RAF, Institute of Aviation Medicine, Farnborough) FPRC Report 233, Jan. 1941.

1,439

Stewart, W.K. 1941 EFFECT OF ABDOMINAL COMPRESSION ON ABILITY TO WITHSTAND G: FINAL REPORT. (RAF, Institute of Aviation Medicine, Farnborough) FPRC Report 300, May 1941

1,440

Stewart, W.K. 1941 PROGRESS NOTE ON THE FRANKS SUIT. (National Research Council, Canada) Report #C-2852 F.P.R.C. 390, 20 December 1941

ABSTRACT Comments are made on progress in the design of the Franks Flying Suit in relation to the latex filling units, covering materials, fillinf of shoes, coverage of thighs and other areas.

1,441

Stewart, W. K. 1942 REPORT ON THE COTTON PNEUMODYNAMIC SUIT. (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. #407(WAM-982-4), January 19, 1942.

1,442

Steward, W. K. 1942 NOTE ON SPENCER ACCELERATION BELT AND LEGGING. (Inst. Aviation Med., R.A.F., Farnborough) FPRC No. 458, 11 May, 1942.

ABSTRACT: Inflation of Spencer belt to 2 to 2.5 psi raises "g" threshold at least 1 "g" for 5 seconds. Structural failure along knee seams occurred in model tested.

1,443

Stewart, W.K. 1942 INTERIM REPORT ON FRANKS SUIT TRIALS AT NO. 43 SQUADRON ACKLINGTON. (National Research Council, Canada) Report #C-2842, 8 June 1942

ABSTRACT: This progress report describes the difficulties encountered during service trials of the Franks Flying Suit with the above squadron. It is recommended that further trials should be conducted.

1,444

Stewart. W.K. & H.L. Roxburgh 1945 GERMAN OCCUPATION DISARMANENT: AVIATION MEDICAL ASPECTS IN SCHLESWIG-HOLSTEIN
(Flying Personnel Research Committee, Air Ministry, Gt. Britain) FPRC 627, Appendix 14, May 1945.

ABSTRACT: Results of the interrogation of German personnel.
In response to questions about the ejection seat, the Squadron Commander gave the following information:
Experiments were first carried out on a ground test rig at the Heinkel aircraft works. This rig, essentially constructed from inclined rails, would appear to have been similar to the Martin-Baker test rig, and to have a vertical height of at least 10 m.
A compressed air system of propulsion was first investigated and abandoned in favour of an explosive charge.
Accelerations of 4-6 g were first investigated and gradually increased to 14 g which was the acceleration necessary for clearance from the Me. 162.
The duration of the acceleration was not known but the distance of propulsion at ground level was stated to be 10 m. and it is considered that these figures are reasonably consistent with present R.A.F. knowledge. At this acceleration, it was necessary to hold the head back and to place the feet on supports. The Squadron Commander did not himself notice any marked difference between the acceleration values of 6 and 14 g.
The highest of g reached in the tests was 26; a few cases of back injury occurred but these had not been observed by the officer.
He stated that the apparatus had actually been used in emergencies on two to three occasions and he thought that the maximum air speed had been 800 Km/hr. (500 mph). No difficulty had been commented on, either in separating grom the seat or in autorotation after ejection. He could not state whether any masks had been dislodged in the air blast.

1,445

Stewart, W.K. 1946 EJECTION OF PILOTS FROM AIRCRAFT: A REVIEW OF THE APPLIED PHYSIOLOGY. (Air Ministry, Flying Personnel Research Committee) Rept. No. 671, Sept 1946. ASTIA AD 222 472

ABSTRACT: For seat ejection two general stages are envisaged. Firstly, ejection from the aircraft, which in itself is a great advance but implies a conscious pilot for preservation of life; secondly, development of ejection with ancillary automatic mechanism to ensure that an unconscious pilot will avoid severe injury. Cabin jettisoning is of primary importance for very high altitudes or very high speed aircraft and should be thoroughly investigated. If it proves acceptable physiologically, the final provisions for escape should include both jettisoning and ejection, but where this proves impossible in any given case, it should be the function of some central authority or committee to state which system has to be installed.

1,446

Stewart, W.K. & Pekarek 1946 IMPROVED ESCAPE FACILITIES IN FLIGHT FOR PILOTS AND AIRCREWS IN SERVICE AIRCRAFT. (RAF, Ministry of Supply Great Britain) Scientific and Technical Memo, November 1946.

1,447

Stieglitz, W. I. 1952 COCKPIT DESIGN AND SAFETY. Aero Eng. Rev. 11:36-41. Oct. 1952.

1,448

Stieglitz, W. I. 1952 REARWARD FACING SEATS
(National Advisory Committee for Aero. Panel on Aircraft Accident Survival, 10 Dec. 1952)

1,449

Still, E.W. 1960 EQUIPPING MAN FOR A FLIGHT TO THE MOON
Engineering, (London) 189(4907): 634-635, May 6, 1960

ABSTRACT: A review is presented of a paper read before the British Interplanetary Society on April 28, 1960. A resume of the United States Space Program was given, followed by a discussion of the environmental requirements for interplanetary travel and the engineering techniques being developed to meet these requirements. (Aerospace Medicine 31(10): 869, Oct. 1960)

1,450

Stimler, F.J. & R.S. Ross 1960 DROP TESTS OF 16,000-SQUARE-INCH MODEL PARACHUTES VOLUME VIII SUMMARY REPORT
(Goodyear Aircraft Corporation, Akron, Ohio) Contract No. AF33(616)-2310 RDO No. 672-160 AF Technical Report 5867, April 1960. ASTIA AD 240877

ABSTRACT: Parachute model drop-tests program was conducted in the Goodyear Aircraft Corporation airship dock at Akron, Ohio. Twenty-seven different models of the following types with 16,000 sq. in. total canopy area were tested: Solid Flat, Solid Extended Skirt, Solid Spherical, Solid Conical, Airfoil, Exeter Type 12, Guide Surface, Ring Slot, and FIST Ribbon.

An information sheet is provided for each of the parachute models and includes a short statement describing general behavior of the parachute during descent and a basic reference list where more information may be found concerning similar parachutes. The following data are also tabulated for terminal vertical velocities of approximately 10, 15, 25 and 40 feet per second by taking the average value for both the horizontal and vertical types of release: drag coefficient, average glide angle, average and maximum angles of oscillation, logarithmic decrement, and frequency of oscillation.

Curves of drag coefficient vs. vertical descent velocity are presented for each parachute family for comparison purposes. The variation of average angle of attack with vertical velocity is presented for the Solid Flat Circular parachute. The effect of suspension-line ration on the drag coefficient of the Solid 10% Extended Skirt parachute is also given for the range of suspension line ratios of 0.60 to 1.40.

In general most of the parachutes tested showed a decrease in drag coefficient for an increase in vertical descent velocity; however, above a critical vertical velocity the drag coefficient became constant in most cases. Only for the very stable parachutes did the drag coefficient remain approximately constant for the vertical velocity

1,451

Stingely, Norman E. 1957 AEROMEDICAL EVACUATION LITTER PATIENT SAFETY HARNESS. WADD TR 57-6; ASTIA AD 110 695.

ABSTRACT: An aeromedical evacuation litter patient safety harness has been developed by New York University. WADC TR 55-333 "Aeromedical Evacuation Litter Patient Safety Device Study" (AD-104851) which resulted from the above contract has been included as an Appendix to give medical and operational requirements for a satisfactory litter harness, and also to give design data for a harness to fit the standard rigid aluminum pole folding litter. The standard pole litter was determined as not capable of withstanding the required g loads and was therefore modified. The harness developed by New York University was modified to function with the modified litter. The psychotic restraints were deleted from the harness and it is suggested a modification of the standard wrist and ankle restraint be used in conjunction with the harness for psychotic-neurotic patients. The modified harness was dynamically tested to determine the capability of restraining a patient to the litter during controlled crash landing. Dynamic litter tests indicated that the harness would restrain the patient up to at least 7.2 g and that the patient will better withstand the impact force if he is loaded head forward in relation to the aircraft.

1,452

Stoeckel 1942 SPECIAL SEAT AND CONTROLS DESIGNED FOR HIGH ACCELERATIONS. (Sitzanlage Mit Steuerungslinrichtung Fuer Hohe Flugbeschleunigungen) Forschungsbericht Nr. 1549, ASTIA ATI-51067 February 1942

ABSTRACT: The permissible acceleration in pulling out of a dive and with the crew in supine position amounts to 16 g over a period of 3 minutes. Thus, maneuverability of modern high performance airplanes, especially Stukas and fighters, is hardly affected by endurance limits attributable to physiological conditions.

For testing the inclined position of the crew in practical flight, a swivel seat, changeable from normal to supine position, equipped with contorl mechanism was developed and installed with dual control arrangement in the observer's place of a Ju 87

Take-off, landing, and normal flight were effected in normal position and three-dimensional curvilinear flights in supine position. Operation of the swivel seat manually about an axis extending through a point near the eye and fixed with respect to the airplane and a control mechanism which can be swivelled with the seat enable maneuverability of the airplane unaffected by swivelling and acceleration.

1,453

Stoll, A., B. M. Lewis, & D. H. Lewis 1955 MEASUREMENTS TO EVALUATE THE EFFECTIVENESS OF THE FULL PRESSURE HALF SUIT IN APPLYING EXTERNAL PRESSURE TO THE BODY. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5502; 21 March 1955

1,454

Stoll, A. M. 1961 THERMAL PROTECTION CAPACITY OF AVIATOR'S TEXTILES. (Naval Air Development Center, Johnsville, Pa.) Rept. NADC-MA-6120

ABSTRACT: Since the advent of high-speed aircraft and nuclear warfare, the need for protection of personnel from thermal injury has been greatly emphasized. Among the more immediate aviation needs is that for fire-resistant anit-G clothing. With this specific need to the fore, an interim method has been devised for the selection and evaluation of textiles on the basis of their resistance to degradation by thermal irradiation of appropriate intensity and their protective capacity when in contact with living skin. At the present time

although field testing is not yet complete, a satisfactory thermally-resistant anti-G suit appears to have been achieved through this effort. This suit is fabricated of DuPont Experimental Fiber HT-1 in a twill weave and double-layer construction. On the basis of percentage of total body burns indicated by fuel flame exposures of clothed dummies, it has proven superior to a double-layer nylon suit and the regulation fire-retarded cotton coverall over the cutaway anti-G suit. The present method is being modified to yield surface temperature measurements during irradiation to provide for the ultimate goal of devising a thermal protection index based on previously established relationships between these temperatures and the tissue damage resulting from thermal irradiation.

1,455

Stone, I. 1955 HELMET DESIGNED FOR SUPERSONIC BAILOUTS.
Aviation Week, Pp. 33-35, 12 Dec. 1955

ABSTRACT: A new full-face helmet has been developed to afford complete head and face protection for the pilot of today's high-speed aircraft. Retention of the conventional helmet and oxygen mask combination is among the prime requisites for survival in high-speed high-altitude bailouts and other emergencies, pilots say. North American Aviation will be the first to evaluate the new helmet, developed by Protection, Inc. The two firms have been collaborating on the project since the supersonic bailout of NAA test pilot George F. Smith (AW Nov. 14, p. 14). Frequently, windblast has ripped away helmet and oxygen mask, exposing pilots to hypoxia (lack of oxygen) and head and face injuries. Integration of the helmet and mask could eliminate the loss of these components in the face of strong windblast.

1,456

Stone, I., & E. Clark 1956 USAF REVEALS NEW X-2 CRASH DETAILS.
Aviation Week 65(19):26-27, 5 Nov. 1956.

ABSTRACT: New details on the loss of the Bell X-2 rocket research plane and the death of USAF Capt. M.G. Apt are revealed. Apparently high-speed pitching of the aircraft caused the pilot to eject the capsule. There is some indication that blackout due to excessive negative g forces may have prevented the pilot from completing the ejection procedures.

1,457

Stone, M.M. 1954 AUTOMOBILE SEAT BELT ASSEMBLIES. (Davis Aircraft Products

1,458

Stout, F.R. 1948 THE CASE FOR SHOULDER STRAPS.
Flying, Chicago, 42(1):33, 34, 85 Jan. 1948

ABSTRACT: A discussion of the use and the advantages of the shoulder harness in forced landings.

1,459

Stout, G. 1941 TEST OF MODIFIED PILOT SEAT #54642
(Bendix Aviation Corp., Bendix Products Div., South Bend, Ind.)
Report No. 289, ASTIA ATI-112158, 3 February 1941

ABSTRACT: The pilot seat used in the test was modified from the Standard Bendix pilot seat #54642 by the removal of the washer plates at the upper and lower tube support brackets. The bolts which fasten the tube support brackets The bolts which fasten the tube support brackets to the seat formerly were of the counter sunk head type which necessitated that the plates and seat back be machined to match. Since a 1/16" plate was added to the back to improve clearance problems, it appeared that the washers in the front side could be eliminated if button head type screws were used. This modification was made on the seat tested.

1,460

Stout, G.C. 1941 TEST OF BENDIX PILOT SEATS NO. 54761 and 54762
(Bendix Aviation Corp., South Bend, Ind.) Report no. 329,
ASTIA ATI 112 331, 13 August 1941

ABSTRACT: The seat tested was a Bendix pilot seat 54761 which is a seat equipped with Sutton Harness belt attachments. Seat 54762 differs from seat 54761 only by the addition of a parachute pack spacer which does not affect the strength of the seat. Therefore, this test also applies to seat 54762.

1,461

Strand, O. T. 1949 PROTECTIVE HELMET IMPACT TESTING EQUIPMENT. (Wright-Patterson AFB, Ohio) AFTR 5820. ASTIA AD 56 003

ABSTRACT: The apparatus necessary for impact testing of protective helmets is described. Its principle parts are a pendulum, an aluminum head, and recording equipment. Strain gauge accelerometers are mounted in the pendulum and in the head. The recording equipment consists of a dual beam cathode-ray oscilloscope and a high-speed camera using sensitized paper. The method of calibration, frequency response of components and overall frequency response and limitations of equipment are also discussed.

1,462

Strand, O. T. 1950 IMPACT EFFECT OF TWO TYPES OF PROTECTIVE HELMETS. (Wright-Patterson AFB, Ohio) AFTR 6020

1,463

Struthers, J.H. 1948 WIND TUNNEL TESTS OF THE CAPSULE EJECTION FROM A 1/12.775 SCALE MODEL OF THE XP-92 AIRPLANE. (Consolidated Vultee Aircraft Corp., San Diego Div., San Diego, Calif.) ASTIA ATI-49163, February 1957

ABSTRACT: Dynamic pilot capsule ejection tests were conducted on a 1/12.775 scale model of the XF-92 fighter with a ducted fuselage. The tests were made to determine the separation characteristics of the pilot capsule from the model with manual and parachute type release. A range of attitudes in pitch and yaw were tested at a dynamic pressure of 30 lb/sp ft. The investigation indicated separates more satisfactorily at all angles without the parachute than with it. The parachute is needed to stabilize the capsule after it leaves the afterbody.

1,464

Stubbs, R.A. 1951 CHARACTERISTICS OF THE I.A.M. EMERGENCY SEAT PACKS AND SEAT PANS UNDER INITIAL SEAT EJECTION CONDITIONS (Institute of Aviation Medicine, R.C.A.F., Toronto) R.C.A.F. Project No. AMTS 5/51, Report No. 1, Sept. 14, 1951. ASTIA ATI 172 039.

ABSTRACT: An attempt was made to analyze the effect of the Seat Pans placed between the subject and the Seat Pack. It seemed reasonable to assume that the

most desirable material for the construction of a Seat Pan would be one having the lowest rate of spring return to prevent additional peak accelerations to the subject. From the analysis, the rate of spring return of a rectangular disphragm as approximated by the Seat Pans, appeared to be a direct function of the modulus of elasticity of the material. Therefore, Seat Pans were constructed of materials of various moduli. The Seat Pans and Packs were subjected to ejection trails on the ejection test rig at Wright Patterson Air Force Base. The accelerations produced on the Jeection Seat, the Seat Pans, and on one hip and one shoulder of the subject, were measured and recorded.

The amount of measured data obatained from the limited number of ejection trials with one subject, tended to indicate that no significant differences in acceleration existed between the Seat Pans fabricated from aluminum alloy (65ST), magnewium, copper, stainless steel or plastic laminate. The trials carried out with two non-rigid Seat Pans, i.e., water cushions with and without baffles, indicated larger instantaneous accelerations than did the rigid Seat Pans. A trial without a Seat Pan of any type was made without discomfort to the subject. The comments of the subject indicated that the most comfortable Pan under ejection was the plastic laminate. The plastic laminate incidentally had the lowest modulus of all Seat Pans tested. On this limited amount of data, it is suggested that a number of Seat Packs be fabricated with plastic laminate Pans for further ejection trials.

1,465

Stubbs, R. A. 1953 DYNAMIC TRIALS OF ANTI-G VALVES
(RCAF Institute of Aviation Medicine, Canada) Rept. No. IAM 53/1; Encl. 1 to Air Attache, Ottawa, Rept. No. TL 59-56; ASTIA AD-103 483; 6 Feb. 1953

1,466

Stubbs, R. A. 1953 DYNAMIC CENTRIFUGE TRIALS OF ANTI-G VALVES
J. of Aviation Medicine 24(4):334-339 August 1953

ABSTRACT: The role of the Anti-G Valve has changed with the advent of modern, high speed aircraft. A smoother-operating, chatter-free valve is required to alleviate fatigue during normal flight wherein low accelerations are encountered for long periods of time. The valve must be of a non-leak type under acceleration to prevent the high valve temperatures which would exist with a continuous flow. In view of these new requirements for an Anti-G Valve, which were not entirely satisfied by the Clarke M-4 Valve, interest was taken in a new Valve designated tye type M-8, developed by Aro Equipment Corporation, and the United States Air Force. Comparative dynamic trials were then carried out on the Aro and Clarke Valves. The traisl were conducted using G-4A and G-4B type suits in order to determine the effects of incorporating the automatic shut-off valve in the G-4B suit. After the tests, it was agreed that the Aro M-8 valve has some advantages over the Clarke M-4 valve in meeting the Anti-G Valve requirements of a modern, high speed aircraft.

1,467

Stubbs, R.A. 1955 INFLATION SYSTEMS FOR THE ANTI-G SUIT IN PRESSURE BREATHING APPLICATIONS. (Flying Personnel Research Committee, Air Ministry) F.P.R.C. Memo. No. 60, May 1955

1,468

Sullivan, G.H., C.J. Martell, & G. Weltman 1963 MYOELECTRIC SERVO CONTROL. (Spacelabs, Inc., Van Nuys, California)

ABSTRACT: Under high accelerative forces, it becomes extremely difficult for a pilot physically to move his arms and hands to exercise control over his craft. By attempting to move his arms, the pilot generates muscles action potentials, or myoelectric signals, which may be utilized as a control source. The basic arm movements desired, and the muscles involved, were determined and the myoelectric activity patterns characteristic of the movements measured. Transforms were performed on the "raw" signals and control logics which relates myoelectric signals to desired servoaction were written. A simulator trainer was constructed which accepts the myoelectric inputs from sets of three or four muscles, indicates the desired arm movement, performs the preset logic on the elicited myoelectric signals, provides success-failure feedback and drives a splint in uniplanar up-down movement. The development of the control logics and servo system mark a significant advance in prosthetic control with direct application to amputees and malformed (Thalidomide) children.
(Aerospace Medicine 34(3):267, March 1963)

1,469

Summers, J.L. 1958 WIND-TUNNEL INVESTIGATION AT MACH NUMBERS FROM 0.6 to 1.4 OF SEVERAL EJECTED PILOT-SEAT MODELS (National Advisory Committee for Aeronautics) NACA RM A58E02, September 1958.

ABSTRACT: An experimental investigation was conducted to determine the static longitudinal and lateral directional aerodynamic characteristics of basic and modified versions of a conventional upward ejected pilot-seat combination, a sled-type upward ejected pilot-seat combination, and a downward ejected pilot-seat combination. Modifications to the basic models incorporated flow deflectors for pilot protection and drag reduction and various stabilizing devices. Test Mach numbers varied from 0.6 to 1.4, angles of attack from -28° to $+40^{\circ}$, and angles of sideslip from -16° to $+12^{\circ}$. Reynolds numbers ranged from 0.9 million to 1.8 million based on the projected frontal height of the models.

1,470

Swearingen, J.J. 1949 DETERMINATION OF THE MOST COMFORTABLE KNEE ANGLE FOR PILOTS. (Naval Medical Research Institute, Bethesda, Maryland) Report No. 4, ASTIA ATI-205871, 21 January 1949

ABSTRACT: The mean value for knee angle assumed by small groups of "tall", "medium", and "short" men, when permitted free choice in the adjustment of brake-rudder pedals, was found to be 110°. The precision of this man is probably adequate for application to cockpit design in view of the individual variation observed. (NMRI Abstract)

1,471

Swearingen, J. J. 1949 DETERMINATION OF THE MOST COMFORTABLE KNEE ANGLE FOR PILOTS. (Civil Aeronautics Medical Research Lab., Civil Aeronautics Administration, Aeronautical Center, Okla. City, Okla.) Project No. BIOTECHNOLOGY 3-48, Rept. No. 1, May 1949

ABSTRACT: The mean value for knee angle assumed by small groups of "tall", "medium", and "short" men, when permitted free choice in the adjustment of brake-rudder pedals, was found to be 110 degrees $\pm$ 4 degrees. The precision of this mean is probably adequate for application to cockpit design in view of the individual variation observed. (AUTHCR)

1,472

Swearingen, J. J., et al. 1949 SPECIFICATIONS FOR HEAD CLEARANCE AND AIRCRAFT DESIGN. (Civil Aeronautics Administration, Oklahoma City, Oklahoma)

1,473

Swearingen, J. J. 1951 DESIGN AND CONSTRUCTION OF A CRASH DUMMY FOR TESTING SHOULDER HARNESS AND SAFETY BELTS.
(Civil Aeronautics Medical Research Lab., Oklahoma City, Okla.) A preliminary Report. April 1951.

1,474

Swearingen, J.J. & D.J. Morrow 1956 MOTIONS OF THE HEAD AND TRUNK ALLOWED BY SAFETY BELT RESTRAINT DURING IMPACT. (Civial Aeronautics Medical Research Laboratory, Federal Aviation Agency, Oklahoma City, Okla.) Project. No. 53-204. June 1956.

ABSTRACT: This study was conducted to record and describe the actual path of motion of the head and trunk as it is propelled forward or to the side over a safety belt in a crash. Records of these orbits of motion for one hundred male subjects are presented in the three figures immediately following: Because of the low forces (about 1 g) used to displace the body in this study, the measurements presented here must be considered as minimal protective distances. In the crash situation two factors will certainly act to permit greater movements of the body. These are: (a) the greater forces involved in crashes, and (b) the practice of passengers wearing their lap safety belt more loosely than the standard maintained for these tests. In this connection laboratory tests were conducted, and even under the 1 g forward loading, it was demonstrated that the soft tissues of the abdomen are compressed until the safety belt is virtually a straight line across the iliac crest of the pelvis. Hence the forward displacement of the body will be increased one inch for every two inches of safety belt not pulled through the buckle.

1,475

Swearingen, J.J. & E.B. McFadden 1960 STUDIES OF AIR LOADS ON MAN. Human Factors, 2(2):84-91, May 1960
See Also Civil Aeromedical Research Institute, Federal Aviation Agency, Oklahoma City, Oklahoma. CARI Report 63-9

ABSTRACT: Data obtained in three different studies related to measurement of forces on the body due to air movement are summarized. The effects of short duration blast forces on personnel seated or standing at various distances from openings during pressure loss, blast forces necessary to disorient the body from numerous positions, effects of clothing on the drag forces, and measurements of forces and moments on the body during wind tunnel tests are discussed and compared.

1,476

Swearingen, J.J. & E.B. McFadden 1960 STUDIES OF AIR LOADS ON MAN. (Civil Aeromedical Research Institute, Federal Aviation Agency, Oklahoma City, Oklahoma) CARI Report 63-9,
See also Human Factors, 2(2):89-91. May 1960.

ABSTRACT: Data obtained in three different studies related to measurement of forces on the body due to air movement are summarized. The effects of

short duration blast forces on personnel seated or standing at various distances from openings during pressure loss, blast forces necessary to disorient the body from numerous positions, effects of clothing on the drag forces, and measurements of forces and moments on the body during wind tunnel tests are discussed and compared.

1,477

Swearingen, J.J., E.B. McFadden, J.D. Garner, J.G. Blethrow & W. Reed 1960 PROTECTION OF SHIPBOARD PERSONNEL AGAINST THE EFFECTS OF SEVERE SHORT-LIVED UPWARD FORCES RESULTING FROM UNDERWATER EXPLOSIONS. (Federal Aviation Agency, Civil Aeromedical Research Inst., Oklahoma City, Okla) Contr. NA-onr-104-51, Jan. 1960.

ABSTRACT: Human voluntary tolerances to vertical impact were determined while standing with knees locked, standing with knees bending, squatting, and seated in a rigid chair. Various energy-dissipating materials and devices were evaluated for protection against vertical impact.

1,478

Swearingen, J.J. & R.G. Snyder 1961 HUMAN TOLERANCE TO VERTICAL IMPACT. (Paper, Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Material Center, Philadelphia, Pa., June 14-15, 1961)

ABSTRACT: The results of several studies concerned with the voluntary physiological tolerance limits and transmission of impact forces parallel to the body's logitudinal axis (caudal-cranial) are presented. Over 500 tests of 13 male subjects were conducted utilizing an instrumented drop test apparatus. Impact forces at the foot and seat level and attenuation at shoulder level was measured for each subject. Results of the seated impacts showed that subjects seated on a rigid chair seat reached voluntary tolerance (complaints of severe pains in chest, head, abdomen, and lumbar spinal areas) when the shoulder accelerometer reached 10-12 G at over 600 G/sec. with mean initial impact loads of 95 G (.0075 sec, 19,000 g/sec jolt). Various materials and methods including Styrofoam, polyvinyl chloride, undrawn nylon, horsehair and rubber, hydraulic bleed pistons, and Stafoam were studied in an attempt to increase the deceleration time and subjects tolerance. Of these, Stafoam indicated most promise as a significant damping agent. Standing impact tolerance was studied with knees locked stiffly and with knees flexed. Attempts to determine static leg loading

through double exposure x-rays was essentially negative. Strength of the legs at various knee angles in both static and dynamic tests, and human tolerance to impact in the squatting position were also investigated. Brief discussion of more recent vertical deceleration research activities at CARI are noted.

1,479

Swearingen, J. J., A. H. Hasbrook, R. G. Snyder, & E. B. McFadden 1962 KINEMATIC BEHAVIOR OF THE HUMAN BODY DURING DECELERATION. (Civil Aeromedical Research Institute, Federal Aviation Agency, Oklahoma City, Oklahoma) Rept. 62-13; ASTIA AD-283 938; June 1962
See reprint Aerospace Medicine 33:188-197, Feb. 1962

ABSTRACT: The geometry of motion of the head, trunk and appendages was established for one hundred male subjects restrained by a safety belt during forward and side dynamic loadings. Lethal structures of present aircraft seating and cockpit arrangements are revealed by correlating crash injuries with these kinematic data. In addition an analysis of the forces created by body kinematics during forward deceleration sheds new light on seat anchorage problems. (AUTHOR)

1,480

Swearingen, J. J., C. D. Wheelwright & J. D. Garner 1962 AN ANALYSIS OF SITTING AREAS AND PRESSURES OF MAN.
(Civil Aeromedical Research Insititute, Federal Aviation Agency, Oklahoma City, Okla.) CARI Rept. No. 62-1, Jan. 1962. ASTIA AD 271 138.

ABSTRACT: Studies of sitting area on a plane rigid surface for a group of 104 male subjects were made. Area was found to vary with height and weight and to increase with age up to 40 years after which there is a steady decline. Means were 179.4 sq. in. for area and .92 pounds/sq. in. for average pressure. Sitting contact area was found to increase with experimentally applied force of magnitudes up to something less than body weight. Analysis of pressure distribution in the sitting area reveals that nearly half of the body weight is supported on 8% of the sitting area. This high pressure area is under or adjacent to the ischial tuberosities. Over one-thired of the body weight on the sitting area is removed by the addition of a footrest, chair arms, and a slightly sloping seat back. (Author)

1,481

Sweeney, H.M. 1948 PRINCIPLES OF PROTECTION AGAINST EFFECTS OF NEGATIVE G
Federation Proc., 7:121

1,482

Sweet, Harold S. 1943 MODEL 49 SEAT TESTS.
(Lockheed Aircraft Corp., Burbank, Calif.) ASTIA ATI-49761,
January 1943

ABSTRACT: At the request of the Stress Group, a Model 49 crew-compartment berth-seat, cabin side-bench, and cabin berth-seat were tested under flight and crash loadings. The crew compartment berth-seat withstood the test loads satisfactorily. After a number of modifications were made to the cabin side-bench and cabin berth-seat, they also carried the test loads

1,483

Swenson, Wayne A. 1959 A STUDY OF PARACHUTES AND SYSTEMS FOR AIRCRAFT DECELERATION
(Radioplane Company, Van Nuys, California) WADC Technical Report 57-128
January 1959 Contract No AF33(616)-2184 Expenditure Order No. R672-142
ASTIA AD 233185

ABSTRACT: A parachute deceleration system was installed in a fighter-type aircraft and tested in flight to determine feasibility of operation and usefulness in flight maneuvers. In addition flight test data was gathered to examine the validity of in-flight parachute-airplane theory developed in a previous study contract.

1,484

Sylvester, M. A. 1960 WIND TUNNEL STATIC STABILITY AND FORCE TESTS OF AN AIRPLANE ESCAPE CAPSULE WITH HIGH-DRAG WEDGETYPE FINS AT MACH NUMBERS 1.75 TO 4.00
(Ballistic Research Labs., Aberdeen Proving Ground, Md.) BRL memo. rept. no. 1313; Nov. 1960. ASTIA AD 323 920.

ABSTRACT: Wind tunnel tests were performed on a 1/25 scale model of Lockheed Aircraft Corporation's proposed high speed airplane escape capsule in the

Ballistic Research Laboratories' supersonic wind tunnel. The model escape capsule simulated the entire nose section of a typical supersonic aircraft and was stabilized by thick sweptback wedge-type fins. The aerodynamic characteristics for the capsule, with varying fin parameters, were determined in the Mach number range from 1.75 to 4.00 for angles of attack from -25 to +25 degree and angles of yaw from 0 to 25 degrees. These results are presented and are summarized and discussed at zero angles of attack and yaw and at trim conditions. (U) (Author)

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1,485

Tapley, B. D. 1960 STRESS-STRAIN CHARACTERISTICS OF MATERIALS AT HIGH STRAIN RATES, PART VI, THE PROPAGATION OF PLASTIC WAVES IN FINITE CYLINDERS OF A STRAIN-RATE-DEPENDENT MATERIAL. (University of Texas, Austin, Texas) Rept. SCDC-2156; Aug. 1960; Rep/3955

ABSTRACT: This work seeks to determine indirectly, by studying the propagation of plastic waves, the basic dynamic-stress strain characteristics of materials. It represents the first successful effort to incorporate in the mathematical analysis of plastic wave propagation in bars, a correction for the effects of lateral inertia and shear

1,486

Taylor, D., & S.R. Harris 1957 A VISUALIZATION STUDY OF WIND BLAST EFFECTS ON FLIGHT CLOTHING AND PERSONAL GEAR (U) (Arnold Engineering Development Ctr., Arnold Air Force Station, Tenn.) AEDC-TR-57-13, Aug. 1957. ASTIA AD 135 335

1,487

Tenney, S.M., & C.R. Honig, 1955 THE EFFECT OF THE ANTI-G SUIT ON THE BALLISTOCARDIOGRAM. REVERSAL OF NORMAL RESPIRATORY VARIATION AND CHANGE IN THORACIC BLOOD VOLUME. J. Aviation Med. 26(3):194-199

ABSTRACT: The standard U.S. Air Force pneumatic anti-G suit (type G-4A when inflated to a pressure above 75 mm. Hg. caused a diminution or reversal of the normal respiratory variation of the systolic complexes of the BCG. Indirect evidence has been presented to show that the pulmonary blood reservoir is enlarged at the time the respiratory variation is reversed from normal and with this observation an explanation has been sought for the change in right and left ventricular force relationships.

1,488

Terry, C.W. 1945 FLIGHT TESTS OF ANTI-BLACKOUT EQUIPMENT. (Committee on Aviation Med., U.S. Nat. Research Council, Washington, D.C. CAM 426, 25 April 1945.

1,489

Texas University 1955 CUSHIONING FOR AIR DROP, PART I. (Structural Mechanics Research Lab., Texas University, Austin, Texas) Contract No. DA 19-129-qm-150; Continuation of Contract No. DA 11-009-qm-19309; ASTIA AD-71 631; 15 July 1955

ABSTRACT: Work was initiated to (1) survey aerial delivery procedures, (2) analyze data on shock-absorbing systems, (3) design and analyze energy absorbing systems which may be used for cushioning in the air drop of supplies and equipment, (4) perform laboratory tests in the development of energy absorbing sytems, and (5) cooperate in the performance of field tests in which systems are used which laboratory and theoretical studies show to be efficient and economical The drop-test facility was developed to a point of satisfactory operation, and improvements are expected to proceed in parallel with the testing program. Specimens of some representative cushioning materials were subjected to extensive tests in connection with perpendicularly applied impact loads. A direct comparison unit energy absorption with maximum encountered stress and thickness efficiency is presented on a single chart. Auxiliary charts permit rapid solutions of cushioning problems. A comparison of the relative costs of retarders and cushioning show that substantial economics can result from a rational balance between these two methods of energy absorption.

1,490

Theiss, E. C., H. Mileaf, & F. Egan 1961 HANDBOOK OF ENVIRONMENTAL ENGINEERING. (Aeronautical Systems Division, Wright-Patterson AFB, Ohio) ASD TR 61-363; ASTIA AD-272 272

ABSTRACT: This handbook presents to the designer the many facets of environmental engineering as applied to flight vehicle systems and their support equipment. The entire gamut of environments, both natural and induced, as well as their effects and methods of protecting against them are discussed in detail. The environments are considered both separately, and, where the present state of the art permits, in various combinations. The importance of an environmental and an operational analysis during preliminary system design are also covered. Chapter headings from the handbook are: introduction (History and philosophy); Astrophysical facts and environments; Environmental factors and effects; Environmental requirements; Environmental protection; and Environmental testing. (AUTHOR)

1,491

Thomsen, W. 1959 ORTHOPEDIC ASSUMPTION FOR THE CONSTRUCTION OF AUTOMOBILE SEATS
(U.S. Dept Comm.) Tech. Transla. 59-17369
(order from SLA Translation Center , The John Crerar Library, 86 East Randolph St. Chicago 1, Ill.)

1,492

Thomson, F. B. 1943 URINAL FOR USE WITHIN FLYING CLOTHING
(National Research Council, Canada) C-2409; 17 Jan. 1943.

ABSTRACT: A rubber urinal for pilots of aircraft were standing to urinate is impossible and opening of clothing is undesirable has been developed. The urinal worn under the flying clothing allows urination at the normal rate in the sitting position and has been tested and found to function adequately during level flight aerobatics, and acceleration up to 5G.

1,493

Thorson, Alvar 1961 ORGANISATION OF THE SEATBELT CAMPAIGN
International Road Safety and Traffic Review 9:46-48

1,494

Thurlow, S.J. 1958 APPARATUS FOR TESTING PROTECTIVE HELMETS.
(Dept. of Scientific and Ind. Res. Read Res. Lab.) no. RM/3290/SJT, p.40 Aug. 1958

ABSTRACT: The revised British Standard 2001:1956 "Protective Helmets for Motor Cyclists" specifies new performance tests which were devised at the Road Research Laboratory. The note describes in detail the apparatus required for carrying out the tests, which are as follows:

1. Shock Absorption Test
2. Test for Helmet Strength and Resistance to Penetration
3. Test for Flexibility of Peak
4. Test for Attachment of Harness.

1,495

Tiller, P.R. and L.M. Libber 1958 A FIRST APPROACH TO THE USE OF VENTILATING AIR IN THE APH-5 CRASH HELMET Jour. Aviation Med., 29(3): 251, March 1958.

ABSTRACT: A study was conducted to determine the effect of ventilation on the thermal discomfort experienced by pilots wearing the one-piece APH-5 crash helmet in desert and tropical climates. Thermocouple measurements were made of head and helmet temperatures in subjects exposed to simulated tropical and desert conditions, with either the helmet unventilated or ventilated by the suction part of a commercial blower.

1,496

Tilley, A.R. 1941 REPORT OF A MEETING HELD AT THE OFFICE OF THE PRINCIPAL MEDICAL OFFICER, R.C.A.F. HEADQUARTERS IN GREAT BRITAIN, SEPTEMBER 16, 1941. (National Research Council, Canada) Report #C-2904

ABSTRACT: Minutes concern a conference on the manufacture of the Franks Flying Suit by the Dunlop Rubber Company, Manchester.

1,497

Tillman, J.M. 1956 SOME SAFETY CONSIDERATIONS FOR INTERIOR CABIN DESIGN OF NEW AIRCRAFT
(United Air Lines, Flight Safety Department, Sept. 10, 1956)

ABSTRACT: Developments in the science of design requirements for crashworthiness and de-lethalization of passenger transport aircraft have been conducted by many government agencies and private interests.

The purpose of this paper is to assist the United Air Lines DC-8 Coordination Committee members and others concerned by providing a guide summarizing some passenger cabin design requirements which will take advantage of the knowledge now available to the industry.

1,498

Titov, G.S. 1962 REPORT OF MAJOR GHERMAN S. TITOV AT FIFTH PLENARY MEETING OF COSPAR ON MAY 3, 1962
(Committee of Space Research (COSPAR), The Hague (Netherlands)) NASA N62-15330

ABSTRACT: Major Gherman S. Titov's speech, given at the Fifth Plenary Meeting of COSPAR, includes details of his flight on August 6-7, 1961, in the spacecraft Vostok II. Major Titov reviews the purpose and accomplishments of his flight. He indicates that reentry into the earth's atmosphere was accomplished by means of a parachute mechanism. The physical sensations he encountered during the flights are discussed.

1,499

Tobias, C.A. & J.V. Slater 1961 CERTAIN ASPECTS OF SPACE BIOLOGY
(Space Sciences Laboratory & Donner Laboratory of Biophysics & Medical Physics, Univ. of Calif., Berkeley, Calif.) USAEC & NASA Series No. 2; Issue No. 7, August 1, 1961

ABSTRACT: In this publication, the authors reach the following conclusions: (1) Space flight for man involves a great many physiological and psychological stresses. It is imperative that we carry out further research to understand man's homeostatic responses to these stresses and their limits. (2) Acceleration forces greater than 1 "g" cause profound chronic alterations in animal longevity, development, and physiology. (3) The condition of weightlessness presents a challenge to the biophysicist, for it presents a new environment, previously untested. It will probably cause chronic alterations in: (a) growth, differentiation and development. (b) longevity and metabolic physiology, with perhaps beneficial effects. (4) Underlying physical causes for the effects of weightlessness probably involve alterations in convection patterns. These appear to change the mode of mixing and of phase changes and might also result in reduced cell division. (5) Radiation hazards, particularly from flares and from heavy primaries, present a serious problem. For long voyages shielding must be applied For the most space radiations accelerators are available or could be built to evaluate biological effects. Two types of studies are of great interest: (a) neurological effects of radiation. (b) developmental effects in embryonic forms. (6) Knowledge in biology is gained slowly and many experiments need to be done. It would be useful if each satellite in the physical programs, particularly those that are to be recovered, would leave some space for a biological experiment. (7) Complete knowledge of planetary life will be gained only when man himself can go to the planets, hence the approaches described above are of some immediate significance. (Author)

1,500

Tobin, J.R. 1941 REPORT ON HYDROSTATIC SUIT.
(National Research Council, Canada) Report #C-2833, June 1941

ABSTRACT: Flight tests were made on the Franks Flying Suit in the Battle and Hurricane aircraft. The suit was found to prevent blackout up to 9 G. Notes for further service trials are included.

1,501

Tomcsak, S. L. 1960 DECELERATOR BAG STUDY.
(Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TR 59-775, June 1960.

1,502

Tompkins, R.C. & D.R. Gero 1951 EJECTABLE AIRCRAFT SEAT CAPSULE DEVELOPMENT PROJECT - PROGRESS REPORT NO. 1 - 1 FEB- 1 MARCH 1951
Goodyear Aircraft Corp., Akron, Ohio GER-2586) March 9, 1951 USN Contr. No. NOA (S)-51-292-c ASTIA ATI 139 544

ABSTRACT: During the past period, all work accomplsihed on the Ejectable Aircraft Seat Capsule was of a preliminary nature. Aeromedical limitations were investigated and evaluated, shell configurations were analyzed, and an aerodynamic program was drawn up and submitted. Two proposals were submitted to BuAer for capsule modification and one for the development of a jato propulsion unit. GAC was advised informally to incorporate armor in the capsule, design the configuration for a back type personal parachute, and to consider only upward ejection. Such considerations are being used for all future design under the assumption that official confirmation is forthcoming. Layouts were made for approximately seven capsules having rotating shells in an attempt to achieve the minimum size enclose. The best of these configurations was selected and the design frozen for use in fabriction of the wind tunnel models and mock-up. The capsule is being designed around the armor plate which will act as the central frame member. All loads will be transmitted into this frame. This report is divided into two sections. Section I discusses the work accomplished in the past period. Section II outlines the work to be accomplished during the next period as well as particular questions which should be answered by BuAer.

1,503

Tompkins, R. C. & D. R. Gero 1951 EJECTABLE AIRCRAFT SEAT CAPSULE DEVELOPMENT PROJECT - PROGRESS REPORT NO. 2 - 1 MARCH - 1 APRIL 1951. (Goodyear Aircraft Corporation, Akron, Ohio) GER-2586, Suppl. #1, April 7, 1951. USN Contr. No. NOA (S)-51-292-c. ASTIA ATI 139 545.

ABSTRACT: The past period was one of transition from preliminary investigation and evaluation to one of formulating working designs. As is the case in any such period, changes had to be made in basic thinking and designs. Such changes will continue to be made for the next several months.

A GAC representative visited the Bureau of Aeronautics and David Taylor Model Basin for the purpose of correlating the design requirements and fabrication of the wind tunnel models.

Slight changes have been made in the basic configuration to provide for better capsule operation and to improve the aerodynamic characteristics of the shell.

This report is divided into two sections. Section I discusses the work accomplished in the past period. Section II outlines the work to be accomplished during the next period as well as a review of existing design problems.

1,504

Tompkins, R.C. & D.E. Gero 1951 EJECTABLE AIRCRAFT SEAT CAPSULE DEVELOPMENT PROJECT - PROGRESS REPORT NO. 3 - 1 APRIL-1 MAY 1951 (Goodyear Aircraft Corp., Akron, Ohio) GER-2586, Supp. No. 2 May 2, 1951 ASTIA ATI 139 541

ABSTRACT: During the past period, the design of the capsule, structural analysis, and flight path calculations began to reach the transition period in which previous assumptions could be reasonably checked for accuracy and practicability. Drawings were released and fabrication started on the wind tunnel models, mockup shells, and seat adjusting guides. Detailed flight path analyses and a transitory analysis were completed for the capsule using a catapult for ejection. These analyses utilized the corrected weight, D.G., C.P., and moments of inertia for the capsule. More detailed calculations must be postponed until finalized information is obtained on the variables used in the calculations. It is apparent that the mockup will serve a very useful function in determining what limits must be held for clearances and pilot comfort.

1,505

Topliff, E.D.L. A STUDY OF ENERGY ABSORBING MATERIALS FOR THE PREVENTION OF IMPACT INJURY. (Defence Research Medical Laboratories, Toronto, Canada) F-8.

1,506

Tourin, B. & S. Macri 1953 AIRCRAFT SAFETY BELTS: THEIR INJURY EFFECT ON THE HUMAN BODY. (Aviation Crash Injury Research, Phoenix, Ariz.)

1,507

Tourin, B. 1958 EJECTION AND AUTOMOBILE FATALITIES. Public Health Reports 73(5):381-391. May 1958.

1,508

Tourin, B. and J. W. Garrett 1960 SAFETY BELT EFFECTIVENESS IN RURAL CALIFORNIA AUTOMOBILE ACCIDENTS. (Crash Injury Res., Cornell Univ., New York) Feb. 1960.

1,509

Tourin, B., & J. W. Garrett 1960 A REPORT ON SAFETY BELTS TO THE CALIFORNIA LEGISLATURE; SUMMARY AND ANALYSIS OF CALIFORNIA HIGHWAY PATROL REPORTS ON OPINIONS ON 54,348 AUTOMOBILE ACCIDENTS. (Results of a joint study by the California Highway Patrol and Automotive Crash Injury Research of Cornell Univ.) Feb. 1960

1,510

Tourin, B., J. W. Garrett 1960 A COMPARISON OF INJURIES TO USERS AND NON-USERS OF SAFETY BELTS. SAFETY BELT EFFECTIVENESS IN RURAL CALIFORNIA. (Highway Patrol and Automotive Crash Injury Research of Cornell Univ.) Feb. 1960

1,511

Townsend, D. E. 1960 SERVICE TEST OF HELMET, COMBAT VEHICLE CREWMAN, T56-6 (U.S. Army Artic Test Board, Fort Greely, Alaska) ATB 2-150; May 31, 1960; DA Project Nr 7-80-05-001. ASTIA AD 238 507.

ABSTRACT: This report describes the experiments concerning the Combat Vehicle Crewman's Helmet, T56-6. Annex A gives the details of the tests. Annex B contains the deficiencies and suggested modifications of the helmet.

1,512

Tripp, R.C.H. 1945 RECENT ADVANCES IN RESEARCH ON PARACHUTES IN THE GERMAN AIR FORCE. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 635, July 1945.

1,513

Tufts U. Inst. 1957 HUMAN ENGINEERING BIBLIOGRAPHY, 1955-1956. (Tufts U. Inst. for Applied Experimental Psychology, Medford, Mass.) (Office of Technical Services, Washington D. C.) PB 131507.

1,514

Turnbow, J. W., & C. C. Steyer 1955 CUSHIONING FOR AIR DROP, PART II AIR DROP COST ANALYSIS. (Structural Mechanics Research Lab., Texas University, Austin, Texas) Contract No. DA 19-129-qm-150; ASTIA AD-87 732; 19 Dec. 1955

ABSTRACT: An investigation was made of properties of cushioning materials and systems used in air drops. A method is presented for analyzing the cost of aerial delivery by parachute, by cushioning, and by a combination of parachute and cushioning. The selection of cushioning materials will be based on the cost per unit energy absorbed, adaptability for use as cushioning material, availability, and ability to function under a wide variety of conditions. General equations of energy absorption costs are derived in terms of air-retarder and cushioning-cost parameters with respect to wide range of conditions pertaining to the parameters and to air-retarder drag coefficients, air density, and ground energy absorption factors. Studies showed that certain cushioning materials can be used with reduced parachute areas to greatly reduce the present cost of delivery. Parachutes are more economical than cushioning for energy absorption at high velocities, but cushioning is more economical in absorbing the remaining energy at velocities less than the optimum. Optimum impact velocities appear to be in the range of 30 to 100 fps. Because of efficient energy dissipation at high velocities retarders should be used to reduce terminal velocities to values near the optimum impact velocity, cushioning should provide the balance of the energy absorption.

1,515

Turnbow, J. W., H. Matlock, & J. N. Thompson 1956 CUSHIONING FOR AIR DROP, PART III, CHARACTERISTICS OF PAPER HONEYCOMB UNDER DYNAMIC LOADING. (Texas University, Austin, Texas, Structural Mechanics Research Lab.) Contract No. DA-19-129-qm-150; ASTIA AD-112 164; 31 Aug. 1956

ABSTRACT: This report is devoted to the presentation and discussion of the dynamic stress-stress-strain curves of seven grades of paper honeycomb and of the associated characteristic values relating to aerial delivery applications. The effects of impact velocity and density of the honeycomb material on the stress-strain characteristics are given. Tabulated values of maximum stress, optimum strain and energy absorption are presented and a comparison of the various honeycomb materials is made on the basis of cost per unit of energy absorbed. As an aid to the understanding of the over air-drop energy-absorption problem, the economic importance of using cushioning materials of a crushable nature, or equivalent energy-absorbing devices, in conjunction with aerial retarders is summarized. The capabilities of paper honeycomb are illustrated further, by the presentation of a cost analysis for the energy-absorption in a typical air-drop. Recommendations for the future study and testing of paper honeycomb as well as other materials and systems potentially even more efficient than honeycomb are discussed.

1,516

Turnbow, J. W. 1957 CUSHIONING FOR AIR DROP, PART VII, CHARACTERISTICS OF FOAMED PLASTICS UNDER DYNAMIC LOADING. (Structural Mechanics Research Lab., Texas University, Austin, Texas) Contract No. DA 19-129-qm-150; ASTIA AD-215 412; 28 March 1957

ABSTRACT: Dynamic stress-strain curves of four foamed plastic materials, including a polyisocyanate-resin suitable for field expansion without the aid of curing ovens or other special equipment, are presented and discussed. Static stress-strain curves are also presented to provide a comparison with the dynamic test results. Additional curves and tables give energy-absorption characteristics, stress levels, and suggested operating limits for the use of these materials in aerial delivery cushioning. Further comparisons of the plastic materials with paper honeycomb are presented with emphasis on cushioning costs and energy absorption capabilities.

1,517

Turnbow, J. W. 1961 U. S. ARMY H-25 HELICOPTER DROP TEST 22 OCTOBER 1960 (Aviation Crash Injury Research, Phoenix, Arizona) AvCIR 2-TR-125, TREC Tech. Rept. No. 60-76, March 1961. ASTIA Doc. No. AD-261 96?

SUMMARY: This report presents the results of an exploratory, experimental study. A Piasecki Model H-25A helicopter has been employed in recreating

a typical accident approximating an unsuccessful attempt to attain autorotation from a low altitude power failure. Relatively high (50G to 100G) vertical and longitudinal accelerations have been observed for periods in the order of 10 milliseconds in an impact leaving the cabin area of the airframe reasonably intact. Failure of all seats occurred without failure of either seat belts or shoulder harness. The instrumentation and research techniques used in (1) the measurement of the impact forces and accelerations, (2) the determination of the feasibility of utilization of on-board recorders, and (3) the evaluation of certain problems inherent in the dynamic crash testing of full-scale helicopter and VTOL aircraft were presented in an earlier preliminary report. (Author)

1,518

Turnbow, J. W., V. E. Rothe, G. M. Bruggink, & H. F. Roegner 1962
CRASH INJURY EVALUATION. MILITARY TROOP SEAT DESIGN CRITERIA.
(U. S. Army Transportation Research Command, Fort Eustis, Va.)
TREC TR 62-79, Nov. 1962.

ABSTRACT: This report was prepared by Aviation Crash Injury Research. It contains the results of a careful analysis of troop seat deficiencies conducted over the past three years. The analysis was made in light of accident experience with this seat, human tolerance as presently known, and accelerations and forces which may be anticipated in potentially survivable accidents involving army aircraft.

The analysis revealed that the strength requirements quoted in current military specifications are considerably lower than (1) those which would be dictated by the upper limit of accelerations which can be tolerated by the occupants of the seats; (2) they were also lower than the accelerations and forces which probably occur in many Army aircraft accidents. 22* This substantiates the observation by the Army that these seats fail under relatively minor accident conditions, thus subjecting the occupant to further hazards, especially to increased contact injuries.

On the basis of the detailed examination of current specifications, human tolerance, and impact acceleration data, it is recommended that the troop seat specifications be revised and that dynamic load factors of 25 G for 0.20 second plus 45 G for 0.10 second be adopted for troop seat design in the longitudinal and lateral directions and 25 G for 0.10 second for the vertical direction. In addition, an energy absorption capability must be incorporated into the seat system to reduce the vertical accelerations on the occupant, which would frequently exceed 25 G, to a tolerable level.

1,519

Turnbow, J.W., V.E. Rothe, G.M. [illegible] & R.F. Reagner (#2) CRASH INJURY EVALUATION: MILITARY TROOP SEAT DESIGN CRITERIA. (Aviation Crash Injury Research, Phoenix, Arizona) TCREC Technical Report No. 62-79, November 1962.

ABSTRACT: This report is made of results of careful analysis of military troop seat deficiencies conducted over a three year period. Available data have been translated into terminology, meaningful to engineering personnel. Utilization of the information presented would produce a seat representative of the current state of the art and greatly reduce incidence of needless injury and death attributable to troop seat failure in survivable-type Army aircraft accidents.

1,520

Tyrer, J. & K.V. Robertson 1944 REPORT ON ANTI-G EQUIPMENT. (Report, Comm. Flying Personnel Research) RAAF-FR 95, 13 Aug. 1944

RESTRAINT, PROTECTION, AND EMERGENCY ESCAPE SYSTEMS

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1,521

U.S. Adjutant General's Office 1958 MILITARY ASPECTS OF SPACE EXPLORATION (Adjutant General's Office, Washington, D.C.) Spec. Bibliography No. 16; June 1958

ABSTRACT: This bibliographic survey was made to throw light on available unclassified literature that points up the military implications of space exploration. The materials are arranged in alphabetical order by title within major and subordinate subject groups. The major groups are miscellaneous; United States space effort; Soviet Russia space effort; satellites, trends and developments (electronics, navigation, orbits, propulsion, guidance control, and telemetry); environmental factors and problems (acceleration, survival, weightlessness); exploration of the moon and Mars; space ships and stations; international and legal aspects; and conferences. conventions, and symposia.

1,522

U.S. Air Force 1947 BACKWARD SEATING EXPERIMENT FOR PASSENGER TRANSPORT AIRCRAFT. (Air Transport Command, Traffic Division) April 1947.

1,523

USAF AMC 1948 ACCESSORIES, PILOT EJECTION SEAT TEST OF. (USAF, Air Material Command, Wright-Patterson AFB, Ohio) Memo. Rept. MCREXE-672-22F

1,524

USAF, AMC 1948 STABILIZATION OF PILOT EJECTION SEAT. (USAF, Air Material Command, Wright-Patterson AFB, Ohio) Memo. Rept. MCREXE-672-22H. 16 July 1948.

1,525

U. S. Air Force 1948 TEST FIRING OF T-7 CATAPULT FOR DOWNWARD SEAT EJECTION. (Aero Medical Laboratory, Wright-Patterson AFB, Ohio) Memorandum Report MCREXD-695-74.1, 11 May 1948.

1,526

U.S. Air Force 1949 STRENGTH REQUIREMENTS FOR SEATS IN USAF AIRCRAFT. (Reference letter, Deputy Chief of Staff, Materiel, Hq USAF, to CG, Air Materiel Command, 14 June 1949.)

1,527

U. S. Air Force 1950 COMPARATIVE AND OPERATIONAL SUITABILITY TEST OF FLYER'S PROTECTIVE HELMETS. Final Report. (Air Proving Ground, Eglin AFB, Florida) Project No. 3506----5, 19 May 1950.

1,528

USAF 1950 SAFETY SHOULDER HARNESS, TYPES G-1,G-2 and G-3 USAF Memorandum Report no. MCREXD-666-25B, 22 Aug., 1950

ABSTRACT: This report deals with the design of a new type or the modifying of the present type shoulder harness in order that the correct fit and adequate strength would be obtained for maximum protection of flying personnel.

1,529

U. S. Air Force 1951 ANALYSIS OF EJECTION SEAT OPERATION IN JET FIGHTER ACCIDENTS. (Medical Safety Division, Directorate of Flight Safety Research) M-37, pp. 1-23, Aug. 1951

1,530

U.S. Air Force 1952 THE BEGINNINGS OF RESEARCH IN SPACE BIOLOGY AT THE AIR FORCE MISSILE DEVELOPMENT CENTER, HOLLOMAN AIR FORCE BASE, NEW MEXICO, 1946-1952
(Air Force Missile Development Ctr., Holloman AFB, N. Mex.) ASTIA AD 208 018

ABSTRACT: The first installment toward fulfilling the need for examining the history of Air Force participation in space-biology research. A serious study of

the origins of biological projects, their gradual evolution, and their scientific and technical contributions is of considerable value in avoiding old mistakes or duplicating previous efforts, and for suggesting new paths of endeavor in the planning and pursuit of the more complex programs required in the immediate future. The V-2 and Aerobee rocket experiments and balloon flights are reviewed, with emphasis upon the biomedical information obtained therefrom. Experiments included fungus spores, fruit flies, mice hamsters, cats, dogs, and monkeys as subjects. The effect at high speed and altitude of G forces, subgravity, and cosmic radiation were major factors explored. Experience gained in rocket and balloon launching, instrumentation and recovery techniques, and the growing collection of scientific data particularly related to cosmic radiation and subgravity problems marked the practical beginnings of Air Force research in space biology.

1,531

U.S. Air Force 1952 LIST OF PERSONNEL ATTENDING THE CONFERENCE ON "PROBLEMS OF EMERGENCY ESCAPE IN HIGH SPEED FLIGHT" AT WRIGHT-PATTERSON AFB, OHIO, 29-30 SEPTEMBER 1952.

1,532

U.S. Air Force 1952 USAF MEDICAL FLYING SAFETY REPORT OF EJECTIONS FOR 1952. USAF, Norton AFB, Calif.

1,533

U. A. Air Force 1953 OPERATIONAL SUITABILITY TEST OF THE MARK IV CONTINUOUS-WEAR ANTI-EXPOSURE SUIT.
(Air Proving Ground Command, Eglin Air Force Base, Fla.) July 1953.
ASTIA AD 16 299

SUMMARY: The Mark IV suit which is designed to provide protection to aircraft members in the event of bailing out over water, was tested to determine its suitability for tactical use under arctic and temperate winter conditions. The suit was found to provide adequate protection at -560 F. It does not impose excessive restrictions on the wearer. The Mark IV boots provide foot protection in low temperatures if mild exercise is taken. The suit with a hood is capable of maintaining body comfort for 2 hours in sub-freezing water (28° F.) at air temperatures as low as -40° F. The time required to don the suit is excessive. The inner liners are not correctly sized, and a hood is not provided to protect the head and neck in low temperatures. The material of which the outer garment is made is easily snagged and torn. The Mark IV suit, as tested, is not entirely suitable for use by aircrew members in winter conditions. A report of immersion tests is appended.

1,534

USAF 1953 PRESSURE SUITS: A CHAPTER FROM PHYSIOLOGY OF FLIGHT. (Department of the Air Force, Washington, D.C.) AF Manual No. 160-30, p. 65-79, July 1953

1,535

U.S. Air Force 1954 HUMAN RESCUE EQUIPMENT (CAPSULE TYPE) (Wright Air Development Center, Wright-Patterson AFB, Ohio) Exhibit WCLEH-5-12, Aug. 1954.

1,536

U. S. Air Force 1954 ESCAPE FROM HIGH SPEED AIRCRAFT. (Army Air Forces, Air Materiel Command Engineering Division) 26 Nov. 1954. ASTIA ATI 9213.

ABSTRACT: This report presents the history, current progress, and future plans for escape from high speed aircraft.

1,537

MOTION PICTURE

U. S. Air Force Film Library Center 1955 HUMAN FACTORS IN EJECTION SEAT DESIGN (Air Force Film Library Ctr., St. Louis, Mo.) Film No. 23035, 16 mm, Silent

ABSTRACT: This film is concerning six tests of downward seat ejection using a dummy showing leg restraint devices.

1,538

U. S. Air Force 1955 OPERATIONAL EXPERIENCE WITH EJECTION ESCAPE SYSTEMS FROM 1 JANUARY 1949 THRU 31 DEC. 1954. (Norton AFB, Calif.) Publication 23-55, AFR 190-16, Aug. 1955

ABSTRACT: This report presents an analysis of all (518) ejection seat bailouts from United States Air Force jet fighter and bomber aircraft since the beginning of ejection seat use (1 January 1949) through 31 December 1954. The efforts upon personnel as related to aircraft model, airspeed, altitude, crew training and other factors are presented; specific and general areas of difficulty in the operation of ejection seat and canopy systems are determined; and recommendations are presented for reducing the incidence of unsuccessful and/or accidental ejection. Some typical ejection briefs are included.

1,539

U.S. Air Force 1955 [illegible] AIRCRAFT AT HIGH SPEED [illegible] Aerial Laboratory, Air Force Missile Development [illegible] AFB, New Mexico) Rept. No. 2, 21 June 1955.

1,540

USAF, WADC, Air Res. & Dev. Comm. 1956 UNITED STATES AIR FORCE PARACHUTE HANDBOOK (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC technical rept. 55-265, December 1956, ASTIA AD-118 036

ABSTRACT: The United States Air Force Parachute Handbook is a collection of information, test results, and other technical data pertaining to the application, design, construction, and testing, of parachutes, parachute systems, and accessories. The contents of this Handbook represent the state-of-the-art of parachute development, design, fabrication, and testing, and will be amended as the state-of-the-art advances.

1,541

U. S. Air Force 1957 GENERAL DATA ON SEAT EJECTION. (Office of Inspector General, USAF, Directorate of Flight Safety Res., Norton AF B se, Calif.) 1 Jan. 1957 - 31 Dec. 1957.

1,542

U.S. Air Force 1958 MAJOR ACHIEVEMENTS IN BIODYNAMICS: ESCAPE PHYSIOLOGY AT THE AIR FORCE MISSILE DEVELOPMENT CENTER, HOLLOMAN AIR FORCE BASE, NEW MEXICO, 1953-1958. (Air Force Missile Development Ctr., Holloman AFB, New Mex.) ASTIA AD 201 282

ABSTRACT: A detailed report of work done at Holloman Air Force Base between 1953-1958 on the following subjects: (1) deceleration and windblast experiments on the Holloman track: (2) specialized windblast studies; (3) other work on the escape problem; (4) seats and capsules (conflicting views of escape).

1,543

U. S. Air Force 1958 REPORTS ON SPACE MEDICINE - 1958. (Air University, School of Aviation Medicine, Randolph AFB, Texas) Feb. 1958.

ABSTRACT: This publication contains the following papers: "Human Performance in the Space Travel Environment" by G. T. Hauty; "Supersonci and Hypersonic Human Flight" by J. E. Ward, S. J. Gerathewohl and G. R. Steinkamp; "Human Engineering

of the Sealed Space Cabin" by G. R. Steinkamp; "Fatigue, Confinement, and Proficiency Decrement" by G. T. Hauty and R. B. Payne; "The Feasibility of Recycling Human Urine for Utilization in a Closed Ecological System" by W. R. Hawkins; "Space Cabin Requirements as Seen by Subjects in the Space Cabin Simulator" by W. R. Hawkins and G. T. Hauty; and "Weightlessness - The Problem and the Air Force Research Program" by S. J. Gerathewohl.

1,544

U. S. Air Force 1958 GENERAL DATA ON SEAT EJECTION.
(Directorate of Flight Safety Research, Norton Air Force B se, California)
1 Jan. 1958 - 31 Dec. 1958.

1,545

U. S. Air Force 1959 USAF SEAT EJECTION, 1 JAN. 1959 THROUGH 30 JUNE 1959.
(Office of Inspector General, USAF, Directorate of Flight Safety Res., Norton AFB, Calif.)

1,546

U. S. Air Force 1959 SEAT: UPWARD EJECTION, AIRCRAFT.
MIL-S-9497, March 1959.

1,547

U. S. Air Force 1959 SELECTED SEAT RESTRAINT DIMENSIONS.
(Anthropology Section, Aerospace Medical Lab., Wright Air Development Ctr.)

1,548

U.S. Air Force 1960 PROCEEDINGS OF WADC SPACE TECHNOLOGY LECTURE SERIES, VOLUME I, TECHNICAL AREAS
(Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 59-732
ASTIA AD 235 424

ABSTRACT: This report is a consolidation of the papers presented by members of the WADC laboratories at its Space Technology Lecture Series between 7 Oct. 1958 and 11 Dec. 1958. The papers were prepared for the purpose of cross-education and therefore are directed toward an audience representing many disciplines of science and engineering. The presentations contained basic technical as well as state-of-the-art information in at least sixteen unique technical areas and subsystems

directly related to space technology. The topics covered in this report are as follows: Propulsion; Flight Mechanics and Structures; Flight Control; Guidance; Communications; Secondary Power; Supporting Subsystems; Reconnaissance; and Vehicle Defense, technical areas: International Geophysical Year - The Ground Work for Space Flight; Environment of Space; Mechanics of Space Flight; Electromagnetics; Space Medicine; and Materials.

1,549

U.S. Air Force 1961 AT SUPERSONIC VELOCITY.
(Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio) Trans. No. FTD-TT-61-203, 27 November 1961. ASTIA AD 268 072.
From Sovetskaya Litva, p. 3. 28 July 1961.

ABSTRACT: New types of ejection seats were developed in recent years. Instead of pyrotechnic cartridges, they use rocket engines. The most perfect samples allow ejections at velocities up to 24000 km/hr. Developed also were the first samples of special safety capsules. They are like small cabins formed by extensive walls. Such a capsule closes automatically and becomes hermetically sealed prior to catapulting, c fering protection against counter stream of air, and safe landing. In addition, it serves as a container for rescue devices (Parachutes, emergency supply, oxygen equipment, etc.) and as a rescue raft in case of falling into the water. (Author)

1,550

U.S. Air Force 1963 NEW GERMANY (SELECTED ARTICLES)
Translation Services Branch, Foreign Technology Division, WP-AFB, Ohio
FTD-TT-62-1584/1+4 Jan. 17, 1963 ASTIA AD 295 769
Original Source: German Newspaper, Neues Deutschland, August 14, 1962, Pp. 1 & 2

ABSTRACT: This publication contains a group of articles praising the flights of spaceships Vostok III and Vostok IV.

1,551

U.S. Air Force 1963 INVESTIGATION OF CREW ESCAPE SYSTEM SURFACE IMPACT TECHNIQUES FOR ADVANCED AEROSPACE VEHICLES.
(Aeronautical Systems Division, Dir/Aero-mechani ., Flight Dynamics Lab., Wright-Patterson AFB, Ohio) Final Report ASD-TDR-63-173, May 1960.

ABSTRACT: This report describes the results of a four-part study related to the parachute landing impacts of a manned capsule. A survey of literature, with the objective of establishing human tolerance to rapidly applied

acceleration, revealed a substantial discrepancy among the data published by investigators in this area. The tolerance limits published in HIAD were accepted as the parametric limits for the present study, pending the completion of advanced studies in this area. Analyses of typical parachute landings revealed that horizontal velocities of up to 56 fps and vertical velocities of up to 33 fps are possible. Secondary impacts resulting from toppling are likely. Active and passive attenuation methods were quanitatively evaluated in an effort to determine an optimum attenuator. From the results of this evaluation, it was recommended that an active type system by developed to negate the horizontal velocity and that a conventional passive type system be employed to alleviate the vertical impact. A study of experimental techniques indicated that part-scale model testing is feasible and advantageous for a program in which prototype attenuators are validated. Methodologies were derived for dynamic scaling of the results obtained from small model experiments to permit prediction of full size model performance.

1,552

U.S.A.F., Air Information Division 1961 FURTHER DETAILS ON GAGARIN FLIGHT (Science and Technology Branch, Air Information Division) AID Rept. 61-113 July 27, 1961 ASTIA AD 261 454

ABSTRACT: The present brief report recounts certain details found in three articles published by USSR scientists and discusses the implications of this information. The first article was written by Professor G.V. Petrovich and published in the Vestnik of the Academy of Sciences USSR. The second is a TASS interview with Professor V.V. Dobronravov. The third was written by Inna Yavorskaya, scientific secretary of the Interplanetary Travel Commission of the Academy of Sciences USSR.

1,553

U.S. Air Information Division 1961 COMPREHENSIVE ANALYSIS OF SOVIET SPACE PROGRAM (BASED ON SOVIET OPEN LITERATURE 1958-61) (Science and Technology Section, Air Information Division) AID Rept. 61-72; 22 May 1961; ASTIA AD 260 501

ABSTRACT: This report is based on more than 200 articles, official (TASS) reports, sketches, and books published in connection with the Soviet space program. The report reflects information on Soviet space technology covering a period of about 3 years (1958-61). The report consists primarily of comments published by Soviet specialists in astronautics and of opinions formed by the writer on the basis of his analysis of this information. In most cases, the Soviet comments and opinions are closely paraphrased, rather than directly quoted. In expressing his own opinions and conclusions, the writer has attempted to show the inferences on which they are based. The literature surveyed has led the writer toward several tentative conclusions which, if correct, may be of considerable significance. These opinions concern the launching and recovery systems used in the Soviet space programs.

1,554

U.S. Air Information Division 1961 SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS (Science and Technology Section, Air Information Division) AID Rept. 61-41 March 24, 1961 ASTIA AD 254 413

ABSTRACT: This is the first in a monthly report series reviewing Soviet developments in life support systems as reflected in Soviet publications. In this series, materials will be grouped according to the following topics: I. Space medicine and biology; II. Space physiology; III. Perceptual physiology; IV. Space psychology; V. Space vehicle ecology; VI. Survival conditions; and VII. Instrumentation. This report is based on source materials made available at the Air Information Division during February, 1961. Items are selected from Soviet open literature and include scien tic publications and literature of a popular type. Materials in this report deal with topics I, II, V, and VI.

1,555

U.S.A.F., Air Information Div. 1961 SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS (Science & Technology Section, Air Information Division) AID Work Assignment No. 22, Rept. 4, AID Rept. 61-109; July 1961 ASTIA AD 261 452

ABSTRACT: This is the fourth in a monthly report series reviewing Soviet developments in life support systems as reflected in Soviet publications. This report is based on materials made available at the Air Information Division during June 1961. Items are selected from Soviet open literature and include scientific publications and literature of a popular type.
The materials in this report deal with the following topics:

I. Space Medicine and Biology
II. Space physiology
III. Space psychology
IV. Space vehicle ecology

1,556

U.S.A.F., Aerospace Information Div. 1961 SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS (Science and Technology Branch, Aerospace Information Division) AID Work Assignment No. 22, Report 6 AID Rept. 61-143 October 27, 1961 ASTIA AD 267 426

ABSTRACT: This is the sixth in a monthly report series reviewing Soviet developments in life support systems as reflected in Soviet publications. It reviews Soviet developments in space biology, medicine, vehicle ecology, and life support instrumentation. This report is based on materials made available at the Aerospace Information Division during September 1961. Items are selected from Soviet open literature and include scientific publications and literature of a popular type.

1,557

U.S.A.F., Aerospace Information Division 1961 SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS
(Science and Technology Branch, Aerospace Information Division) AID Work Assignment No. 22, Report 7 AID Report 61-168 December 20, 1961 ASTIA AD 271 154

ABSTRACT: This is the seventh in a monthly report series reviewing Soviet developments in life support systems as reflected in Soviet publications. This report is based on materials made available at the Aerospace Information Division during October-November 1961. Items are selected from Soviet open literature and include scientific publications and literature of a popular type.

The materials in this report deal with the following topic: Space medicine and biology.

1,558

Aerospace Information Div. 1962 SOVIET MANNED SPACE FLIGHT LIFE SUPPORT SYSTEMS: MEDICAL AND BIOLOGICAL ASPECTS OF THE VOSTOK-3 AND VOSTOK-4 FLIGHTS
(Aerospace Information Div., Washington, D.C.) AID Rept. No. 62-191; Nov. 1962 ASTIA AD 291 911

ABSTRACT: The medical and biological aspects of the Vostok-3 and Vostok-4 flight, including selections of orbits, physical and psychological preparation, medical monitoring, radiation protection diet, cabin ecology, and projected problems for interplanetary flight, were reviewed. The sources are from Soviet open-literature, chiefly newspapers, published in the period from August thru October, 1962.

1,559

Aerospace Information Div. 1962 PRINCIPLES OF LIFE SUPPORT IN SPACE BASED ON SOVIET OPEN LITERATURE PUBLISHED IN CONNECTION WITH THE VOSTOK-3 AND VOSTOK-4 LAUNCHINGS. (Aerospace Information Div., Washington, D.C.) 5 Dec. 1962. ASTIA AD 291 910.

ABSTRACT: Descriptions of the principles of life support in space used by Soviet specialists at the present time for orbital flights, and those which are being discussed and developed for future long-range missions have been extracted from more than two hundred articles and TASS reports published predominantly in Soviet newspapers in connection with the launching of the Vostok-3 and Vostok-4 spaceships. The articles were written by various specialists in the field of space technology, including academicians, corresponding members of the Academy of Sciences, professors, doctors of biological sciences, doctors of medical sciences, candidates of medical and technical sciences and physics and mathematics, engineers, science reporters, and cosmonauts. Primary emphasis was placed on discussions of data which describe the design elements of

equipment used in space applications, including the spaceship cabin, automatic devices, equipment used in the cosmonaut training program. Psychological and physiological conditioning and responses and safety factors are included.
(Author)

1,560

U.S. Aerospace Technical Intelligence Center 1961 DETAILS OF THE LEGENDARY FLIGHT
(Aerospace Technical Intelligence Center, Wright-Patterson AFB, Ohio)
Trans. No MCL-1035 16 April 1961 ASTIA AD 261 805
Original Source: Komsomol'skaya Pravda 91(11031): 1-3

1,561

USAF Air Technical Intelligence Center. 1952 AIRCRAFT TYPE 29: EJECTIONS BY CATAPULT SEAT.
(Wright-Patterson AFB, Ohio) ASTIA AD 153 353.

1,562

U. S. Air Technical Intelligence Ctr. 1955 PRESSURIZED SUITS (COMBINAISONS PRESSURISEES). (Air Technical Intelligence Ctr., Wright-Patterson AFB, Ohio) Rept. No. ATIC-236836-B, C; Trans. No. F-TS-8803/III; Trans. from l'Air and Aviation; ASTIA AD-105 079; Sept. 1955

1,563

U.S. AAF Air Technical Service Command 1947 NOTES ON DECELERATION AT BAIL-OUT OF AIRCRAFT. Memorandum Reel - C 262. A.T.I. 7236
10 April 1947.

ABSTRACT: In this report the results are presented of considerations and calculations covering deceleration, velocity, and time during bail-out of high speed aircraft. As a result of the high speed the air forces on a human body leaving a plane without opened parachute are very high and can increase to such an extent that the limit a man can withstand may be surpassed. The decelerations were investigated for velocities from 300 mph to 600 mph, for altitudes from sea level to 40,000 ft and for drag areas from the largest and smallest cross-section of a human body, for average drag area obtained from human free-falling tests, and for a human body leaving a plane with ejection seat.

1,564

Armament Research Dept. 1946 PILOT EJECTION, RESULTS OF PHYSIOLOGICAL TESTS AT A.R.D. BALLISTICS (L.P.D.) (Armament Research Dept., White Lea) Note No. 130, Sept. 1946

1,565

Armed Services Technical Information Agency 1959 BIO-ASTRONAUTICS AN ASTIA REPORT BIBLIOGRAPHY (Armed Services Technical Information Agency, Arlington, Va.) Feb. 1959 ASTIA AD 211 775

ABSTRACT: This bibliography covers the literature from 1952-1958.

1,566

Armed Services Technical Information Agency 1962 HUMAN ENGINEERING, AN ASTIA REPORT BIBLIOGRAPHY (Armed Services Technical Information Agency, Arlington, Virginia) May 1962, ASTIA AD-274 800

1,567

U.S. Army 1958 EVALUATION OF THE U. S. NAVY PILOTS PROTECTIVE HELMET. TYPE APH-5.
(Army Aviation Board, Fort Rucker, Ala.) April 1958; Proj. No. AVN 4157.1/58. ASTIA AD 161 095.

1,568

U. S. Army 1960 HIGH ALTITUDE RELEASE, LOW OPENING PARACHUTE DELIVERY OF PERSONNEL. (Quartermaster Field Evaluation Agency, U. S. Army, Quartermaster Research and Engineering Command, Fort Lee, Virginia) Technical Rept. E-49; FEA ABN 5827; June 1960

ABSTRACT: This project was conducted to qualify selected personnel in body stabilization free-fall techniques and to develop their technical competency to participate in engineering design evaluations and engineering tests of developmental parachutes and air delivery equipment. The project included a program of instruction conducted by qualified personnel for the selected group of parachutists. This course included (1) classroom instructions in the theory of stabilized free-fall parachute jumping, (2) theory of parachutes and special equipment, (3) physical training, (4) operation, maintenance, and use of special equipment, (5) physiological training and instructions in proper use of oxygen, (6)

procedures and techniques of exit from U. S. Army aircraft, and (7) a series of qualifying parachute jumps which included both static line release and free-fall manual ripcord release.
The project has qualified personnel to participate in engineering design evaluations and engineering tests of developmental parachutes and air delivery equipment. To maintain this capability, the above course, somewhat modified in scope and emphasis, is being continued. (USA)

1,569

U. S. Army Airborne & Electronics Board 1959 TEST OF PAPERBOARD HONEYCOMB FOR USE WITH THE STANDARD TYPE AERIAL DELIVERY SYSTEM. (Army Airborne & Electronics Board, Fort Bragg, N. C.) Project No. AB 958; ASTIA AD-212 249; 27 Feb. 1959

ABSTRACT: Service tests were made to determine the suitability of paperboard honeycomb for use with the standard-type aerial delivery system.
The paperboard honeycomb was constructed of untreated 80-lb basis weight kraft paper containing ½ in. cells, expanded and double faced. It is available in an expanded and an unexpanded form. In the expanded form a sheet measures 96 by 33 in., and weighs 13.5 pounds. Tests included (1) the determination of physical characteristics, (2) rigging of Army equipment on the current standard-type aerial delivery platforms, (3) loading of rigged loads into appropriate aircraft, (4) functioning as an energy dissipator, (5) ease of derigging, and (6) resistance to the effects of exposure to weather. Representative items of Army equipment rigged and subjected to a static drop and at least 3 drops from aircraft included (1) the 105-mm howitzer (6100-lb gross weight), (2) a ¼-ton trailer (5500 lbs), (3) a 3/4-ton trailer (6500 lbs.), (4) the 3/4-ton M37 truck (8109 lbs), (5) the M29C cargo carrier (6566 lbs), (6) the 76-mm T-124 gun (5162 lbs), (7) the 2-½-ton M34 truck (17,103 lbs), and the ¼-ton M38A1 truck (4089 lbs). As a result of the tests the following conclusions were made: (1) paperboard honeycomb is suitable for use with the current standard-type aerial delivery system in temperate climates, and (2) paperboard honeycomb when used as an energy dissipator with the standard-type aerial delivery system is less resilient and a better energy dissipator than the current standard-type felt shock pad.

1,570

U.S. Army Arctic Test Board 1960 SERVICE TEST MODIFIED TROOP TYPE T-10 PERSONNEL PARACHUTE HARNESS INCORPORATING MODIFIED CAPEWELL CANOPY RELEASE ASSEMBLY
(U.S. Army Arctic Test Board, Fort Greely, Alaska) DA Project Nr 7-87-03-004 ASTIA AD 236476

ABSTRACT: This is a detailed report of the modified troop type-10 personnel parachute harness incorporating modified capewell canopy release assembly. Also included is Annex A through E.

1,571

U. S. Army Arctic Test Board 1960 REPORT OF TEST OF PROJECT NR ATB 3-430 SERVICE TEST OF PARACHUTE JUMPING FROM ARMY AIRCRAFT (H-37) (DA Project Nr 9-38-04-000), 20 May 1960.

ABSTRACT: The purpose of these series of tests was to determine the suitability of the H-37 helicopter for aerial delivery of Army troops, supplies, and equipment under arctic winter conditions. Also, it was necessary to determine safe procedures for parachute jumping from the H-37 helicopter under arctic winter conditions. It was found that the H-37 helicopter, when modified by the installation of the anchor cable assembly described in Sikorsky Drawing S1507-5120-C less the starboard cable, will be suitable for parachute delivery of a maximum of 16 combat equipped parachutists under arctic winter conditions. When so modified, the H-37 helicopter will be suitable for consecutive delivery of standard type aerial delivery containers from the door or from the external cargo hook followed by parachutists from the door under arctic winter conditions. No requirement exists for the starboard anchor cable under arctic winter conditions and the item should be deleted from Sikorsky Drawing S1507-512-C for installation in the H-37 helicopter. The requirement for use of the static line protective shield will be limited and infrequent and therefore the shield should be locally fabricated by using units as required.

1,572

U. S. Army Artic Test Board 1962 REPORT OF TEST OF PROJECT NR ATB 3-262 SERVICE TEST OF PARACHUTE ASSEMBLY, PERSONNEL, FREE-FALL-TYPE, STEERABLE (INTERIM HALO). (US Army Artic Test Board, Fort Greely, Alaska) Project Nr. ATB 3-262, ASTIA AD-277654, 9 June 1962.

ABSTRACT: Tests were conducted in Alaska to determine the suitability of the Parachute Assembly Personnel, Free-Fall-Types, Steerable, (Interim Halo) for Army use under artic conditions. The tests included an inspection of physical characteristics and preoperational deficiencies and another inspection of functional suitability of automatic parachute ripcord release, altimeter, and stop watch. Further tests included investigations of the functional suitability for free-fall parachuting, determination of suitable jump procedures, maintenance and durability and reliability.

1,573

U. S. Army Board for Aviation Accident Research ARMY AVIATION HELMET EXPERIENCE. (United States Army Board for Aviation Accident Research, Report No. HF 4-61

1,574

U. S. Army Board for Aviation Accident Research HU-1 SEAT FAILURES, A REPORT OF FOUR CASES. (U. S. Army Board for Aviation Accident Research, Ft. Rucker, Alabama)

1,575

Army Board for Aviation Accident Research 1961 ARMY AVIATION HELMET EXPERIENCE
(Army Board for Aviation Accident Research, Fort Rucker, Ala.)
Rept. no. HF 4-61 1961 ASTIA AD 262 880

ABSTRACT: The purpose of this research was to determine the effectiveness of hard shell helmets for preventing loss of life and injuries during Army aircraft accidents and to summarize comments on helmets in current use. The wearing of hard shell helmets was credited with prevention of head injuries to 265 occupants of Army aircraft during the period studied. Factors of convenience and comfort, particularly heat retaining qualities, constitute major objections to wearing the APH-5 helmet. (Author)

1,576

U. S. Quartermaster Food & Container Institute for the Armed Forces 1958 DYNAMIC PROPERTIES OF ENERGY ABSORBERS FOR USE IN AERIAL DELIVERY. (Quartermaster Food and Container Institute for the Armed Forces, Chicago) Rept. No. 10-58; Tech. Rept. No. 175; June 1958. ASTIA AD 219 659.

ABSTRACT: Data on dynamic performance of energy absorbers are required to establish a rational design of packaging for airdrop. Paper honeycomb, empty beer cans, and styrofoam were evaluated under dynamic conditions to determine their energy-absorbing characteristics. A mass of known weight was dropped on the test specimens at velocities up to 59 fps. Force, time and displacement were recorded during impact. The average constant dynamic stress values for the materials were as follows: Grade 2 honeycomb, 3, 140 psf; Grade 3 honeycomb, 8, 890 psf; Grade 6 honeycomb, 4290 psf; styrofoam, 6450 psf; and beer cans, 15,600 psf. The average energy-absorbing values in foot-pounds per square foot per inch of displacement of the material were as follows: Grade 2 honeycomb, 360; Grade 3 honeycomb, 615; Grade 6 honeycomb, 412 styrofoam, 560; and beer cans 1430.

1,577

U. S. Army Quartermaster Research and Engineering Command 1958 REINFORCEMENT OF SUSPENSION FOR PARACHUTISTS SAFETY HELMETS. (Quartermaster Research and Engineering Command, Natick, Mass.) Textile Engineering Lab. rept. no. 196; May 1958. ASTIA AD 202 466

ABSTRACT: Several suspension slings were made with a stitching system and installed in a parachutists safety helmets. The suspension slings withstood 40 ft-lb in a drop test. Recommendations were made to specify a 3/4 by 3/4 in. box stitch with 6 to 7 stitches/in. of stitch type 301 and nylon thread. This conforms to the requirements of type II, class 1 or 2 Spec MIL-T-7807A.

1,578

U. S. Army Quartermaster Research & Engineering Command 1960 AIR DELIVERY ENGINEERING STUDY, M-831, AIRBORNE DITCHER. (Quartermaster Field Evaluation Agency, U. S. Army Quartermaster Research & Engineering Command, Fort Lee, Va.) Tech. Rept. E-51, FEA ABN 5937, Sept. 1960.

ABSTRACT: An air delivery engineering test was conducted to determine the structural adequacy of the M-831 Airborne Ditcher for air delivery. Both static and airdrop tests were made to obtain the necessary data required for evaluation. Standard air delivery equipment was used wherever possible. The air delivery system was designed for an impact velocity of 25 feet per second and an impact deceleration not to exceed 20 g's or a damage susceptibility factor of 20.

Four instrumented static drop tests were performed at the FEA's Static Drop Facility from a height of 8 feet to determine a suitable energy dissipating unit. The results of static drop tests gave an average impact load factor of 17.9 g's. Five airdrop tests were made on the FEA's Tracking Range from a C-130 aircraft flying at an indicated airspeed of 130 knots and an absolute altitude of 1,500 feet. The gross weight of the system, rigged for air delivery, was 20,600 pounds. A 24-foot fist ribbon cargo extraction parachute was used for extraction and 6 G-11A cargo parachutes were used for retardation. The extraction force varied between 17,000 and 19,500 pounds and the average opening force for each of the 6 G-11A cargo parachutes was 2.23 g's. The results of the airdrop tests gave the average equilibrium rate of descent, we_o, as 21.7 feet per second. It was concluded that the test item is functionally suitable for air delivery providing the test item is modified to include (1) 4 suspension points, (2) 4 load-bearing plates attached to the basic frame, and (3) installation of a permanent brace to secure the discharg conveyor assembly. It was recommended that the M-831 Airborne Ditcher be submitted to the appropriate agencies for air delivery service test when the proposed modifications are accomplished. (Abstract Bibliography Technical Reports Published Fiscal Year 1961, Quartermaster Research & Engineering, Airborne Test Activity, Yuma Test Station, Arizona, Aug. 1961. ASTIA AD 262 97)

1,579

U. S. Army Quartermaster Research & Engineering Command 1961 AIR DELIVERY ENGINEERING STUDY OF TRANSPORTER, LIQUID, ROLLING WHEEL TYPE, 600 GALLON, T-4.
(Quartermaster Airborne Test Activity, Quartermaster Research & Engineering Command, U. S. Army, Yuma Test Station, Arizona) Techn. Rept. E-59; March 1961. ASTIA ATI 61014.

ABSTRACT: An air delivery engineering study was conducted to determine the structural adequacy of the Transporter, Liquid, Rolling Wheel Type, 600 Gallon, T-4 for low velocity type air delivery; to design a low velocity air delivery system for use with U. S. Air Force aircraft, utilizing standard air delivery components wherever possible; and to determine if the air delivery system is functionally suitable to submit to the appropriate agencies for service test. A series of static drop tests were conducted to determine the structural adequacy of the test item when dropped using standard air type equipment and paperboard honeycomb energy dissipating material. The air delivery system was designed for an impact velocity of 25 feet per second and an impact deceleration of 20 g's. A series of airdrop tests were conducted to determine the functional suitability of the air delivery system. These tests were conducted from a C-130 cargo aircraft flying at 130 knots indicated airspeed and 1500 feet absolute altitude. The gross weight of the CEP system, prepared for air delivery, was 8700 pounds. A 22-foot cargo extraction parachute was used for extraction and three G-11A cargo parachutes were used for load retardation.

It was concluded that the test item was structurally adequate for air delivery and the proposed air delivery system was functionally suitable for air delivery and recommended that the air delivery system be submitted to the appropriate agencies for service test. (Abstract Bibliography Technical Reports Published Fiscal Year 1961, Quartermaster Research & Engineering, Airborne Test Activity, Yuma Test Station, Arizona, Aug. 1961. ASTIA AD 262 197)

1,580

U. S. Army Quartermaster Research & Engineering Command 1961 QUARTERMASTER RESEARCH AND ENGINEERING AIRBORNE TEST ACTIVITY.
(Airborne Test Activity, U. S. Army, Yuma Test Station, Arizona)
Aug. 1961. ASTIA AD 252 197

ABSTRACT: The Airborne Test Activity, a subordinate Engineering Test Activity of the Quartermaster Research and Engineering Command is responsible for the timely accomplishement of that portion of the Air Delivery Equipment Project approved and assinged by Headquarters, Quartermaster Research and Engineering Command and includes (1) Engineering studies, evaluations, surveys, and tests of Army air delivery material, systems and techniques. (2) Development of new and improved test method. (3) Provision of air delivery testing services to other United States Military agencies.

The Activity's end product is a technical report, published by the Activity and distributed by Headquarters, Quartermasters Research and Engineering Command, which presents the results of engineering tests and studies of Final Letter Reports Tentative Evaluations, and bound Technical Reports. This bibliography is a compilation of the Activity's accomplishments during the past fiscal year and contains abstracts of the bound technical reports published and a listing of other reports forwarded. The reports are cross-referenced by test number and title.

1,581

U.S. Army Signal Corps Project Michigan 1961 REPORT: SEVENTH ANNUAL HUMAN FACTORS ENGINEERING CONFERENCE, 3-6 OCTOBER 1961. (U.S. Army Signal Corps Project Michigan, University of Michigan, Ann Arbor, Mich.). Pp.81-84; 209-217. ASTIA AD 267 153.
NOTE: See Fedderson, W.E. and McCort F.P.

1,582

U.S. Army Air Force 1941 EJECTION OF PILOT FROM COCKPIT OF PUSHER TYPE AIRPLANES (U.S.AAF, Air Materiel Command, Eng. Div., Aircraft Laboratory) ER EXP-M-587-10 dated 23 July 1941

1,583

U. S. Army Air Forces 1943 EFFECT OF ACCELERATION ON ESCAPE FROM AIRCRAFT. Appendix J. TSELA-3-697-11, 28 February 1943.

1,584

U. S. Army Air Forces Board 1944 ANTI-"G" FLYING SUITS---COMPARATIVE TESTS OF THE CLARK AND BERGER MODELS. (Eglin Field, AAF Proving Ground Command) Project No. 3658-C-422.3., 8 Nov. 1944

ABSTRACT: After flight tests by 8 experienced pilots, it was concluded that the Clark coverall suit is superior to the Berger Bros. G-2 model, especially in regard to comfort. The Cornelius Clark valve which supplies the pressure also perforns better at altitude than the Berger Bros. valve.
Photographs of the Clark suit and Cornelius Clark valve and drawings of the Berger Bros. valve are included.

1,585

U. S. Army Air Force 1945 EFFECT OF ACCELERATION ON ESCAPE FROM AIRCRAFT (Paper, Conference on "Human Factors in the Design and Operation of Aircraft" Aero Medical Laboratory, Engineering Division, Wright-Patterson AFB, Ohio, 19, 20 Jan. 1945) ASTIA ATI 12 729.

1,586

U.S. Army Air Force 1945 EVALUATION OF GERMAN PILOT EJECTION SEAT(USAAF, Air Materiel Command, Eng. Div., Aircraft Lab.) RST from TSEAL2L to TSEAL6D, 11 June 1945.

1,587

U.S. Army Air Force Materiel Center 1945 COMPARISON OF THE PROTECTIVE VALUE OF AN ANTI-BLACKOUT SUIT ON SUBJECTS IN AN A-24 AIRPLANE AND ON THE MAYO CENTRIFUGE (Army Air Forces Materiel Center, Mayo Aero Medical Unit) Contract no. W(33-038)ac-9166, October 1945.

ABSTRACT: The experiments to be described in this report are a continuation of studies being carried out in an attempt to determine the applicability of observations made on the human centrifuge to the aviator exposed to positive acceleration in flight. In the experiments to be described the protection afforded against the effects of positive acceleration by an anti-blackout suit was assayed on a series of individuals acting as subjects in an airplane and on a centrifuge. It was found that despite the higher g tolerance of the subjects when in the airplane, the amount of protection afforded by the anti-blackout suit was the same in the airplane as it was on the centrifuge.

1,588

U.S. Army Air Force 1946 ACCIDENT TYPES AND GENERAL CAUSE FACTORS: A. SUMMARY OF "REPORT ON THE HAZARDS OF ESCAPING FROM AIRCRAFT IN COMBAT" (R.A.F. Inst. of Avn. Med. - March 1946); B. SEAT FAILURES IN HIGH-SPEED AIRCRAFT. (AAF Flying Safety Service, Medical Safety Division) Medical Investigators' Accident Bulletin 2(10): Oct. 1946.

1,589

U.S. Army Air Force 1946 A METHOD FOR CALCULATING THE TRAJECTORY OF A MAN EJECTED FROM AN AIRPLANE (U.S. AAF Air Materiel Command, Eng. Div., Aircraft Lab.) MR TSEAC3-4534-1-1, 29 July 1946.

1,590

U.S. Army Air Force 1946 CERVICAL FRACTURE DESPITE THE USE OF THE SHOULDER HARNESS. In Accident Bulletin for Medical Investigators (Continental U.S. Army Air Forces, Hq. AAF, AC/ AS-3 Flight Operations Div., Flying Safety Branch) P. 2. Feb. 1946.

1,591

U.S. Army Air Force 1946 REQUIREMENTS FOR PILOT EJECTION IN FIGHTER AIRPLANES. (U.S. AFF, Air Material Command, Eng. Div., Aircraft Lab.) TSEAC11-4534-7-2, add. no. 1, 1 May 1946.

1,592

U.S. Army Air Force 1946 PILOT EJECTION FORCE MEASUREMENTS MOROC ARMY AIR FIELD FLIGHT TESTS (USAAF, Air Materiel Command, Edg. Div., Aircraft Lab.) MR TSEAC12A-4303-45-1, 30 July 1946

1,593

U. S. Army Air Force 1946 PILOT EJECTION SEAT TESTS AT MUROC ARMY AIR FIELD (U.S.A.A.F. Air Materiel Command, Eng. Div., Aircraft Lab.) MR TSEAC11-4303-45-2, 30 July 1946.

1,594

U. S. Army Air Force 1946 PRINCIPLES OF COCKPIT SEATING (Army Air Forces Air Technical Service Command, Engineering Division) TSEAA-695-58C, 28 February 1946, ASTIA AD-50569.

ABSTRACT: The purpose of this report is to present a study of seating requirements for the pilot position in all types of military aircraft. The subject study is one of a series committed to the determination of the fundamental seating and position requirements of flying personnel in the various new positions of military aircraft. The present report covers the position requirements of pilots of aircraft having the wheel-type control, and summarizes the results of both studies.

1,595

U.S. Army Air Force 1947 SEAT FAILURE.
(AAF Flying Safety Service, Medical Safety Division)
Medical Investigators' Accident Bulletin 3(5): May-June 1947.

1,596

U. S. Coast Guard 1956 AIRCRAFT EMERGENCY PROCEDURE OVER WATER. (Available through U. S. Govt. Printing Office) CG 306.

I,597

U.S. Continental Air Command 1956 PRELIMINARY REPORT ON A SUBSTANTIATED SUPERSONIC EJECTION. (Continental Air Command, Mitchell Air Force Base, N.Y.) Med. Training Bull. 3(3):1-5, Feb. 1956.

1,598

U.S. Dept. of Health, Education & Welfare 1958 BIBLIOGRAPHY OF SPACE MEDICINE (U.S. Dept. of Health, Education & Welfare, Public Health Service, National Library of Medicine, Reference Division, W shington, D.C.) Public Health Service Publication No. 617; Public Health Service Bibliography Series No. 21

ABSTRACT: This bibliography contains information on the following topics: sealed cabin problems; acceleration/deceleration; fractional and zero gravity; cosmic radiation; survival problems; psychological and social problems; ground crew problems; and extra-terrestrail aspects.

1,599

U.S. Directorate of Research and Development FUNDAMENTALS OF ASTRONAUTICS (Directorate of Research and Development, Headquarters USAF, Washington, D.C.) ASTIA AD 252 825

ABSTRACT: This paper is intended to serve as a brief refresher for some of the physics and physiology of space flight. It will also define some of the more important astronautical terms and concepts. The author defines the separate layers of the Earth's atmosphere including the troposphere, stratosphere, ionosphere, and exosphere. He then discusses the solar system including the planets, satellites, asteroids, and sun. The physics of space flight is discussed with particular emphasis on rocket propulsion, thrust, specific impulse, mass ratios, thermal efficiency, and propulsion efficiency. The subject of human factors in space flight concentrates largely on the aspects of cabin environment requirements, waste disposal, weightlessness, isolation and sensory deprivation, cosmic radiation, and limited G forces.

1,600

U.S. Federal Aviation Agency 1961 AFT VS. FORWARD FACING SEATS IN TRANSPORT AIRCRAFT.
(ATA Memorandum distributed at the FAA-Industry Conference, Washington, D.C., June 8 and 9, 1961)

1,601

Foreign Tech. Division 1963 DROPPING THE CARGO WITHOUT A PARACHUTE.
(Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio) 15 February 1963. ASTIA AD 400 530
Trans. No. FTD-TT-62-1842 from Przeglad Techniczny, 14:2, 1962

1,602

U.S. House of Representatives 1957 AUTOMOBILE SEAT BELTS (Report on the Special Subcommittee on Traffic Safety of the Committee on Interstate and Foreign Commerce.)
(House of Representatives) House Rept. No. 1275; 1957.
See also Stapp, J. P. 1957 Automobile Seat Belts.

1,603

U. S. House of Representatives 1957 A REPORT OF THE TESTIMONY FROM MEMBERS OF THE CORNELL COMMITTEE FOR TRANSPORTATION SAFETY RESEARCH.
Seat Belt Hearings in the United States House of Representatives, presented April 30, 1957 in a hearing before the Special Subcommittee on Traffic Safety of the Committee on Interstate and Foreign Commerce.)

1,604

National Research Council 1946 HAZARDS OF SEAT BACKS IN AIRCRAFT ACCIDENTS. (Crash Injury Research, National Research Council, Washington, D.C.) 18 October 1946.

1,605

U. S. Navy Department, Bureau of Aeronautics, Washington 1942 REPORT ON RESEARCH PROJECT --- ANTI-BLACKOUT SUIT AND ATTACHMENTS. (Memo from Medical Research Section to Director, Div. Med. Res., Bureau of Medicine and Surgery 14 Oct. 1942)

ABSTRACT: The physiological basis of anti-"g" suits is discussed and the history of the Navy pulsating pressure suit and early constant pressure suit is given.

1,606

US NASA, Program Office, Mercury/Atlas Launch Vehicle. 1961 MERCURY/ATLAS LAUNCH VEHICLE FACTORY ROLLOUT INSPECTION GENERAL PROCEDURES AND ORGANIZATION--PILOT SAFETY PROGRAM OF THE ATLAS LAUNCH VEHICLE FOR NASA PROJECT MERCURY. Aerospace Corp., El Segundo, Calif. Rept. No. TOR-594 (1101) RP-3 Contract No. AF04 (647)-930, 31 Oct. 1961.

1,607

U.S. Office of Naval Research 1946 MONTHLY REPORT OF THE SPECIAL DEVICES CENTER, DECEMBER 1946
(Office of Naval Research, Special Devices Center, Port Washington, L.I., N.Y.)
ASTIA ATI 28590

ABSTRACT: Synthetic training devices, teaching aids, human engineering, tactical evaluators, research tools, and training methods are the fields for which special devices have been developed. In order to familiarize the operator with his duties, new training techniques include assessing dry aircraft rocket and bombing runs, remote scoring target, projector smoke generator, coordination of navigation devices, and contact-flight simulator. A discussion is given of the pilot ejection seat which is necessary for escape from high-speed aircraft. New developments in sighting for aircraft and anti-aircraft gun systems are automatic sighting systems combining radar information, a gyro unit, a computer, and servos. It is suggested that television be used for mass training of personnel which is an important factor in emergencies.

1,608

U. S. Navy 1947 PILOT'S EQUIPMENT EMERGENCY RELEASE BELT TYPE AND SEAT TYPE. (Medical and Safety Department Aircraft, Fleet Marine Force, Atlantic Marine Corps Air Station Cherry Point, North Carolina) B M&S Research Project X-677 (Av-358-a) Report No. 3, 30 July 1947, ASTIA TIP-U 2998.

ABSTRACT:
1. A prototype of a pilot's equipment emergency release has been developed embodying headset, oxygen, microphone, anti-G suit, and heating suit connections as well as the shoulder straps and safety belt release. All are released with the one simple motion already familiar with pilots; namely, releasing the safety belt.
2. Such a release is desirable for quick escapes because it:
   (1) Quickly disconnects the pilot from all of his plane connections when the safety belt is released,
   (2) reduces escape time 100%.
   (3) prevents equipment entanglements during escapes where the pilot either willfully failed to complete disconnections or did not have time to do so,

(4) Centralizes connections formerly scattered throughout the cockpit thereby making more room in the cockpit, is situated at the waist level where the bulky anti-G and heating suit connections will be the shortest and most out of the way.

(5) Puts pilot's connections in a comfortable out-of-the-way position reducing entanglements and annoyances in flight, and

(6) is easily adaptable to the ejection seat through the use of the seat release, and makes possible the use of oxygen with the initial descent in the ejection seat.

3. These prototypes have been favorably "jumped" tested. (NCAS Abstract)

1,609

U. S. Navy 1949 AN INVESTIGATION OF LAP TYPE SAFETY BELTS AND SHOULDER HARNESSES.
(Naval Aircraft Factory) Rept. M-4851; 1 June 1949.

1,610

USN Special Devices Center 1950 BIBLIOGRAPHY OF HUMAN ENGINEERING REPORTS
(USN Special Devices Center, Port Washington, N. Y.)
NAVEXOS P 530 B, Rev. Nov. 1950.

ABSTRACT: This bibliography categorizes the entries broadly into the following topics and subtopics: learning--training methods, mass training, criterion studies; motor skills--general, positioning reactions, transfer; perception--general, vision, audition; voice communications--general, speech intelligibility, measurement, training; extreme environmental factors; syetems analysis--surface, subsurface, aircraft, airships, radar equipment; training devices--general, gunnery, flight; research tools; human engineering in general. (Tufts)

1,611

U.S. Navy Department 1953 PILOTS PROTECTIVE HELMETS, SERVICE EVALUATION OF (Naval Air Test Center, Patuxent River, Maryland) Project TED No. PTR-AE-525032, 30 Jan 1953, ASTIA ATI No. 208 289

ABSTRACT: The purpose of the tests described in this report was to investigate the operational suitability of five types of experimental helmets and to

compare them with the H-3 helmet. The five protective helmets tested were not superior to the H-3 helmet design and were not adopted for service use. The following features would have to be incorporated for acceptable service: a two-piece design; a maxamum weight of two and one-half pounds complete; a minimum of electrical connections; a full vision visor or integral full vision goggles; adjustable sling suspension.

1,612

U.S. Navy 1959 PARTIAL PRESSURE SUIT SEAT PAN REGULATOR ASSEMBLY, FIREWEL COMPANY, TEST AND EVALUATION OF, REPORT # 1, FINAL REPORT. (Naval Air Test Center, U.S. Naval Air Station Patuxent River, Maryland) ASTIA AD-214 716-L, 26 January 1959

ABSTRACT: The partial pressure suit seat pan regulator assembly was installed in an F8U-1 scat pan and flown in that airplane for evaluation.

The seat pan assembly improved the suitability of the partial pressure suit by simplifying the accessories and attachments. The A13-A mask adapter, the inadequate length of the oxygen hose, and the excessive height of the seat pan proved to be unacceptable features.

1,613

U. S. Navy Department 1959 PILOT'S ABILITY TO ACTUATE EJECTION CONTROLS; FINAL REPORT CONCERNING (U. S. Naval Air Development Center, Johnsville, Pa.) TED ADC AE 5205, NM 15 01 12.3, ASTIA AD 257520, 5 Feb. 1959.

ABSTRACT: An investigation was carried out at the Aviation Medical Acceleration Lab. on the ability of pilots to operate ejection controls. This letter report constitutes the final report of this investigation. Earlier work performed at this laboratory related to this investigation was reported in references (b) through (g). The purpose of the present study was two-fold. The first part was to determine the effects of acceleration on a pilot's ability to actuate the ejection controls of two makes of ejection seats, the McDonnell-Stanley ejection seat equipped with an experimental torso-head restraint system and the Martin-Baker G-5 ejection seat equipped with the integrated harness restraint system. The second purpose was to determine the degree to which the Mark V exposure flight suit and Mark IV (Goodrich) and the AX-83 (Arrowhead) lightweight full pressure flight suit impeded a pilot in the actuation of the ejection controls when compared to his performance while wearing the summer flight suit. It may be concluded that little difference exists between the accessibility of the two ejection controls under positive and transverse chest-to-back acceleration which

forced the subject down and back into the seat. But under transverse back-to-chest and leteral accelerations, where the subject was thrown against the harness, the accessibility of the D-ring was markedly decreased. There was no apparent difference in the obstruction offered by the Goodrich and Arrowhead full pressure when they were not inflated. For this reason, the data on the two kinds of suits are combined in enclosure. The average maximum G level at which the subjects were able to operate the ejection controls is shown for both controls under each condition of acceleration. However, the Goodrich is the more flexible of the two suits during ejection.

1,614

U.S. Navy Department 1959 INTERIM EJECTION SEAT STUDY (U.S. Navy, Naval Aviation Safety Center) 1 January to 30 June 1959, ASTIA AD-232431

ABSTRACT: This is a report on ejections from U.S. Navy aircraft for the period 1 January to 30 June 1959.
It is the policy of the Naval Aviation Safety Center to publish a yearly summary of ejections. In order to furnish more current data to interested bureau, agencies, manufacturers, etc., about emergency escapes by ejections, the Naval Aviation Safety Center is publishing an interim report for the six month period. The general format followed in this interim report is a tabular presentation with no interpretation. The complete analysis of the emergency use of the ejection seat will be published in the yearly summary.

1,615

U.S. Navy 1961 BIBLIOGRAPHY OF HUMAN ENGINEERING REPORTS (U.S. Naval Training Device Center, Port Washington, LI., New York) NAVEXOS P-1491, 15 July 1961. Revised. ASTIA AD 264 953

1,616

U.S. Navy n.d. FLIGHT TESTS OF XF3D-1 ESCAPE SYSTEM PARACHUTE EXPERIMENTAL UNIT. (U.S. Naval Auxiliary Air Station, El Centro, Calif.) Parachute Technical Report No. 5030-49-1

1,617

U. S. Navy Yard 1941 ACCELERATION BELT.
(RAF, Institute of Aviation Medicine, Farnborough)
FPRC 263 (c), March 1941.

1,618

U.S. Naval Air Development Ctr. 1955 ANTI-BLACKOUT EQUIPMENT, DETERMINATION OF LIMITATIONS OF EQUIPMENT AND PERSONNEL. (Naval Air Development Ctr., Johnsville, Pa.) Project TED ADC AE-5201.3, 31 Dec. 1955

ABSTRACT: Experimental work on G protection and limitations of G suits, the integrated suit, the full pressure half suit, supination, and a combination of G suit and supination has been completed. The maximum protection against blackout was provided with the subject wearing a Z-2 anti-blackout suit and straining while supinated 65 degrees. One hundred percent of the subjects withstood 7 G for 30 seconds without peripheral light loss.

1,619

U. S. Naval Air Development Ctr. 1957 UNDERWATER ESCAPE PROGRAM F9F4 AEROPLANE LOW LEVEL DROP TESTS AT KEY WEST, AUG. 1957. (Naval Air Development Ctr., Johnsville, Pa.) Rept. No. NADC ED 2720, 25 Sept. 1957.

1,620

U. S. Naval Air Development Ctr. 1958 COMPARATIVE EVALUATION OF A STANDARD FACE CURTAIN AND AN EXPERIMENTAL D-RING LOCATED ON THE SEAT FRONT AS MODES OF ACTUATING EJECTION DURING EXPOSURE TO ACCELERATION. (Naval Air Development Ctr., Johnsville, Pa.) NADC AE5205, MA 3-3585, 5 May 1958

1,621

U. S. Naval Air Development Ctr. 1958 UNDERWATER ESCAPE PROGRAM. DESCRIPTION OF F86 D-11 LOW LEVEL DROPS AND COMPARISON WITH F9F-4 TEST DROPS, KEY WEST FLORIDA. (Naval Air Development Ctr., Johnsville, Pa.) Rept. NADC ED-5811, March 1958.

1,622

U.S. Naval Air Development Ctr. 1958 STATUS REPORT ON ANIMAL SATELLITE (Naval Air Development Center, Johnsville, Pa.) NADC Letter Report AE-1412

ABSTRACT: Progress which has been made in the biosatellite program since its initiation on February 27, 1958, is listed. The preparations for this animal satellite which has not been put in orbit were made with cooperation of the Franklin Institute.

1,623

U.S. Naval Air Development Ctr. 1959 EVALUATION OF THE TORSO-HEAD SYSTEM AND THE INTEGRATED HARNESS RESTRAINT SYSTEM UNDER CONDITIONS OF ACCELERATION. (Naval Air Development Ctr., Johnsville, Pa.) MA-82-2621, 2 April 1959. ASTIA AD 257 375

ABSTRACT: An investigation was carried out at the Aviation Medical Acceleration Laboratory to evaluate the torso-head restraint system developed under BuAer research contract No. 57-737 with respect to its ability to restrain the pilot under conditions of sustained and fluctuating patterns of acceleration. A model F4H-1 aircraft ejection seat equipped with the torso-head restraint system was used for this investigation. In addition, the integrated harness restraint system used with the Martin-Baker G-5 ejection seat was also evaluated under conditions of sustained acceleration. This report presents the results of the investigation.

1,624

U.S. Naval Air Development Ctr. 1959 TORSO-HEAD RESTRAINT SYSTEM FOR THE MODEL F4H-1 AIRPLANE. (Naval Air Development Ctr., Johnsville, Pa.) Rept. No. MA-82-1390, 20 Feb. 1959. ASTIA AD 257 374

ABSTRACT: A study was conducted to evaluate an experimental torso-head restraint system to be used in the flight tests of the Model F4H-1 airplane. This study was concerned with the adequacy of the restraint offered by the system with respect to protection of the pilot during exposure to acceleration. Three specific acceleration patterns representing extreme conditions which might occur during the course of the flight tests were investigated. Also determined in the course of the study was the ability of subjects to operate the stick and rudder pedals, the aircraft drogue chute, and both ejection controls under these conditions of acceleration while using the torso-head restraint. Results indicated that to the degree that the conditions of flight of the F4H-1 were simulated in this study the pilot will be adequately restrained by this seat and restraint system and will be able to operate the stick control, rudder pedals, drogue chute control, and the ejection controls under actual flight conditions. (Author)

1,625

U.S. Naval Air Development Center 1961 NAVY CENTRIFUGE AND NORTH AMERICAN AVIATION G SEAT SIMULATIONS OF LOW ALTITUDE FLIGHT, PROGRAM 2 (U.S. Naval Air Development Center, Johnsville Pa.) Progress Report. NADC-MA-L6128, Rept. No. MA-2, 18 July 1961. ASTIA AD 327-415L (Confidential Report)

1,626

U. S. Naval Air Test Center 1958 PARTIAL PRESSURE SUIT AND ANCILLARY EQUIPMENT MODIFICATIONS, EVALUATION AND TEST OF.
(Naval Air Test Center, Patuxent River, Md.) Proj. Ted. No. PTR AE-5140: Serial no. ST 33-284; 29 Sept. 1958. ASTIA AD 205 131 L.

1,627

U. S. Naval Air Test Center 1959 PILOT'S PROTECTIVE HELMET, TYPE APH-5, VENTILATION OF.
(Naval Air Test Center, Patuxent River, Md.) Proj. TED no. PTR AE-5203.13; Serial no. ST33-4; 9 Jan. 1959. ASTIA AD 210 467 L

1,628

U. .S. Naval Air Test Center 1959 TEST AND EVALUATION OF MK-5 AND MK-6 ANTI-EXPOSURE SUITS AND ESTABLISHMENT OF A PROCEDURE FOR VENTILATING THESE GARMENTS IN VARIOUS TYPES OF AIRCRAFT.
(Naval Air Test Center, Patuxent River, Md.) Rept. no. 2; Proj. no. TED PTR AE-5134; Serial no. ST33-2; 14 Jan. 1959. ASTIA AD 210 794L

1,629

Naval Aviation Safety Center 1956 EJECTION SEAT STUDY REPORT FOR AUGUST 1949 - MAY 1956, ON EJECTIONS AND BAILOUTS.
(Naval Aviation Safety Center, Norfolk, Va.)
ASTIA AD 125 052

ABSTRACT: The increasing ejection rate per unit hours flown and an increasing number of these units flown indicated a steady mounting of the frequency of ejections. There is a pronouned relationship between successful ejections and altitude. The relationship between altitude and successful ejection becomes apparent at 5000 ft and ejections become increasingly hazardous as the altitude decreases below this height. The mean altitude at which ejections occur did not increase during the period covered by this study. In terms of mach number, M = 0.70 is the beginning of the critically dangerous zone for ejections. In terms of indicated airspeed only, 400 kn is the beginning of the critically dangerous zone for ejections. Ejecting from the F9F, F7U, and TV model aircraft is significantly more dangerous than ejecting from the F2H and FJ models. Ejections from the swept-wing F9F are no more dangerous than those from the straight wing F9F. Ejections are more dangerous than bailouts with present equipment. No relationship existed between altitude and injury in bailouts (as long as irreducible minimum is observed.) Successful bailouts may be made at lower altitudes than ejections with present equipment. No relationship existed between speed and injuries resulting from bailouts within the speed range in which bailouts are made. The mean speed at which bailouts are made is substantially slower than the mean speed at which ejections are made. Bailing out from the F4U model aircraft is significantly more dangerous than bailing out of AD and SNJ models. (ASTIA)

1,630

U.S. Naval Aviation Safety Ctr. 1956 EJECTION SEAT STUDY: A REPORT OF EJECTIONS AND BAILOUTS, AUGUST 1949 THROUGH MAY 1956. (Naval Aviation Safety Ctr., Norfolk, Va.) ASTIA AD 125 052

ABSTRACT: A study is presented on the ejection seat in emergency escape from naval aircraft from the first ejection in August 1949 through May 1956. The findings demonstrate an increase in the ejection rate per unit hours flown, and a pronounced relationship between successful ejection and altitude and speed. Successful bailouts may be made at lower altitudes and slower speed than can ejections. Ejecting from F9F, F7U and TV model aircraft is significantly more dangerous than from F2H and FJ models. Bailing out from FAU model aircraft is more dangerous than that from AD and SNJ models. Injuries sustained during ejections occur mainly upon landing, by the forces involved in ejecting the seat and the pilot, and by the shock of the opening parachute. Injuries sustained during bailouts occur upon landing, in the cockpit, upon the fuselage, and by parachute shock. A large and significant difference was found in the number of injuries between trained parachute jumpers and untrained ones. (Author)

1,631

U.S. Naval Aviation Safety Center 1958 INTERIM EJECTION SEAT STUDY. (U.S. Naval Aviation Safety Center, Norfolk, Va., Interim report for 1 Jan. - 30 June 1958) ASTIA AD-211169

ABSTRACT: This is a report on ejections from U.S. Navy aircraft for the period January 1 to June 30, 1958. It is the policy of the Naval Aviation Safety Center to publish a yearly summary of ejections. In order to furnish more current data to interested bureaus, agencies, manufacturers, etc., about emergency escapes by ejections, the Naval Aviation Safety Center is publishing an interim report for the six month period. The general format followed in this interim report is a factual presentation with little or no interpretation. The complete analysis of the emergency use of the ejection seat will be published in the yearly summary.

Sixty-five ejections occurred during the period January 1, 1958 to June 30, 1958. Forty-six ejections were recorded for this same period in 1957. The rate per 10,000 flying hours is 1.27 for the six-month period. This is in contrast to a rate of .98 for the first half of 1957. The fatality rate for the period covered by this report is .21. The fatality rate for the corresponding period of 1957 was also .21.

1,632

U.S. Naval Aviation Safety Center 1960 EJECTION SEAT STUDY (U.S. Naval Aviation Safety Center, Aero-Medical Dept.) Period Covered: 1959 ASTIA AD 238 492

ABSTRACT: A series of tables and graphs stating ejection rates and rate of fatalities, altitudes of ejection, new seat systems and modifications, speed at time of ejection, attitude at time of ejection, and injuries caused by ejection.

1,633

U.S. Naval Aviation Safety Center 1960 EMERGENCY AIRBORNE ESCAPE SUMMARY. A REPORT OF EJECTIONS AND BAILOUTS FOR CALENDAR 1960. (Naval Aviation Safety Center, Norfolk, Va.) ASTIA AD-259 078

ABSTRACT: This summary presents an analysis of emergency airborne escapes occurring during the calendar year 1960. Its purpose is to apprise operators, commands and others of the record of escape system usage as utilized in Naval aircraft. (Author)

1,634

Naval Air Material Center 1960 ENVIRONMENTAL REQUIREMENTS OF SEALED CABINS FOR SPACE AND ORBITAL FLIGHTS (A BIBLIOGRAPHY OF PSYCHOPHYSIOLOGICAL STUDIES RELEVENT TO SPACE AND ORBITAL FLIGHT) (Naval Air Material Center, Air Crew Equipment Lab., Philadelphia, Pa.) Rept. No. ACEL-441; 26 Oct. 1960 ASTIA AD 246 414.

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1,635

U.S. Naval Air Material Center 1961 PROGRAM FOR SYMPOSIUM ON BIOMECHANICS OF BODY RESTRAINT AND HEAD INJURY. (Sponsored by the Office of Naval Research, The Bureau of Naval Weapons and the Air Crew Equipment Laboratory. Naval Air Material Center, Philadelphia. 14-15 June, 1961)

ABSTRACT: The objectives of the Symposium were to (1) review and bring

up-to-date the theoretical biological knowledge on acceleration injuries, (2) review and bring up-to-date engineering progress in the design of protective devices, and (3) foster the interchange of ideas between the two disciplines with the hope of eventually developing better protection against linear acceleration.

This Compendium contains a copy of the program, those abstracts of papers which were submitted for inclusion herein, and a complete list of attendees.

1,636

U.S. Naval School of Aviation Medicine 1954 A STUDY OF THE HALF-PRESSURE ANTI-BLACKOUT SUIT. (Naval School of Aviation Medicine, Pensacola, Fla.) Research Report no. NM 001.059.15.03; p. 1-10 20 July 1954

1,637

University of Minn. 1956 REPORT ON RESEARCH ON SAFETY DEVICES FOR GROUND VEHICLES AT HOLLOMAN AF Base. (Automotive Safety Research Project, University of Minn.) Contract AF 29(600)-831, 31 December 1956.

1,638

University of Southern Calif., School of Medicine 1951 ESCAPE FROM HIGH-SPEED AIRCRAFT AND THE PROBLEM OF COMPOUND ACCELERATIONS: A LABORATORY STUDY. (Presented at the twenty-second meeting of the Aero Medical Association in Denver, Colorado, May 1951)

RESTRAINT, PROTECTION, AND EMERGENCY ESCAPE SYSTEMS

V

1,639

Valentine, G. 1956 DYNAMIC ANALYSIS-EMERGENCY ESCAPE SYSTEMS. (Stanley Aviation Corp., Denver, Colorado) Document No. 451 Contract AF 33(600)32054, 13 July 1956. ASTIA AD 115 879

ABSTRACT: This report presents an appraisal of twelve configurations of emergency escape devices. They are: (1) Upward seat, forward facing; (2) Upward seat, forward facing with added mass; (3) Downward seat, forward facing; (4) Downward seat, forward facing with added mass; (5) Seat-capsule, forward facing; (6) Seat-capsule, forward facing with added mass; (7) Upward seat aft facing; (8) Upward seat aft facing with added mass; (9) Downward seat aft facing; (10) Downward seat aft facing with added mass; (11) Seat capsule, aft facing; (12) Seat capsule, aft facing with added mass. The following characteristics of the more promising of these configurations were determined for ejection at 650 knots EAS at sea level and 44000 feet altitude: (1) Trajectory to tail. (2) Spinal and cross-body accelerations vs. time. (3) Pitching acceleration, velocity and altitude vs. time. Also determined were thruster requirements for upward ejection at maximum q and minimum airspeed and low altitude escape limitations for critical configurations.

1,640

Valentine, G. A. 1958 PROPOSAL - ENCAPSULATED SEAT (Stanley Aviation Corporation, Denver, Colo.) Document No. 645, 20 May 1958.

ABSTRACT: Presented herein is the Stanley Aviation design proposal for an emergency escape system capable of functioning successfully at speed and altitude regimes compatible with the sensational performance of the Convair-Fort Worth B-58 airplane.

1,641

Valentine, G.A. 1960 HUMAN FACTOR CONSIDERATIONS IN THE DESIGN OF THE B-58 ESCAPE CAPSULE. (Paper, 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960)

ABSTRACT: The Convair B-58 will be equipped with an escape capsule in each cockpit. The escape capsule is designed to provide protection in case of cockpit decompression at altitude, permit emergency egress throughout the speed and altitude range of the B-58, and serve as an aid to survival on either water or land under any climatic condition. In the event that cockpit pressurization is lost, the B-58 pilot and crew members can actuate handles which initiate the following series of actions: torso and leg positioning, capsule door closure, and capsule pressurization. The pilot's capsule permits the pilot to fly the aircraft being encapsulated. Thus, the aircraft can be flown to an altitude where pressurization is not required. Capsule ejection is initiated by the aircraft crew using either or both of the two ejection triggers. The capsule doors provide protection against windblast as the capsule enters the airstream. Careful rocket catapult design and good stability, provided by a stabilization parachute, hold accelerations within human tolerance limits. The stabilization equipment is jettisoned as the recovery parachute is deployed. Landing accelerations are minimized through the use of an impact attenuating air bag. Automatically inflated flotation cells on outriggers are used to provide buoyancy and stability when the capsule lands on water. Critical survival equipment is accessible to the capsule occupant with the doors closed. A complete set of Strategic Air Command survival equipment is provided in each capsule and is readily accessible with the capsule doors opened.

1,642

Valentine, G.A. 1962 HUMAN FACTORS CONSIDERATIONS IN THE DESIGN OF THE B-58 ESCAPE CAPSULE. In Barbour, A.B., & H.E. Whittingham eds., Human Problems of Supersonic and Hypersonic Flight (New York; Oxford; London; Paris; Pergamon Press, 1962) Pp. 286-294

1,643

van der Toorn, L.J. 1961 BIBLIOGRAFIE SCHOK EN TRILLINGWERING IN VERPAKKING (BIBLIOGRAPHY. SHOCK AND VIBRATION ABSORPTION IN PACKAGING (CUSHIONING)) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht (Netherlands).

ABSTRACT: This bibliography contains abstracts of articles and reports on theory of shock, vibration and damping. Attention is paid to the analysis of mechanical

influences occurring during shipment, storage and operational conditions. Part of the bibliography deals with test methods and measuring equipment. Obtained results are given. Extensive information is gathered on cushioning materials and shock and vibration resistant constructions as used in packaging techniques. I Items on properties of materials are compiled. References on isolators against shock and vibration used for the protection of apparatus aboard ships, aircraft and guided missiles are also included. Literature on air drop operations is presented. A survey is given of prescriptions and military specifications deal ing with the above mentioned subjects. (Author)

1,644

van Schaik, A.C. 1958 LITERATURE SURVEY OF SHOCK RESISTANT MATERIALS FOR AIR DROP OPERATIONS (Technisch Documentatie Centrum voor de Krijgsmacht (Netherlands) Rept. no. TDCK 14220, ASTIA AD-226 676

1,645

van Woerden, J. 1961 SEARCH AND RESCUE - BIBLIOGRAPHY
(Netherlands Armed Services, Technical Documentation and Information Center)
The Hague, May 1961 ASTIA AD 259 360

ABSTRACT: This bibliography contains summaries of reports and articles on search and rescue of survivors of shipwrecks and aircraft-accidents, compiled from the abstract-cards indexes of the Netherlands Armed Services Technical Documentation and Information Centre.
This bibliography is the fifth part of a series of five bibliographies.

1,646

Van Zelm Associates, Inc. 1959 DRAG PARACHUTE RETRACTING SYSTEM.
(Van Zelm Associates, Inc., Baltimore, Md.) Rept. Nos. 151 and 156; WADC Technical Rept. No. 57-57; Contract AF 33(600)30389; ASTIA AD-155 709; Jan. 1959

ABSTRACT: The general problem of a retractable deceleration parachute system has been examined and possible solutions have been studied. These solutions have been evaluated, and the final system configuration has been selected and designed The design incorporates a basic concept of winding a parachute around a revolving drum after retraction through a duct which collapses the parachute and compresses

it to a size which the drum can accommodate. The rewind motor is hydraulically or pneumatically actuated and the control system is largely mechanical with some components being hydraulic or pneumatic. A prototype unit was manufactured for test which weighed 94 pounds, and was installed on a truck. The vehicle was used to conduct a comprehensive testing program, to study the action of the parachute during deployment and retraction, and to evaluate the retraction system. Tests of the retraction system demonstrated that the design meets the requirements of such a device. (AUTHOR)

1,647

Vasboe, M. 1950 ACTUATOR ASSEMBLY — PILOT'S SEAT
(Boeing Airplane Co., Seattle Div., Washington) 12 July 1950.
ASTIA ATI 99 276.

ABSTRACT: This specification defines a linear actuator assembly to raise and lower the Pilot's and Co-pilot's seat by remote electrical control. This specification states the purchaser's engineering requirements, requirements for furnishing data, and procedures for obtaining approval all of which Vendor agrees to meet when purchase order refers to this specification. Revisions may be made to include other uses or other articles considered acceptable by purchaser's engineering, to change existing requirements when agreeable to both parties, and to correct errors

1,648

Vasil'yev, G. 1959 CABIN OF A SPACE ROCKET (Kabina Kosmicheskoy Rakety)
Trans. of Sovetskaya Aviatsiya (USSR) 1959, 12 Sept., p. 4.
(Office of Technical Services, Washington, D.C.)
Oct. 22, 1959 59-22210

ABSTRACT: Comparisons of the work conditions of deep-sea divers and of pilots in a chamber filled with water show that the ideas of Konstantin Eduardovich Tsiolkovskiy for an anti-g chamber based on the buoyancy principle of Archimedes are well founded. Such a chamber will apparently be a rigid, hermetically sealed cabin built of a durable thin and transparent material. All controls will be inside of it, with hermetically sealed outlets leading outside. Astronauts will fill the chamber with liquid when they expect a greater g-force; during takeoff, braking, landing, and sharp changes in flight direction. Quick removal of water can be accomplished with compressed air.

1,649

Vasil'yev, G. 1959 KABINA KOSMICHESKEY RAKETY (Cabin of a Space Rocket) Sovet. Aviat. (USSR) P. 4, 12 Sept. 1959. (Air Technical Intelligence Ctr., Wright-Patterson AFB, Ohio) Rept. No. ATIC 1256225, 22 Oct. 1959.

ABSTRACT: The use of Tsiolkevskii's chamber, filled with water, in place of the usual cabin by pilots of fighter planes and by astronauts is suggested by the author as a means for counteracting the effects of great g-force exerted on the human body during certain maneuvers.

1,650

Vaughan, V.L., Jr. 1959 WATER-LANDING IMPACT ACCELERATIONS FOR THREE MODELS OF REENTRY CAPSULES. (Langley Research Center, Langley Field, Va.) NASA TN D-145, ASTIA AD 227296

ABSTRACT: Three conical models were tested to determine the rigid-body impact accelerations for nominal flightpaths angles of 90° and 65°, a range of contact attitudes of -30° to 30°, and a range of full-scale vertical contact velocity from 10 to 45 feet per second. Accelerations of the models at impact were measured along the X (roll) and Z (yaw) axes.

1,651

Vaughan, V.L., Jr. 1961 LANDING CHARACTERISTICS AND FLOTATION PROPERTIES OF A REENTRY CAPSULE. NASA TN D-653, ASTIA AD 251 188

ABSTRACT: An investigation has been conducted to determine the rigid-body impact accelerations of a reentry capsule during simulated parachute-supported landings on sand and on water. Tests were also made to determine the flotation properties of the capsule. Two 1/6-scale dynamically similar models, one a landing impact model and one a flotation model, were used in the investigation. Tests were made at a variety of flight paths to simulate the effect of surface winds that might act on the capsule during parachute letdown. A range of contact attitudes was investigated to simulate the attitude the capsule might have upon contact as a result of the capsule swinging under the parachute. Landing impact accelerations were measured along the X-axis (roll) and Z-axis (yaw) by accelerometers located at the center of gravity of the models. The maximum accelerations along the X-axis measured at the center of gravity were about 74 g for sand landings and about 33 g for water landings. The maximum onset rates of acceleration, also along the X-axis, were about 25,000 g per second for sand landings and about 12,800 g per second for water landings.

Accelerations 2.05 feet in front and in back of the center of gravity for water landings varied as much as ± 65 percent from those along the X-axis. The maximum accelerations at the center of gravity along the Z-axis were about 25 g for sand landings and about 9 g for water landings. The capsule with a dry interior was stable with center-of-gravity locations at 1.21 feet and 1.08 feet measured above the maximum diameter of the capsule. The capsule was unstable with a center-of-gravity location at 1.33 feet and would turn over on its side. The weight of a man and his survival equipment in the canister caused the capsule to turn over on its side for all center-of-gravity conditions tested.

1,652

Viggiano, L.R. 1958 TEST OF A FULL SCALE EJECTION SEAT AND DUMMY WITH AND WITHOUT STABILIZING FLAP COMBINATIONS CONDUCTED IN THE MASSIE MEMORIAL WIND TUNNEL. (AMC, Wright-Patterson AFB, Dayton, Ohio) Technical Report No. 5778, ASTIA ATI-55251, August 1958

ABSTRACT: Wind tunnel tests were conducted on a full scale ejection seat with dummy and with and without head flaps to determine its points of stable equilibrium and the magnitude of lift, drag, and side forces at various angles of pitch, yaw and roll. A series of 12 tests was conducted, composed of 4 configurations. The first configuration consisted of tests without flaps at varied angles of pitch, yaw and roll. In the second configuration, plain head flaps were added to the seat. The same head flaps, with an additional set, were used in the third configuration. The magnitude of moment, lift, drag, and side forces was determined at 5° intervals through the range of pitch, yaw, and roll. The pitching range extended from -45° through +135°, whereas the ranges of yaw and roll extended from zero through 90°.

1,653

Virgin, E.W. & J.G. Beerer 1948 REPORT ON GROUND TEST FIRING PILOT'S EJECTION SEAT - AND APPENDIX 1 - MODEL B-45A AIRPLANE (North American Aviation, Inc., Los Angeles, Calif.) Report No. NA-48-600 June 25, 1948 ASTIA ATI 102 200

ABSTRACT: The seat and a dummy were ejected from a nearly complete nose section taken from the production assembly line of the Contractor's Long Beach plant, and set in a stand on the Flight Ramp. The cockpit interior was dientical to that of a finished airplane. Ejection was considered satisfactory. The details covering the ejection are delineated in the discussion portion of this report. Due to the

lack of a net to catch the seat, considerable damage to the seat resulted. Several undesirable features were encountered during ejection, which were attributed to the coupling of the catapult gun to the seat. Forward rotation of the seat upon leaving the guide rails resulted in sufficient frictional drag in the catapult itself to appreciably reduce the ejection velocity. Inertia loads did not remove the oxygen mask from the dummy; however, it was pulled away from his face sufficiently to expose his mouth. Air loads that would occur in flight were not simulated.

1,654

Visconti, Fioravante & Robert J. Nuber 1951 A WIND-TUNNEL INVESTIGATION OF THE STATIC STABILITY CHARACTERISTICS OF A 1/8-SCALE EJECTABLE PILOT-SEAT COMBINATION AT A MACH NUMBER OF 0.8
(National Advisory Committee for Aeronautics, Langley Aeronautical Lab., Langley Air Force Base, Va.) NACA Research Memorandum No. L51H08 Dec. 7, 1951 ASTIA ATI 130 618

ABSTRACT: An investigation was made of a 1/8-scale model of an ejectable pilot-seat combination with and without stabilizing fins. The purpose of this investigation was to determine the static aerodynamic characteristics and the effectiveness of various stabilizing fins at a high subsonic Mach number (0.8).

The results of these tests indicated that the instability of the pilot-seat combination was eliminated by the addition of stabilizing fins. Large changes in the stability characteristics and trim angles resulted from variations in fin position, dihedral, or incidence angles and from small displacements of the center-of-gravity position. The magnitude of the aerodynamic interference that exists about the seat had a large effect on the effectiveness of fins located at moderate distances from the seat.

1,655

Vloynkin, Yu. M., V.I. Yazdovskiy et al. 1962 THE FIRST MANNED SPACE FLIGHTS (Pervyye Kosmicheskiye Polety Cheloveka)
Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio) Trans. No. FTD-TT-62-1619 Dec. 7, 1962 ASTIA AD 294 537
Original Source: Mediko-Biologicheskiye Issledovaniya (Moskva)

ABSTRACT: Contents include material on the following subjects:
Training cosmonauts in controlling the ship
Life Support in space flight

Microclimatic conditions in a spaceship cabin
Food and water supply
Life support and recovery systems
Radiation protection
The biological effect of cosmic radiation in spaceships
Measures providing radiation safety on the flights of Gagarin and Titov
The protective properties of space suits
Emergency supply pack of the cosmonaut
Systems for landing the cosmonaut
Familiarization-training flights on aircraft under weightlessness conditions
Organization and method of carrying out physical training exercises
Results of the medical examination of the astronauts
Methods of physiological investigations and medical monitoring during spaceflight
The physiological reactions of the astronauts in flight

1,656

Voas, R.B. 1961 PROJECT MERCURY ASTRONAUT TRAINING PROGRAM
In: The Training of Astronauts (National Academy of Sciences, National Research Council) Publication No. 873, Pp. 22-40

ABSTRACT: A general over-all outline of the training program is given. A brief discussion is presented of the astronaut selection program and basic considerations for the training program. Training in vehicle operation includes lectures, field trips, and study programs of the various capsule systems. Simulators for training in attitude control during orbit and retrofire, navigation control of tumbling, environmental control of the cabin, and management of procedures are discussed. Training in various scientific disciplines is described along with the various lecture courses that each astronaut takes. Space flight conditions such as disorientation, weightlessness, reduced pressure, etc., are described and simulated for the astronauts. A physical fitness program for the trainees is discussed pertaining to weight control, breathing control, and general physical conditioning. Countdown procedures and ground communications and recovery-survival methods are part of ground activity training. Maintenance of flight skills as a method to maintain vigilant decision making is accomplished by regular flights in high-performance jet aircraft. The significance of this program on future space flight is discussed. (J. Aerospace Med. 33(11): 1403 Nov. 1962)

1,657

Voas, R.B. 1963 TRAINING MAN FOR SPACE
Paper: Lectures in Aerospace Medicine, School of Aviation Medicine, Brooks AFB Texas, 4-8 February 1963

1,658

Vodonik, E.J. 1951 THE STATIC TEST OF THE NAVIGATOR'S PILOT'S SEAT AND IMMEDIATE FLOOR STRUCTURE - MODEL B-47B.
(Boeing Airplane Co., Wichita Div., Kans.) Report No. WD-105999
ASTIA ATI-103279, February 1955

ABSTRACT: Static tests were conducted in the navigator's, pilot's, and co-pilot's seats, supporting structure, and immediate floor structure. The B-47B seats reinforced as noted in this report satisfactorily complied with the requirements with only a few exceptions. The results indicated that the seats were structurally satisfactory. The deflections and set conditions at limit loads in certain cases could be reduced by reinforcing the parts concerned and reducing tolerances.

1,659

von Beckh, H.J. & G.J.D. Schock 1958 CENTRIFUGE EXPERIMENTS ON HIGH-G LOADS IN MICE AND THEIR POSSIBLE ALLEVIATION BY MULTIDIRECTIONAL ANTI-G DEVICES
(Air Force Missile Development Ctr., Holloman AFB, N. Mex.) AFMDC TN 58-10
Aug. 1958 ASTIA AD 154 104

ABSTRACT: Using the centrifuge, time-tolerance limits on transversely positioned mice were studied and the results compared with longitudinal G-tolerance values reported by other authors. The possibilities of a multidirectional G-protection during escape trajectories and the re-entry phase are discussed. (Author)

1,660

von Beckh, H.J. 1958 MULTI-DIRECTIONAL G-PROTECTION IN SPACE VEHICLES
In: Hecht, F., ed. VIII th International Congress, Barcelona, 1957
(Vienna: Springer, 1958) Pp. 37-46

1,661

von Beckh, H.J. 1958 MULTI-DIRECTIONAL G PROTECTION IN SPACE FLIGHT AND DURING ESCAPE. A THEORETICAL APPROACH.
J. Aviat. Med. 29(5): 335-342, May 1958

ABSTRACT: The re-entry phase of orbital and space projects, as well as changes in direction of the flight paths of supersonic atmospheric crafts require

vehicle designs which will be capable of producing appreciable G loads for extended periods of time. Since protection by anti-G suits cannit be greatly increased, this report proposes a device called the "anti-G capsule," which is pivoted about the lateral axis of the craft, and which automatically assumes positions that would render the resultant of all acting accelerations perpendicular to the heart-head line of the occupant. This device would also be designed to serve as an ejection capsule, affording G protection during and after escape from aircraft or space vehicle within the atmosphere.

1,662

von Beckh, H. J. 1958 MULTI-DIRECTIONAL G-PROTECTION IN SPACE VEHICLES
J. Brit. Interplan. Soc. 16(9):525-533, Sept./Oct. 1958

ABSTRACT: In this paper there is described a device which could grant this multidirectional g-protection by automatic positioning. The resultant of all acting accelerations would be presented at right angles to the head-heart line of the operator. This device, termed the "Anti-g Capsule," would at the same time afford an analogous g-protection during and after escape from a disabled space vehicle within the lower layers of the atmosphere. An anti-g capsule for providing multidirectional protection for pilots of space vehicles during periods of acceleration, by automatic positioning, is described and the relevant literature is reviewed. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space Medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903; ASTIA AD-227 817; Feb. 1959)

1,663

von Beckh, H.J. 1958 MULTI-DIRECTIONAL G-PROTECTION IN SPACE FLIGHT AND ESCAPE
Paper, Second European Congress of Aviation Medicine, Stockholm, September, 16-19, 1957
See also: J. Aviat. Med. 29(5): 335-341, 1958

ABSTRACT: It is known that maximum human tolerance to G-loads is obtained if the accelerations are acting at right angles to the long axis of the body. Tnis report describes a device, termed the "anti-G capsule", which is pivoted about the lateral axis of the craft and automatically assumes a position, such that the resultant of all acting accelerations is perpendicular to the heart-head line of the subject. The ejection and stabilization mechanism of this capsule would also afford an analogous G protection during and after escape from a disabled aircraft or space vehicle within the lower layers of the atmosphere.

1,664

von Beckh, H.J. 1958 FLIGHT EXPERIMENTS ABOUT HUMAN REACTIONS TO ACCELERATIONS WHICH ARE FOLLOWED OR PRECEDED BY THE WEIGHTLESS STATE (Air Force Missile Development Ctr., Holloman AFB, N. Mex.) AFMDC-TN-58-15 Dec. 1958 ASTIA AD 154 108

ABSTRACT: Flight experiments which simulated Pre-weightlessness and Post-weightlessness acceleration were conducted in jet aircraft. It was shown that alternations of acceleration and the weightless state decrease the acceleration tolerance of the subject and the efficiency of the physiological recovery mechanisms. The implications for planning of manned space flight are (1) thrust values and re-entry profiles must take the lower acceleration-tolerance into consideration; and (2) adequate G-protection must be designed for the pilot, to prevent dangerous effects of unavoidable high accelerations. (Author)

1,665

von Beckh, H.J. 1959 FLIGHT EXPERIMENTS ABOUT HUMAN REACTIONS TO ACCELERATIONS WHICH ARE FOLLOWED OR PRECEDED BY THE WEIGHTLESS STATE
Aerospace Medicine 30(6): 391-409, June 1959

ABSTRACT: Alternation of weightlessness and acceleration results in a decrease of acceleration tolerance and of the efficiency of physiologic recovery mechanisms. This indicates that acceleration thresholds of reversible and irreversible injury will be lower in space flight conditions than in the one G field of man's earthly environment. Defects of circulation, muscular effectiveness, vision, and of conscious judgment will occur at lower acceleration values and will probably continue for longer times than they do under present normal flight conditions. In an astronautical venture depending upon the skill of a human pilot, a blackout, lapse of judgment or even the slightest reduction in efficiency at a crucial time, could undoubtedly cause the failure of the mission.

The implications for planning of manned space flight are, first, that thrust values and reentry profiles must take the lower acceleration tolerance into consideration and second, that adequate G protection must be designed for the pilot to prevent dangerous effects of high acceleration.

1,666

von Beckh, H.J. 1959 FLIGHT EXPERIMENTS ABOUT HUMAN REACTIONS TO ACCELERATIONS WHICH ARE FOLLOWED OR PRECEDED BY WEIGHTLESSNESS
In: International Astronautical Congress, Proceedings of the IXth, 1958 (Wien: Springer - Verlag, 1958, Pp. 507-525)

ABSTRACT: Alteration of weightlessness and accelerations results in a decrease of acceleration tolerance and of the efficiency of physiologic recovery mechanism. The implications for planning manned space flight are, first, that thrust values and re-entry profiles must take the lower acceleration tolerance into consideration, and second, that adequate G protection must be designed for the pilot, to prevent dangerous effects of unavoidable high accelerations.

1,667

von Diringshofen, H. 1936 UNTERSUCHUNGEN IM FLUGZEUG ÜBER SEH-UND BEWUSSTSEINNSSTÖRUNGEN DURCH ZENTRIFUGALBESCHLEUNIGUNGEN (Research in the Aircraft Concerning Sight and Consciousness Disturbances Through Centrifugal Accelerations)
Klinische Wochenschrift (Berlin) 15: 877

1,668

von Diringshofen, H. 1936 UBER DEN EINFLUSS DER KORPERHALTUNG FUR DAS ERTRAGEN HOHER BESCHLEUNIGUNGEN (Influence of Body Posture on Ability to Endure Greatly Accelerated Speed and Evaluation)
Verh. dtsch. Ges. inn. Med. (Munich) 48: 283-287

1,669

von Diringshofen, H. 1937 KORPERLICHE BEANSPRUNCHUNG DER BESATZUNG IN HOCHWERTIGEN FLUGZEUGEN (Bodily Requirement of the Crew in High Performance Aircraft) Luftwehr. (Berlin) 4:359-366.

1,670

von Diringshofen, H. 1942 DIE WIRKUNG VON FLIEHKRAFTEN AUF DEN BLUTKREISLAUF DES IM FLUGZEUG SITZENDEN MENSCHEN (Effect of Centrifugal Acceleration in Flight on Circulation of Man in Sitting Position)
Luftfahrtmedizin 6: 152-165, 1942

1,671

von Diringshofen, H., 1955 "LONG CHAIR" POSITION FOR FIGHTER PILOTS. J. Aviation Med. 26(6):467-470

SUMMARY: The pilot possibly may tolerate in a long chair position of 45° positive accelerations of long duration up to 8 G without visual disturbances and without essential inconvenience in the air combat because:

1. The reduction of the level difference heart-eyes of about 5 cm. (by bending the head forward to the vertical line) compared with the upright position. Therefore, the lowest blood pressure at heart level for a sufficient blood flow through the eyes is reduced for a tolerance of 7 G at 155 to 170 mm. Hg and of 8 G at 170 to 185 mm. Hg.

2. The considerable improvement of the conditions for the venous blood return from the legs and the abdomen to the heart with a noticeable increase of the pressure in the vena cava caudalis through the intra-abdominal pressure on this vessel.

3. The facilitation of an artificial increase of the intra-abdominal pressure with the aid of an abdominal cuff of an anti-G suit or with something heavy in the abdominal belt.

1,672

Von Gierke, H. E. & R. R. Coermann 1961 THE BIODYNAMICS OF HUMAN RESPONSE TO VIBRATION AND IMPACT. Rev. Med. Aero (Paris) 2:201-203, Dec. 1961.

1,673

Von Gierke, H. E. & R. R. Coermann 1963 THE BIODYNAMICS OF HUMAN RESPONSE TO VIBRATION AND IMPACT. Industr. Med. Surg. 32:30-32, Jan. 1963.

1,674

Vorachek, J. J., F. Milhoan and others 1961 INVESTIGATION OF ESCAPE CAPSULE SYSTEMS FOR MULTI-PLACE AIRCRAFT. PART I. PRELIMINARY INVESTIGATION. (Goodyear Aircraft Corp., Akron, Ohio) WADC TR 57-329, Pt. 1; ASTIA AD 273 625.

ABSTRACT: Findings are summarized of an investigation of 4 escape capsule systems for a hypothetical multi-place aircraft. The aircraft has been assumed to operate in a performance envelope having a maximum equivalent airspeed of 800 knots through an altitude range from sea level to 55,000

ft and a Mach number of 4.0 from 55,000 to 100,000 ft with a flight duration of 30 hr. Four capsule configurations are evaluated: cockpit, nose section, tandem and individual. All the configurations tested provide the required escape potential, necessary crew comfort and access to work areas, and adequate survival potential. The individual capsule concept was the most desirable arrangement of the 4 concepts due to its weight factor, the least effect on aircraft availability, greatest escape potential, least susceptibility to damage, and the most positive separation factor from the aircraft. (Author)

1,675

Vykukal, H.C., G.W. Stinnett & R.P. Gallant 1961 PERFORMANCE OF AN INTERCHANGEABLE, MOBILE-PILOT RESTRAINT-SYSTEM DESIGNED FOR USE IN A MODERATELY HIGH ACCELERATION FIELD. (Paper, Aerospace Medical Assoc., Chicago, Ill., 24-27 April 1961)

ABSTRACT: A continuing program has been underway at the NASA Ames Research Center to provide a pilot-restraint system suitable for use in research programs designed to investigate the ability of pilots to perform meaningful control tasks while being subjected to large acceleration forces as would be encountered in re-entry vehicles returning from orbital or lunar missions. Previous investigations have used the NASA contour couch which has proved to be unwieldly to handle and is not interchangeable between pilots. At the present, two modified separate pilot restraint systems have been built and tested at the University of Southern California centrifuge, up to levels of 8 g eyeballs in, eyeballs out, and eyeballs down. Modifications to the support concepts as a result of this testing were made, and this new support system was used in a recent program conducted at the AMAL-NADC Johnsville centrifuge. These systems, in part, are mobile, feature adjusting to the pilot's contour, and are considered by the user pilots to be equal or superior to previous systems experienced. This paper will describe the various support systems and outline the pilot's acceptance of these systems noting those areas requiring improvement. Consideration will be given to the adaptability of the present approach to vibration and impact stresses. Aerospace Medicine 32(3):251. March 1961.

1,676

Vykukal, H.C., R.P. Gallant, & G.W. Stinnett 1961 AN INTERCHANGEABLE, MOBILE PILOT-RESTRAINT SYSTEM, DESIGNED FOR USE IN A MODERATELY HIGH ACCELERATION FIELD. Aerospace Med. 33(3):279-285, March 1962.

ABSTRACT: A pilots' mobile restraint suit, developed at the Ames Research

Center of the National Aeronautics and Space Administration is described. The primary purpose of this restraint and support system was to permit simulator studies of flight vehicle control under varying conditions of acceleration stress. Although not tested under impact accelerations or lateral transverse forces, it is believed that the basic concept would be useful for an orbital or space vehicle. A list of 8 restraint suit requirements is given with pictures and a detailed description. (CARI)

RESTRAINT, PROTECTION, AND EMERGENCY ESCAPE SYSTEMS

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1,677

Wacholder, B.V. & E. Fayer 1960 STUDY OF INSTRUMENTATION AND TECHNIQUES FOR MONITORING VEHICLE AND EQUIPMENT ENVIRONMENTS AT HIGH ALTITUDE; INSTRUMENTATION AND MONITORING TECHNIQUES
(Wright Air Development Division, Air Research and Development Command, Wright-Patterson AFB, Ohio) WADC TN-59-307, Vol. III June 1960
ASTIA AD 268 090

ABSTRACT: Instrumentation techniques are presented which are available within the state-of-the-art; an instrumentation system is proposed for the monitoring of high-altitude environments encountered by typical vehicles. The high altitude environmental effects on typical vehicles and equipment is summarized. The present airborne-instrumentation state-of-the-art is presented for measuring temperature, pressure, strain, vibration, acceleration, radiation, meteorite detection, and acoustic noise. A feasible instrumentation system is discussed for monitoring these deleterious environments. In addition, recommendations are made for an extension of this study to cover environments that are outside the scope of the present program, such as the environments created by nuclear and other advanced propulsion systems. Another recommendation is the continuation of the instrumentation study to effect a complete design specification for a environmental monitoring system for a particular vehicle.

1,678

Waecker, N. J. 1959 DESCRIPTION OF ROCKET CATAPULTS XM8, XM9, XM10, XM12 (Frankford Arsenal, Philadelphia, Pa.) Proj. No. TS1-15; Technical Memo. No. M59-28-1, May 59, ASTIA AD-217 240.

ABSTRACT: The physical and performance characteristics of 3 rocket-assist catapults are presented. Each catapult consists basically to two assemblies, an outer tube assembly, which is mounted to an airframe structure, and a telescoping inside tube assembly, which contains the rocket motor. This inside tube assembly is connected to an ejection seat. During ejection, a booster propellant, located in the inside tube, is ignited and the tube telescopes out of the launcher, carrying the ejection seat and man. The stroke of the telescoping action varies on the different catapults from 34 to 40 inches. Near the end of the stroke, the rocket motor solid propellant is ignited, supplying the necessary thrust for carrying the ejection seat with man clear of the aircraft and into free flight.

1,679

Wahl, N.E., Whiting, A.A. 1948 HEAD IMPACT INVESTIGATION- PROGRESS REPORT FOR AUGUST (Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.) Report No. OG-537-D-7, NR-172-384, Contract No. 5Nori-119, Task Order 8, 1 Jan. 1948. TIP U1912

ABSTRACT: This program is divided into two phases; one, the development of plastic head forms and two, the evaluation and crash testing of these forms.

During the past month, fifteen head forms were fabricated for test purposes and material for additional head forms has been prepared.

Difficulties were experienced in the instrumentation set-up which required some changes before actual testing could be started.

Several successful test runs were made against 1/8" 24ST aluminum alloy flat panels.

With impact velocities of approximately 30 feet per second, the head form was decelerated at approximately 195 G's with no damage to the head form at the point of impact. There was however, a failure of the head form in contre-coup with a shattering fracture at the rear of the head form.

1,680

Wahl, N.E., A.A. Whiting 1948 HEAD IMPACT INVESTIGATION- PROGRESS REPORT FOR SEPTEMBER (Cornell Aeronautical Laboratory, Inc. , Buffalo, N.Y.) Rept. No. OG-537-D-8, NR-172-384, Contract No. N6ori-119, Task Order VIII 1 Jan. 1948. TIP U2186

ABSTRACT: During the past month, additional tests have been run against 1/8" 24ST aluminum alloy flat panels, aluminum alloy curved panels, and sandwich construction panels using balsa wood and Styrofoam. An additional series of tests have been run using several tubes of different materials.

Tests conducted at impact velocities up to 60 ft. per second indicate that the sandwich construction panel offers excellent protection for the head form. 24ST aluminum alloy tubes with low diameter: thickness ration severely damaged the head form on impact. By increasing the diameter: thickness ratio, the tubes were less destructive to the head form on impact.

The test wok on various panels is nearing completeion and the next report published will be the final report summarizing all work covered under this contract.

1,681

Wahl, N.E. & A.A. Whiting 1948 HEAD IMPACT INVESTIGATION (Cornell Aeronautical Lab., Inc., Buffalo, N.Y.) Report No. OG-537-D-9 NR 172-384, 22 Dec. 1948. ASTIA AD 201360.

ABSTRACT: The objectives of this project were the collection of data on acc rations impact blows, and the determination of protective characteristics of panels and structural configurations.

A plastic head form filled with a gelatinous material was developed to have strength characteristics similar to those of a human head. This 9-1/2 pound head form was designed to fracture when dropped five feet onto a flat, rigid surface.

A shock cord actuated catapult apparatus was developed to project the head forms into test panels and other structural configurations.

It was found that with proper considerations for the design of impact structures it is entirely possible to absorb impact energies of 400-800 in. lbs. without fracture of the skull Prevention of skull fractures by proper energy absorption devices will greatly reduce the number of fatal injuries received in airplane crashes. However, fracture of the skull is only one indication of a lethal blow and many deaths have been recorded where the brain has been injured as a result of a head blow without skull fractures.

1,682

Wakeland, H. H. 1962 SYSTEMATIC AUTOMOBILE DESIGN FOR PEDESTRIAN INJURY PREVENTION. (In M. K. Cragun, ed., The Fifth Stapp Automotive Crash and Field Demonstration Conference, Sept. 14 - 16, 1961) Pp. 193-218.

1,683

Walchner, O. & F.M. Sawyer 1958 PARACHUTIST SPIN PROBLEM. (USAF, Wright-Patterson AFB, Ohio) WADC TN-58-261. Sept. 1958.

1,684

Walchner, O. & F.M. Sawyer 1960 PARACHUTIST'S SPIN PROBLEM (Aeronautical Research Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio) Proj. No. 1366, Rept. No. ARL TN 60-150, Sept. 1958. ASTIA AD 250 438.

ABSTRACT: Research was undertaken to furnish the Aerospace Medical Laboratory an estimate of the spinrates possible when a man falls free from high altitudes in a supine position. The spinning moments acting on a small model in a uniform airflow were determined for some configurations which were slightly unsymmetrical with respect to the spinaxis. The spinrates were then calculated assuming that the body does not pitch and roll during the fall. For a vertical fall from an altitude of 83,000 ft, spinrates were determined which far exceed the value which may be fatal to man. (Author)

1,685

Walchner, O. 1961 PARACHUTIST'S SPIN PROBLEM. In Bergeret, P., ed., Escape and Survival: Clinical & Biological Problems in Aero Space Medicine. (London, New York, Paris: Pergamon Press, 1961) AGARDograph 52. Pp. 10-17

1,686

Wallingford, V.R. 1943 SUBSTITUTION OF STEEL SPRINGS FOR RUBBER SHOCK CORD ON PILOT'S SEAT ADJUSTMENT FOR AT-16 AIRPLANES. (Noorduyn Aviation Limited, Montreal, Canada) Report no. 633, ASTIA ATI-116147, July 1943

ABSTRACT: Tests were conducted substituting steel springs for rubber shock cord on pilot's seat adjustment for AT-16 airplanes. It was found that the difference in weight of 1¼ oz. per aircraft for the two installations is considered negligible The use of only twenty-four parts in the spring installation as against sixty-nine used in the shock cord installation means a definite reduction in assembly time and detail manufacturing time and cost. The operation of the seats with the spring installation is satisfactory. Substitution of springs for shock cord in accordance with this report is considered satisfactory.

1,687

Walpole, H.L. 1952 MOCK-UP AND OPERATIONAL LIMIT STUDIES INCLUDING FLOTATION, STRUCTURAL AND FIRING TESTS OF AN EJECTABLE COCKPIT CAPSULE. (Douglas Aircraft Co., El Segundo, Calif.) Report No. ES-16043

1,688

Walsh, D.K. and R.J. Sippel 1961 PUBLICATIONS OF THE JET PROPULSION LABORATORY JULY 1960 THROUGH JUNE 1961. BIBLIOGRAPHY NO. 39-2 (Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California) ASTIA AD-273 324, December 29, 1961

ABSTRACT: JPL Bibliography No. 39-2 is a compilation of official reports of the Jet Propulsion Laboratory released July 1, 1960 through June 30, 1961. Current security classifications are indicated; titles and abstracts given herein are unclassified.

1,689

Walsh, R. H. 1957 AUTOMOTIVE ENGINEERING WITH URETHANE FOAMS Rubber World 136:386

1,690

Ward, J.A. 1959 CANOPY SPILLER FOR TROOP PERSONNEL PARACHUTE ASSEMBLY, TYPE T-10 (Aeronautical Accessories Lab., Wright Air Development Center, Wright Patterson Air Force Base, Ohio) WADC technical rept. no. 59-245, May 1959, ASTIA AD-233 016

ABSTRACT: A device was needed with the Type T-10 parachute to release or

collapse the canopy at ground impact. Eight designs were evaluated and the Air Force Type J-1 selected for modification. The surface of the Type J-1 was smoothed and a duck and felt cover provided to prevent facial abrasions; the release button was enlarged, making operation easier with either hand when wearing mittens or gloves; and an oversized lug was added to the male portion of the release mechanism to prevent malassembly. (Author)

1,691

Ward, J. E. and G. R. Steinkamp 1959 HUMAN ENGINEERING OF THE SEALED SPACE CABIN In: Reports on Space Medicine - 1958 (Air Force School of Aviation Medicine, Randolph AFB, Tex.) Feb. 1959

1,692

Warfield, D. 1950 PROCUREMENT SPECIFICATION - SEAT - PILOT AND CO-PILOT - YH-21 HELICOPTER. (Piasecki Helicopter Corp., Morton, Pa.) Report No. PS-181, ASTIA ATI 96 610, November 1950.

ABSTRACT: This specification covers the design of a pilot or co-pilot seat assembly for use in the YH-21 Helicopter. General configuration and principal dimensions are to be as shown on PHC Drawing L22E4041 which forms a part of this specification. Specification requirements for seats purchased under this specification are included. Applicable specifications and drawings are also a part of this report.

1,693

Waters, M.H. L., D.B. Cobb and V.J. Bonnett 1960 SOME WIND TUNNEL EXPERIMENTS ON THE REEFING OF PARACHUTES (Royal Aircraft Establishment (Gt. Brit.). Technical note no. Mech Eng 329; Nov 1960; ASTIA AD-253 328

ABSTRACT: The results of an investigation in the R.A.E. 24 foot wind tunnel or various methods of reefing parachutes are presented. Of those tried, rigging point reefing was the best and, for this method, measurements were made at constant speed conditions on several parachute designs and for a range of reefing cord lengths. With rigging point reefing it is possible to achieve in the correct design of parachute substantially linear relationship between parachute drag and reefing cord lengths less than approximatley 70% of the parachute periphery. The drag of a reefed parachute with 70% reefing is very little less than that of the fully-opened parachute. If the parachute has a critical speed close to that at which it is tested then the reefed parachute will squid and the linear relationship will not be obtained. The U.S. method of calculating the length of a reefing cord was compared with that proposed in this Note. (Author)

1,694

Watson, M.B.P. 1959 TESTS OF THE AVROCAR IN THE STATIC RIG (Avro Aircraft, Canada) Rept. no. AVRO/SPG/TR 305, ASTIA AD-271 496 December 1959

ABSTRACT: Ground tests were initiated to develop the air-craft to the stage where it could be demonstrated that initial hovering was reasonably safe and that mechanical operation was acceptable for the projected NASA Wind Tunnel Test Program. Effort was made (1) to study the performance of the aircraft, establish the maximum thrust available and make any necessary modification whereby the performance might be improved; (2) to establish the control characteristics and develop the control system to permit satisfactory handling characteristics for the initial hovering trials; and (3) to verify the structural integrity and mechanical operation of the aircraft. (author)

1,695

Watson- Jones, R. 1941 FRACTURES OF THE SPINE SUSTAINED BY RAF PILOTS AND THE RELATIONSHIP OF THESE INJURIES TO THE SUTTON HARNESS, PARACHUTE HARNESS AND OTHER EQUIPMENT. (Flying Personnel Research Committee, Canada) F.P.R.C. Report No. 274, April 1941

1,696

Watts, D. T., E. S. Mendelson, & H. N. Hunter 1947 EVALUATION OF FACE CURTAIN AND ARM REST FOR USE ON EJECTION SEATS. (Naval Air Experimental Station, Philadelphia, Pa.) TED No. NAM 256005, Rept. No. 4, March 1947.

ABSTRACT: Experiments were conducted comparing arm rests and a face curtain for use on ejection seats. The curtain is pulled from above the head to the level of the sternum. This fires the catapult, restrains the head and partially supports the weight of the hands, arms and shoulders during the following acceleration. The curtain satisfactorily restrained the head and shoulders at accelerations from 17 to 21 G. With arm rests undesirable flexion of the body occurred at 10 to 12 G. Subjective reactions using the curtain were much less severe at the higher accelerations than they were at the lower values using the arms rests. It is concluded that the curtain is absolutely essential and is more protective than arm rests for use on ejection seats at accelerations up to 21 G.

1,697

Watts, D.T., E.S. Mendelson, & A.T. Kornfield 1947 HUMAN TOLERANCE TO ACCELERATIONS APPLIED FROM SEAT TO HEAD DURING EJECTION SEAT TESTS; PILOT'S ESCAPE FROM HIGH PERFORMANCE AIRCRAFT MECHANISM FOR -DEVELOPMENT AND TEST OF (Aero Medical Equipment Lab., Naval Air Experimental Station, Naval Air Material Ctr., Pa.) Project TED No. NAM 256005, Rept. No. 1, Jan. 1947. ASTIA ATI 206052.

CONCLUSIONS: Average subjects have repeatedly ridden on the MBA 40", 52" and 60" catapults and have attained average velocities of 55.4, 63.4, and 60.4 ft/sec respectively. Average maximum "G" recorded on the catapult seat and the hip, shoulder and head of subjects have been 17.4, 18.9, 18.5 and 17.0 "G" respectively. These accelerations have not resulted in significantly undesirable reactions and it is believed average aviation personnel could tolerate such accelerations with no injury.

The T-2 catapult with a much faster initial rate of acceleration produces unbalanced oscillations in the seat-cushion-subject mass system. This results in excessive accelerations recorded on the subject and man's limitation is approached while obtaining a maximum ejection velocity of 40 to 47.5 ft/sec No conclusions can be made as to the absolute optimum rate of seat acceleration for personnel ejection catapults. However, from the practical standpoint these experiments have shown that seat acceleration rates up to 100 "G" per second have not produced significant internal oscillations in the seat-cushion-subject mass with resultant excessive accelerations on the subject. Acceleration rates of 100 to 200 "g" per second begin to elicit excessive accelerations on the subject and rates of 200 to 700 "G" per second lead to such highly excessive acceleration on the subject that the performance of any catapult with a given stroke is definitely limited. This phenomenon might be controlled to some extent by the use of highly damped cushions, but the more logical point of control is in the catapult imparting the accelerations and it is believed the present seat parachute and cushion is a highly satisfactory cushioning system for ejection seats.

As shown under the condition of these experiments average men can safely tolerate the acceleration required to obtain adequate velocity for seat ejection. It is expected that other problems associated with seat ejection from aircraft can be solved. This is borne out by the live ejection of Lt. A.J. Furtek on 30 Oct. 1946 at an IAS of 250 mph. (Author)

1,698

Watts, D. T., Mendelson, E. S., Hunter, H. N. Kornfield, A. T. and Poppen, J. R. 1947 TOLERANCE TO VERTICAL ACCELERATION REQUIRED FOR SEAT EJECTION. J. Aviation Med. 18 (6):554-564.

SUMMARY: 1. The problem of bailing out of military aircraft and the desirability of the ejection seat as a means of escape are discussed. A 105-foot test rig and experimental procedures are described.

2. Results are given of sixty ejection seat experiments in which volunteer subjects were exposed to maximum acceleration in the range of approximately 18 to 21 G. It is concluded that, under the conditions of the

experiments, average men can tolerate this acceleration, which is adequate to eject aviators from aircraft.

3. Careful recordings of catapult pressure and resultant accelerations were essential for the control and analysis of the forces to which personnel were exposed. Satisfactory instrumentation for this purpose has been assembled and its use described.

4. The dynamic response of the seat-cushion-subject mass to the suddenly applied ejection force is analyzed and discussed. This analysis has led to the improvement of existing catapults and the development of new and superior ejection devices.

1,699

Weaver, J., M. Rubinstein, C.C. Clark, & R.F. Gray 1962 ENCAPSULATION OF HUMANS IN RIGID POLYURETHANE FOAM FOR USE AS A RESTRAINT SYSTEM IN HIGH ACCELERATION ENVIRONMENT. (Naval Air Development Center, Johnsville, Pa.) Report No. NADC-MA 6147, May 31, 1962.

ABSTRACT: Molded seats and couches have the advantages of distributing accelerative loads developed by the user's body across the maximum possible area. This report discusses experiments with complete encapsulation of humans in rigid casts of polyurethane foam for periods of more than two hours. The procedures discussed were judged by a subject to give better support in an acceleration environment than other forms of human restraint tested at the Aviation Medical Acceleration Laboratory, U.S. Naval Air Development Center, Johnsville, Pa. Considerable progress in solving the problems associated with casting humans in this material was made during these experiments. It was found possible to form a complete rigid cast around a human in five minutes and possible to remove this cast in less than three minutes. Subjects have stayed encapsulated in foam casts for periods of up to 30 minutes without special provisions for cooling. Vestilatable garments permit persons to stay encapsulated in the foam for periods of at least two hours. The immobilization leads muscle and joint pain which increases with time and sets limits on tolerance to being submerged in this type of rigid cast. (Author)

1,700

Webb Associates 1962 NASA LIFE SCIENCES DATA BOOK
(Webb Associates, Yellow Springs, Ohio)
Contract NASr-89; June 1962

CONTENTS:

I. Environmental Design Ranges
A. Atmosphere
B. Force Fields
C. Temperature
D. Decompression
E. Radiation

II. Active Human Exchanges
  A. Energy
  B. Water
  C. Waste
III. Characteristics of Man
  A. Size and Motion
  B. Breathing
  C. Senses

1,701

Webb, M.G. 1957 TEST AND EVALUATION OF ANTI-BLACKOUT EQUIPMENT WHEN USED IN VARIOUS COMBINATIONS
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR17 Jan. 9, 1957

ABSTRACT: An investigation was conducted on the AMAL centrifuge to determine the effectiveness of standard anti-blackout equipment when used in various combinations. Six subjects were tested wearing Z-2 and Z-3 suits with different combinations of other clothing. From the results obtained in this experiment, it is concluded that there is no appreciable difference in the effectiveness of anti-blackout equipment when worn in the combinations tested.

1,702

Webb, M. G. 1957 PILOT'S ABILITY TO ACTUATE COCKPIT CONTROLS UNDER G CONDITIONS (Naval Air Development Ctr., Johnsville, Pa.) Letter Rept. TED ADC AE-6303.1, Serial 2625, 29 Mar. 1957

1,703

Webb, M. G., & R. F. Gray 1958 PRELIMINARY STUDY OF G TOLERANCE OF A SUBJECT IN THE G CAPSULE, PRONE POSITION. (Naval Air Development Ctr., Johnsville, Pa.) Letter Rept. TED ADC AE-1411, Serial 0568, 8 July 1958

1,704

Webb, M. G., Jr. and R. F. Gray 1960 A NEW METHOD OF PROTECTION AGAINST THE EFFECTS OF ACCELERATION ON THE CARDIOVASCULAR SYSTEM. Amer. J. Cardiol. 6: 1070-1077, Dec. 1960.

1,705

Webb, P. 1959 HUMAN TOLERANCE AND PROTECTIVE CLOTHING Annals New York Acad. Sc., 82(3):714-234, 7 Oct. 1959.

1,706

Webb, P. & F.K. Klemm 1959 DESIGN OF VENTILATED CLOTHING (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADC-TR-58-584, March 1959

1,707

Weber, W. C. and W. C. Knerr 1959 UNDERWATER ESCAPE PROGRAM: F8U-1 UNDERWATER CANOPY REMOVAL, FLOODING ORIFICES AND SEAT EJECTION, (U. S. Naval Air Development Center, Johnsville, Pa.) Rept No. 9 Proj. ADC-AE 6307; ASTIA AD230 569.

SUMMARY: This report covers all the underwater tests performed on an F8U-1 aircraft cockpit section by the NADEVCEN. The test work was accomplished at the NAS, Key West, Florida from July through December 1958. These tests evaluated the basic F8U-1 canopy remover system, determined the requirements for underwater canopy removal, evaluated the use of cockpit flooding orifices to reduce the differential pressure on the canopy, and evaluated the ejection seat system as a means of underwater escape from aircraft.

1,708

Webster, A. P. and H. A. Smedal 1950 HIGH ALTITUDE-HIGH VELOCITY FLYING WITH SPECIAL REFERENCE TO THE HUMAN FACTORS. - BARE SKIN HAZARD FROM FROSTBITE IN ESCAPE FROM AIRCRAFT. (Naval Medical Field Research Lab., Camp Lejeune) Proj. NM 006 014.02.02 (Sept. 1950) 1: 131-158.

ABSTRACT: The equation, $t(F_s-F) = C$, was derived to express the relationship between exposure time, t, and exposure temperature, F, in the production of frostbite, where F_s is the maximum exposure temperature just productive of frostbite for an indefinite exposure time and C is the exposure which just produces frostbite. For bare skin, F_s is taken as + 14°F and C as 4860 sec. -°F. Application of free-fall and open-parachute descent conditions gave a jumper's frostbite equation. For a 200-lb. jumper leaving a plane in horizontal flight, the estimated maximum altitude avoid frostbite was 39,600 ft. for freefall. The minimum freefall distance required was 26,980 ft. with a free-fall time of about 100 sec. For open descent all the way, with a 28-ft. nylon parachute, the estimated maximum altitude was 20,910 ft. A chart is presented, for an average jumper in the standard atmosphere, in which 3 regions are shown: dangerous region, for all altitudes at jump above 39,600 ft., and for altitudes above 20,910 ft., where the free-fall distance is not sufficient; safe region, freefall necessary, for altitudes

1,709

Webster, A. P. and H. A. Smedal 1951 HIGH ALTITUDE-HIGH VELOCITY FLYING WITH SPECIAL REFERENCE TO THE HUMAN FACTORS III: BARE SKIN HAZARD FROM FROSTBITE IN ESCAPE FROM AIRCRAFT. J. Aviation Med. 22(2):89-99.

SUMMARY: There are a number of physiological hazards in escape from aircraft flying at high altitudes. One of these hazards is frostbite.

Frostbite is a result of exposure which is composed of two factors: Time and temperature. Hypothesis indicates that the relationship between exposure time, t, and exposure temperature, F, is of the form $t(Fm-F)=C$ where F_m is the maximum exposure temperature just productive of frostbite for an indefinite exposure which just produces frostbite. For bare skin, F_m is taken as + 14°f., and C as 4,860 sec. - °F.

Application of free-fall conditions and open parachute descent conditions gives the Jumper's Frostbite Equation

$$\frac{1}{k_{cr}}\left[\sum_{h_f}^{h_m} \rho^{1/2}\,\Delta h(F_m - F) + 11(F_m - F_t) + \frac{1}{k_{op}}\sum_{h_o}^{h_f} \rho^{1/2}\,\Delta h(F_m - F)\right] = C$$

Insertion in this equation of selected constants for a 200 pound jumper leaving a plane in horizontal flight and waring a 28 foot nylon parachute, permits solution of the altitude at open parachute, h_o, to avoid frostbite on bare skin. Hence, the free-fall distance is determined, and the free-fall time.

The maximum altitude at jump to avoid frostbite may be determined by insertion of selected constants in the equation. For a 200-pound jumper leaving a plane in horizontal flight, the estimated maximum altitude is 39,600 feet for free-fall. The minimum free-fall distance required is 26,980 feet, with a free-fall time of about 100 seconds. For open descent all the way, with a 28-foot nylon parachute, the estimated maximum altitude is 20,910 feet.

A Frostbite Chart is presented, for an average jumper in the Standard Atmosphere, in which three regions are shown: A Dangerous Region, for all altitudes at jump above 39,600 feet, and for altitudes above 20, 910 feet where the free-fall distance is not sufficient; a Safe Region, Free-Fall Necessary, for altitudes between 29,910 feet and 39,600 feet; and a Safe Region, Immediate Opening, for altitudes below 20,910 feet.
Frostbite equations, tables, and charts are presented for estimating safe regions of escape to avoid the hazard from frostbite.

The maximum altitude at jump to avoid frostbite on bare skin varies only slightly with the weight of the jumper; and only slightly with the usual range of parachute canopies and drag coefficients of jumpers and parachutes.

1,710

Webster, A.P., 1953 HIGH ALTITUDE-HIGH VELOCITY FLYING WITH REFERENCE TO THE HUMAN FACTORS. IV. OPENING SHOCK OF PARACHUTE DESCENTS. J. Aviation Med. 24(2):189-199

SUMMARY: The opening shock of standard American parachutes is shown to increase directly with the fourth power of the velocity (true air speed) of the jumper when the parachute opens; to increase directly with the weight of the jumper; and to increase directly with the mass density of the air, i.e., decrease with increase in altitude. The equation for the opening shock is of the form $P = AW_p V_o^4$
where P is the opening shock in pounds; W is the weight of the jumper in

pounds; ρ is the mass density of the air in slugs per cubic foot; is the opening velocity in feet per second; G is the opening shock in multiples of g, the acceleration due to gravity; and A is a constant depending on the type of parachute. This constant has been estimated to be 3.964×10^{-6}, 3.441×10^{-6}, and 5.386×10^{-6} for 24-foot nylon, 28-foot nylon and 28-foot silk parachutes, respectively. If the jumper is falling at equilibrium free-fall velocity when the parachute opens, the opening shock may be obtained from the equation $P = BWV_\rho^2$ or $G = BV_\rho^2$ where V_e is the free-fall equilibrium velocity, and B is a constant depending on the type of parachute. This constant has been estimated to be 0.0488, 0.575, and 0.0785 for 24-foot nylon, 28-foot nylon, and 28-foot silk parachutes, respectively. For a constant G-tolerance criterion, the relation between the velocity and mass density of the air (altitude) is of the form

$$V_o = \left(\frac{C}{\rho}\right)^{1/4}$$

where C is a constant depending on the type of parachute and the value of G selected.

For a 200-pound jumper with a 20 G criterion and a 28-foot nylon parachute, the constant C is estimated to be 5.812×10^6 and for a 30G criterion, 8.718×10^6. Using this latter equation and constants a velocity-altitude tolerance table and chart were prepared showing a SAFE REGION production of 20G or less, a DANGEROUS REGION PRODUCING 30G or more, and BORDERLINE REGION producing between 20 and 30G.

1,711

Weckman, E.L., O.L. Slaughter, and E.H. Wood 1955 MEASUREMENTS TO EVALUATE THE EFFECTIVENESS OF THE FULL PRESSURE HALF SUIT IN APPLYING EXTERNAL PRESSURE TO THE BODY. (Aviation Medical Acceleration, Lab., Johnsville, Pa.) NADC-MA-5502, March 21, 1955

1,712

Weinberg, J. W. 1959 DOUBLE-WALLED FACEPIECES MA-1A ALTITUDE HELMET (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC Tech Rep. 58-643 ASTIA 212313.

1,713

Weinstock, M. & W. Boaz 1958 INVESTIGATION OF THE PRINCIPLE OF CONTROLLED ACCELERATION OPERATION OF PERSONNEL ESCAPE CATAPULTS. (Pitman-Dunn Laboratories Group, Frankford Arsenal, Philadelphia, Pa.) Memorandum Report No. MR-712, WADC TN 58-372, MIPR 33-600-8-1375A-178, FA Subproject No. C180, OCO Project No. TS1-15, DA Project No. 502-06-001, Oct. 1958. ASTIA AD 207612

ABSTRACT: The Pitman-Dunn Laboratories Division of Frankford Arsenal designed a pressure-sensitive relief valve in compliance with a request by the Wright Air Development Center. The basic project (TS1-15-C180) was aimed at developing a propellant charge for use in the M5 catapult in order to obtain a safe

personnel ejection from an aircraft at runway level; the relief valve was conceived as an alternate means of obtaining this capability. The relief valve maintains the gas at the pressure level required for optimum acceleration of the catapult by venting the excess gases formed during the catapult stroke. In this configuration, the catapult propellant charge must be great enough to produce above-normal operating pressures over the range of operating temperatures, thus insuring, throughout the stroke, an abundant supply of gas for regulation by the relief valve. The test firings demonstrated that the pressure relief valve functioned satisfactorily. The test results established the soundness of the principle of controlled-acceleration operation in personnel escape catapults.

1,714

Weinwurm, G. F. 1959 X-15 WINDBLAST TESTS
(Air Force Flight Test Ctr., Edwards AFB, Calif.) AFFTC-TN-58-42; ASTIA AD-302 802; March 1959

SUMMARY: The X-15 windblast tests performed on the Air Force Flight Test Center High Speed Track are analyzed to supply aerodynamic load information for the seat, and points out a number of deficiencies in the system. These include malfunction of the fin locking mechanism, oscillation of the extended skip flow generator, weakness of the parachute package, tendency of several parts of the seat to puncture the pressure suit, and material failure of the survival garment at a number of points. (ASTIA)

1,715

Weiswurm, K. 1961 EXPERIMENTAL MOUSE CAPSULE WITH LIFE SUPPORTING SYSTEM. Rept. on Equipment for Life Support in Aerospace. (Aerospace Medical Lab., Aeronautical Systems Division, Wright-Patterson AFB, Ohio) ASD TR 61-323, August 1961. ASTIA Doc. No. AD-267 143

ABSTRACT: To determine the basic requirements needed to furnish a sealed atmosphere suitable for sustaining life, a 12-inch sphere housing a mouse cage, 2-week food and water supply, atmosphere control units, and photographic equipment was designed and built for laboratory testing. Several methods of atmosphere control were tested using drierite, calcium chloride, gaseous oxygen, and potassium superoxide. Potassium superoxide in this application performs three functions in a single process-it absorbs carbon dioxide, it absorbs water vapor, and it releases oxygen. It makes possible an atmosphere regeneration system having no fans or other air-circulation devices; thus resulting in higher reliability. Three tests using potassium superoxide, each lasting two weeks, were very successful and demonstrated the advantages of this method. (Author)

1,716

Wells, J. A. 1961 DESIGN STUDY OF THE CAPSULE ESCAPE VEHICLE PARACHUTE RECOVERY SYSTEM HARDWARE. (Space Recovery Systems, Inc., El Segundo, California) Rept. No. SRS 635, Vol. 1, ASD TR 61-178, Vol. 1, October 1961. ASTIA Doc. No. AD-269 124.

ABSTRACT: A detailed evaluation was conducted to determine the characteristics required in a parachute recovery system for an escape capsule ejected from an aircraft having a performance capability of Mach 4 and 100,000 feet altitude. Certain operational parameters such as maximum and minimum deployment velocity and altitude, final rate of descent, capsule weight, and boost rocket thrust were given. Based on this evaluation, a general configuration of the system was established. An industry-wide survey of known sources of recovery system hardware components yielded data that were used in the design and evaluation of several basic types of systems. The most prominent of these were a gas-operated pyrotechnic system and an electric-pyrotechnic system. The gas-operated pyrotechnic system was selected ultimately as the optimum type available currently. A test program was established for qualification of the selected system. (Author)

1,717

Wells, J. A. 1961 DESIGN STUDY OF THE CAPSULE ESCAPE VEHICLE PARACHUTE RECOVERY SYSTEM HARDWARE. Vol. II (Space Recovery Systems, Inc., El Segundo, California) Rept. No. SRS 635, Vol. 2, ASD TR 61-178, Vol. 2, October 1961. ASTIA Doc. No. AD-269 125.

ABSTRACT: This report includes detailed technical charts, illustrations and explanations of the capsule escape vehicle parachute recovery system hardware.

1,718

West, D. R. & J. T. Greenslade 1962 ENGINEERING EVALUATION SEAT SEPARATORS (Central Experimental and Proving Establishment, Canada) CEPE RN 1622, May 1962, ASTIA AD-287 009

ABSTRACT: In conventional jet aircraft such as the T33 or F86, employing a ballistic catapult type of ejection seat, man/seat separation is accomplished by the difference in aerodynamic drag forces and masses of the seat/man. The actual time of separation under these conditions will be a function of the speed at which ejection occurs and the orientation of the seat/man package after ejection. These conditions render the seat/man separation time predictable only within a relatively broad range, and in the low altitude, low forward speed case, a delayed separation could cause a critical collision to occur between the man and seat. The introduction of a man/seat separating device, programmed to separate the crew member positively from his seat at a specific time, will reduce the separation time normally encountered when drag/mass ratio is the controlling factor. This would eliminate the collision probability by providing a safe distance between the man and the seat when parachute deployment occurs. Elimination of delay in speatation will permit an over-all decrease in the escape system's functioning time and thus provide an improvement in height-above-ground recovery capability. Ballistically operated man/seat separator actuators were obtained

on a load-for-test basis from commercial sources. A series of bench tests, static and airborne ejections was done to prove the separator installation for the T33 ejection seat. A feasibility of installation study was done for the F86 aircraft. (AUTHOR)

1,719

Wheelwright, C. D., J. J. Swearingen and J. D. Garner 1959 AN ANALYSIS OF SITTING AREAS AND PRESSURES OF MAN. (CAMR Lab., FAA, Oklahoma City, Oklahoma) Jan. 1959.

1,720

Whillans, M.G. 1942 SPONGE RUBBER ABDOMINAL BELT FOR USE WITH CRASH BOAT CREW TO PREVENT EFFECTS OF JOLTING.
(National Research Council, Canada) 4 Feb. 1942. C-2477

1,721

White, A.E. 1962 DEVELOPMENT AND QUALIFICATION THRUSTER, CARTRIDGE ACTUATED, XM16
(Aeronautical Systems Division, Wright-Patterson AFB, Ohio) ASD-TDR-62-1061
FA Report R-1639 ASTIA AD 402 377

ABSTRACT: The Air Force modification of the B52 aircraft escape system required a device to position leg guards for the protection of personnel ejected downward. It was determined that the T22 thruster being developed by the Frankford Arsenal for positioning the stabilizing dorsal fins of the F103 aircraft escape capsule could, after minor modifications, be used as an interim device to perform this operation. Frankford Arsenal was asked to modify the T22 thruster into a trunnion-mounted, gas-fired device to be designated Thruster, Cartridge Actuated, XM16. In all performance tests specified for the Xm16 Thruster, the unit satisfied military requirements for use in the B52 aircraft escape system.

1,722

White, C. B., P. J. Johnson & H. T. E. Hertzberg 1952 REVIEW OF ESCAPE HATCH SIZES FOR BAILOUT AND DITCHING.
(Wright Air Development Center, ARDC) Tech. Note WCRD 52-81; Sept. 1952.
ASTIA AD 99 784

ABSTRACT: This publication reviews wartime specifications of escape hatches in terms of current and experimental flying equipment. Each of the simulated bail-out and ditching tests was begun by a check of the adequacy of the present hatch sizes by subjects wearing the full flying equipment in present use. The hatch opening, if too small, was then enlarged until it was adequate. The entire procedure was then repeated with the subject wearing experimental arctic clothing,

which is considerably more bulky than present equipment. First the A-1, then the E-1 survival kit was used with each trial. It was found that the present standard sizes of 20 by 31 inches for the side hatch and 20 by 29 inches for the bottom hatch is adequate for use with either the current equipmentor the new experimental heavier clothing, provided no tunnel is involved, or the access area is not obstructed. It was also found that the standard size of the top hatch should be increased to 22 by 22 inches and these should be a step or ledge not more than 45 inches below the lowest edge of the hatch to give additional leverage to shorter crew members.

1,723

White, R. M. n.d. ANTHROPOMETRIC MEASUREMENTS OF 500 ARMY AVIATORS. (Quatermaster Res. and Dev. Ctr., Natick, Mass.) Unpub. data.

1,724

White, S. 1960 PRESENT AND FUTURE PERSONAL EQUIPMENT. Lectures in Aerospace Medicine, 11-15 January 1960 (Conducted at the School of Aviation Medicine USAF Aerospace Medical Center).

1,725

Whiting, A A. et al. 1951 HEAD IMPACT AND HELMET INVESTIGATION (Cornell Aero. Lab., Inc., Buffalo, N.Y.) Rept. No. OG-675-D-5, Contract No. N6ori-11917, 30 April 1951.

1,726

Whitney, R. U. 1956 DEVELOPMENT AND EVALUATION OF NEW CUTAWAY ANTI-G SUIT. Tech. Memo Rept., WCRD 56-34.

1,727

Whittenberger, R. K. 1959 IMPROVED SEAT AND BACK CUSHIONS. (The Goodyear Tire and Rubber Company, Akron, Ohio.) Proj. 7215; Task 71724 WADC TR 59-376. ASTIA Doc. No. AD-233 446.

Abstract: Development of an improved pilot seat and back assembly for the reduction of pilot fatigue is described in detail. The design criteria for these seat and back cushions are included. The study covers both seat design and seating materials; 25 experimental pilot seat cushions and 25 experimental back cushions were produced both contoured and noncontoured, as well as foam rubber and polyurethane foam. The results of this study indicate that polyurethane foams of a proper density and compression resistance can be safely

and efficiently used in aircraft pilot seat and back cushions. The combined advantages of lighter weight, solvent resistance, and closer quality control indicate that the polyurethance foams offer a superior body support material. (author)

1,728

Whittingham, P.D.G.V., H. Lundy & F. W. Baskerville 1956 COMPARATIVE TRIALS ON IMMERSION SUITS.
(Inst. Aviation Med., R.A.F., Farnborough) FPRC 977; July 1956.

1,729

Wiant, Harry W. & R. O. Fredette 1956 A STUDY OF HIGH DRAG CONFIGURATIOI AS FIRST STAGE DECELERATORS. (U.S. Air Force) WADC Tech. Note 56-320, July 1956.

1,730

Wiesehofer, H. 1940 UBER FLUGVERSUCHE ZUR FRAGE DER ERTRAGLICHKEIT HOHER BESCHLEUNIGUNGEN BEI LIEGENDER UNTERBRINGUNG DER FLUGZEUGINSASSEN (Question of Tolerance of High Rates of Acceleration by Pilot While Lying Down; Experimental Studies)
Luftfahrtmedizin 4: 145-155

1,731

Wiesenhoefer, H. 1943 FLUGMEDIZINISCHE GRUNDLAGEN ZUM BAN VON SCHLEUDERSITZEN. (Aero-Medical Basis for Construction of Catapult Seats) Oct. 1943. ASTIA ATI 52016

ABSTRACT: A detailed discussion is presented on the aero-medical principles for construction of catapult seats. The main topic of the discussion is the determination of how well the human body is able to withstand the strain connected with high acceleration, and how these stresses can be reduced, and other safety measures are outlined. Numerical tables are given showing the stress resistance of various vertebrae to various stresses. One proposed measure to reduce acceleration is to catapult the seat downward. Results of tests showed that accelerations of 18 to 20 g for a period of 1/10 to 2/10 sec are permissible causing no serious effects to the body.

1,732

Wiesehoefer 1944 SCHLEUDERSITZABECHUESSE MIT MENSCHEN ZUR...FLUGZEUG-MUSTER. (Tolerance of Human Subjects to Acceleration During Catapult Seat Ejection) Oct. 1944. ASTIA ATI 43761

ABSTRACT: Tests were performed with catapult ejection seats with human subjects to determine tolerance to high acceleration. Catapult seats intended for the Do 335 and He 219 fighters were used, at ejection pressures of 60 to 135 atmospheres corresponding to actual flight of both aircraft. Attention is directed to the difference in construction of both assemblies. On the basis of results obtained it is shown that these ejection seats may be used without causing injuries to pilots due to excessive acceleration. It is considered premature to regard accelerations up to 28 g, which have been well tolerated in the tests, as lying invariably below the breaking load of skeletal structures.

1,733

Wiesehofer, H., tr. J.B. Bateman 1945 AVIATION MEDICAL PRINCIPLES FOR THE CONSTRUCTION OF EMERGENCY EJECTION SEATS. (Deutsche Versuchsanstalt fur Luftfahrt, E.V., Berlin-Aldershof) Rept. Rf 301/12, UM 1175(150)2402, 27 Oct. 1943. Translated as Appendix 2 to Lovelace, W.R., E.J. Baldes, & V.J. Wulff, The Ejection Seat for Emergency Escape from High-Speed Aircraft, Aug. 31, 1945. ASTIA ATI 7245

ABSTRACT: Following a review of the dynamic processes occurring in the ejection of the catapult seat, the effects on the human subject resulting from accelerations and air resistance are set forth. The limiting conditions are established under which the thresholds of tolerance of the human body, and particularly of the spinal column, are not exceeded. The procedures for reducing the forces involved and certain safety measures are discussed.

I. Introduction
II. Technical Details of the Ejection Seat.
III. Tolerance Toward Impact-Like Accelerations.
IV. Experiments on Tolerance to Wind Blast.
V. Flight Tests with Catapult Seat in the Ju 87.
VI. Possible Methods of Reducing the Acceleration During Ejection. (Author)

1,734

Wiesohofer, , tr., J.B. Bateman 1945 CATAPULT SEAT EJECTION WITH HUMAN SUBJECTS: TOLERANCE TO ACCELERATION OF PERSONS EJECTED FROM THE Do 335 AND He 219. (Deutsche Versuchsanstalt Fur Luftfahrt, E.V., Berlin-Adlershof) Deutsche Luftfahrtforschung: Investigation and Report No. 1393, 31 Oct. 1944. Translated as Appendix 14 to Lovelace, W.R., E.J. Baldes, & V.J. Wulff, The Ejection Seat for Emergency Escape from High-Speed Aircraft, ASTIA ATI No. 7245

ABSTRACT: The report deals with the effects on human subjects of seat ejection from a stationary mounting using high driving forces.

Using a catapult seat assembly intended for model Do 335, twenty-seven ejections have been performed with ten subjects, using pressures of 60 to 135 atmospheres. Using that intended for model He 219, fourteen ejections have been made with five subjects at pressures of 60 to 90 atmospheres.
Attention is drawn to the differences between the two assemblies; the requirements for each are set forth, and the results of the experiments are discussed. (Author)

1,735

Wilbur, Carl E. 1957 U.S. NAVY OPERATIONAL EXPERIENCE WITH EJECTION SEAT ESCAPE
Journal of Aviation Medicine 28:64-68, Feb. 1957.

ABSTRACT: There are many variables involved in any successful ejection, the principal ones being: (1) the condition of the aircraft, including its altitude and speed; (2) the functioning of the ejection seat mechanism, including separation from the seat and deployment of the parachute; and (3) the reactions of the pilot, including his decision to eject and his ability to complete the required procedure.

It is difficult in each instance of ejection to isolate the variable factors at fault. For this reason, each individual ejection should be considered as an occurrence in itself for purposes of safety study and preventive action. Furthermore, it is not possible in a series of only 177 cases to be on firm statistical ground.

Although the ejection system has been relatively safe in flight, its extra safety factors may have introduced undesirable features into escape under extreme emergency conditions. The seat cannot be fired until the canopy is jettisoned and thus pulls the seat catapult safety pin. This provision prevents premature ejection through a closed or partially opened canopy. However, since in this system failure of the canopy ejection mechanism would mean inability to eject with possible fatal results, a device for altenate removal of the safety pin has been invorporated to allow ejection through the canopy. The remaining major areas for reduction of fatalities lie in increasing the probability of successful escape at low altitudes, and at very high altitudes and speeds.
(The paper presents several graphs and many statistics concerning speed during escape, cause of ejection, and survival rate of ejected pilots)

1,736

Wilcox, B. 1958 THE CALCULATION OF FILLING TIME AND TRANSIENT LOADS FOR A PARACHUTE CANOPY DURING DEPLOYMENT AND OPENING. (Sandia Corp., Albuquerque, N. Mex.) Rept. no. SC4151; ASTIA AD-156428: Feb. 1958

ABSTRACT: Theoretical relations are developed for use in predicti , the filling time and transient shock forces developed during the deployment and opening of a parachute canopy. These relations are used to calculated filling times and loads which are compared with measured values obtained from full-scale parachute research flight tests. The comparison is shown to be good.

1,737

Wilder, J.H. 1958 MODEL PARACHUTE TESTS IN VERTICAL WIND TUNNEL AT WRIGHT AIR DEVELOPMENT CENTER (Dayton U. Research Inst., Ohio) WADC Technical rept. no. 58-279, Sep. 1958, Contract AF 33(616)3922, ASTIA AD-204 424

ABSTRACT: The static stability and drag characteristics were determined of certain presently known parachute designs from wind tunnel tests on model parachutes. A special 3-component balance was employed to measure the body fixed components, normal force (force normal to the balance-boom axis), pitching moment and tangential force. The experimental tests were conducted in the 12-ft vertical wind tunnel. Twelve parachute models were tested, and the results indicated that 5 were stable about zero degrees angle of attack, that 1 was possibly stable about zero degrees angle of attack, that 1 was possibly stable at zero degrees angle of attack, and that 1 would not inflate at any air velocity. Those parachutes which were unstable about zero degrees angle or sick were in all cases stable about some other angle. In this study a positive slope of the moment coefficient versus angle of attack curve at a point of zero mement indicates stability. The manner in which a parachute canopy deforms is very important to the stability characteristics of that parachute. Deformation alone is believed to account for 5 points of zero mement for a parachute such as the the 20% porosity ribbon instead of the usual 3 points of zero moment experienced by most designs. Drag coefficients at zero angle of attack resulting from the wind tunnel tests were generally lower than those reported from free-fall drop tests.

1,736

Wilkes, W.H. 1952 ESCAPE FROM MULTIPLACE SUPERSONIC AIRCRAFT. (Paper, Symposium on Problems of Emergency Escape in High Speed Flight, Wright Field, Ohio, Sept. 29-30, 1952)

ABSTRACT: The principal dangers involved in escape from an aircraft at supersonic speeds and high altitudes are as follows: (1) explosive decompression; (2) immobility due to uncontrollable airplane or injury; (3) possibility of collision with the airplane structure such as wing, fin, wheels, etc.; (4) possible high temperatures due to aerodynamic heating of the crewman; (5) extreme horizontal deceleration after entering the airstream; (6) physical harm due to air blast on face and body; (7) lack of oxygen; (8) extreme cold; and (9) inability to open the parachute due to unconsciousness. The implications of these dangers are briefly discussed, in as much as they apply to multiplace bombers operating at altitudes up to 60,000 feet and speeds up to Mach 2.

1,739

Wilkins, R.W. 1944 BIMONTHLY PROGRESS REPORT NO. 17 TO THE CMR-OSRD ON CONTRACT OEMcmr-143. 2 Oct. 1944.

ABSTRACT: An anti-"g" suit has been constructed out of cotton netting which works on the principle of the "Japanese finger trap". Tests at the Wright Field Centrifuge show that it gives a protection of 1/2 to 1 "g". The experimental model is now being strengthened and simplified.

1,740

Wilkins, R. W. 1946 NET SUIT, COMBINED WITH PARACHUTE AND SAFETY HARNESS. (National Research Council, Committee on Aviation Medicine, Washington, D. C.) Special CAM Report, 8 May 1946.

1,741

Williams, D.C. 1959 T33 AIRCRAFT EJECTION SEAT TRIALS LOW LEVEL CASE USING D-RING LANYARD SYSTEM (Royal Canadian Air Force Central Experimental and Proving Establishment) Report No CEPE-1363 March 1959.

1,742

Williams, R.B. & R.J. Benjamin 1960 ANALYSIS OF WEBBING IMPACT DATA AND DETERMINATION OF OPTIMUM INSTRUMENTATION TO BE USED IN CONJUNCTION WITH THE IMPACTING OF WEBBING. (Cook Technological Center, Morton Grove, Ill.) March 1960. ASTIA AD 237 171.

ABSTRACT: Quantities of data have been obtained at Edwards Air Force Base, California, concerning the impact behavior of nylon webbing. The basic aims of this investigation are:

(1) To evaluate and analyze the methods used to obtain data acquired during nylon webbing impact tests conducted at Edwards Air Force Base, California.

(2) To interpret these data and to judge their reliability.

(3) To recommend, if necessary, improved or modified testing methods and instrumentation techniques which would result in obtaining data of greater value in future tests.

Analysis and interpretation of the test data indicated that these data were of intermediate reliability. Certain trends were apparent, but relatively large experimental scatter existed. Possible causes of the scatter were investigated and recommendations were made for improvement of testing methods, equipment, data reduction technique, and data interpretation.

1,743

Willis, J. M. N. 1956 THE EFFECT OF SPRING SUSPENSIONS FOR SEATS ON COMFORT IN HIGH SPEED, LOW LEVEL FLIGHT. (Ministry of Supply, R.A.E., Farnborough,) Departmental Memo No. ME 124

1,744

Wilson, C. L. and M. B. Zinn 1960 MEDICAL PROBLEMS IN TESTING HIGH ALTITUDE PRESSURE SUIT. Aerospace Med. 31:49.

Wilson, C. L. 1961 OPERATIONAL USE OF THE UNITED STATES AIR FORCE PARTIAL PRESSURE SUIT.
Aerospace Med 32(9):825-828.

1,746

Wilson, Charles L. 1962 PHYSIOLOGICAL PROTECTION OF THE CSU-4/P HIGH-ALTITUDE PRESSURE SUIT
(6570th Aerospace Medical Research Laboratories, Wright-Patterson Air Force Base, Ohio) AMRL-TDR-62-112 ASTIA AD 291 079

ABSTRACT: The SCU-4/P high-altitude bladder pressure suit was designed mainly for quick donning. Each of 15 subjects who wore the suit ensemble was rapidly decompressed from 282 mm Hg chamber pressure (7.6 km) to 42 mm Hg chamber pressure (19.8 km) in an average of 1.5 seconds and then further to 33.6 mm Hg (21.4 km). All subjects were able to remain at 33.6 mm Hg for 5 minutes without any difficulty. Each of 14 of the subjects was again successfully exposed to the same profile except that one hand was bare and the other hand was protected by an unpressurized leather flying glove. Eight subjects were easily able to remain at 8 to 3 mm Hg chamber pressure (30.6 to 36.7 km) continuously for 120 minutes. One subject wore the CSU-4/P pressure suit ensemble during a special decompression study.

1,747

Wilson, K. G., et al. 1945 SAFETY ADVANTAGE OF REARWARD SEATING IN PASSENGER AIRCRAFT. (Consolidated Vultee Aircraft Corp., San Diego, Calif.) Dec. 1945

1,748

Wilson, R. B. 1960 MAINTAINING THE CONFIDENCE OF THE SPACE CREW IN THEIR LIFE SUPPORT SYSTEM
(Paper SAE National Aeronautic Meeting, Los Angeles, Calif., Oct. 10-14, 1960)
(Society of Automotive Engineers, Inc., New York, N. Y.)
Rep. 244B, Oct. 1960.

ABSTRACT: Detailed data on environmental parameters that must be controlled to maintain healthful conditions in a satellite cabin are presented. A display design that will indicate the condition of these parameters is proposed and suggestions are made for instrumentation design. Ways and means of verifying the validity of the displays are discussed. Emergency backup for the environmental parameters is also provided. (Tufts)

1,764

Wood, J., C.C. Cain & D. Mahoney n.d. PHYSIOLOGICAL EVALUATION OF THE PARTIAL PRESSURE SUIT. Memo Rept. MCREXD-696-104P. (unpublished)

1,765

Wood, P.W. 1961 LIGHT WEIGHT HIGH ACCELERATION CREW SEAT (Vought Astronautics, Dallas, Texas) Progress Rept. No. 2, AST/EIR-13502, June 1961.

1,766

Wood, P. W. 1961 INVESTIGATION OF A NET CREW SEAT CONCEPT FOR ADVANCED FLIGHT VEHICLES, PART I (Aeronautical Systems Division, Wright-Patterson AFB, Ohio) Report 61-546. Oct. 1961.

1,767

Woodbury, J. 1959 EVALUATION OF LOW LEVEL ESCAPE SYSTEM, ZERO DELAY AIRCRAFT-TO-ACTUATOR LANYARD. (Naval Air Test Center, Patuxent River, Md.) Rept. No. 1; Project TED No. PTR AE-5214; ASTIA AD-267 640; 14 Oct. 1959

ABSTRACT:
1) A flight evaluation was conducted by the Service Test Division to determine the service suitability of a low level escape system, zero delay aircraft-to-actuator lanyard developed by the Naval Parachute Unit, El Centro, California.
2) It is concluded that pilots forget to hook or unhook the lanyard unless specifically reminded by radio at appropriate times during the flight. The hooking and unhooking of the lanyard at the altitudes recommended by the Naval Parachute Unit interferes with other cockpit actions and occasionally requires a head motion which is conducive to vertigo during initial climb after take-off under actual instrument conditions.
3) It is recommended that the lanyard not be accepted for service use.
(AUTHOR)

1,768

Woodward, C. et al. 1957 INVESTIGATION, DESIGN AND DEVELOPMENT OF AN F7U-3 EJECTION SEAT ENERGY-ABSORPTION SYSTEM FOR REDUCTION OF CRASH FORCE-LOADS.
(Air Crew Equipment Laboratory, Naval Air Material Center, Philadelphia, Pa.) NAMC-ACEL-335, 24 June 1957.

ABSTRACT: Spinal injuries resulting from failure of the nose landing gear during carrier landings caused an investigation of the forces involved and research into a method of reducing these forces.

A simulated crash test determined that forces along the vertical plane of the seat, corresponding to forces in the vertical plane of the spinal

column, were far in excess of the tolerable limits of the human body. An energy-absorption system, consisting of a stainless steel strap with attaching devices, coupled with an energy-absorbing seat cushion, was devised and tested. etc.

1,769

Wurzel, E.M., L.J. Polansky & E.E. Metcalfe 1948 MEASUREMENT OF THE LOADS REQUIRED TO BREAK COMMERCIAL AVIATION SAFETY BELTS AS AN INDICATION OF THE ABILITY OF THE HUMAN BODY TO WITHSTAND HIGH IMPACT FORCES. (Naval Medical Research Institute, Bethesda, Md.) Research Proj. X-630 Rept. No. 12, March 1948.

ABSTRACT: The force required to break aviation safety belts used in private aircraft was determined in order to correlate this force with the trauma recorded in the reports of private aircraft crashes. The force was determined by using a new method of testing which closely simulates the conditions believed to exist in actual aircraft crashes.

The results indicate that in private aircraft crashes man has frequently survived impact loads of 2500 pounds with no sign or symptoms of injury.

RESTRAINT, PROTECTION, AND EMERGENCY ESCAPE SYSTEMS

X

RESTRAINT, PROTECTION, AND EMERGENCY ESCAPE SYSTEMS

Y

1,770

Yale Aero-medical Research Group 1942 PNEUMATIC ANTI-G GARMENTS.
(Flying Personnel Research Committee, Air Ministry)
F.P.R.C. Report No. 423e, July 1942

1,771

York, R.R. 1941 HYDROSTATIC SUITS.
(National Research Council, Canada) Report #C-2839, 8 September 1941

ABSTRACT: This is a personal report of the service trial with the Franks Flying Suit at 74 Squadron, R.A.F., Acklington.

1,772

Young, R.D. 1945 NOTE ON [illegible] NORMALLY FROM AN AEROPLANE MOVING AT A [illegible]
(Royal Aircraft Establishment, [illegible] ro. 1484, Aug. 1944. Appendix 7 to Lovelace, W. [illegible] W.J. Wulff, The Ejection Seat from High Speed [illegible] AMRA ATI 7245

SUMMARY: Calculations have been made of the flight path of a man ejected [illegible]ally from an aeroplane moving at speeds (0 degrees) of 400 f.p.s., and [illegible].p.s. Ejection velocities ( ) of 20 f.p.s., 50 f.p.s. and 100 f.p.s. in both up and down directions have been considered for each case, and the calculations are sufficiently valid for practical requirements. It is concluded that an upward ejection velocity of about 40 f.p.s. should be sufficient in most cases for the man to clear the aeroplane structure. The initial acceleration on the man required to give him this ejection velocity is estimated to be about 12 1/2 g acting for 1/10th sec.; this is not considered serious. The power required can be readily provided by a few ounces of cordite. (Author)

1,773

Yustein, S.E. & R.R. Winans 1951 REPORT OF INVESTIGATION FOR DEVELOPMENT OF AN IMPACT TEST FOR PROTECTIVE HATS. (Material Lab., Naval Shipyard, Brooklyn, N.Y.) Report NS 181-013, 7 Aug. 1951. ASTIA AD 205 655

ABSTRACT: The object of this investigation is to develop the Brinell impression method as described in reference (f), with a view to its use in drop ball impact tests on protective hats for brand approval and inspection test purposes.

RESTRAINT, PROTECTION, AND EMERGENCY ESCAPE SYSTEMS

Z

1,774

Zabelicky, R. J. 1957 ANTI-BLACKOUT VALVES, MODEL 7050 SCOTT AVIATION CORP., MODEL 7050-2 SCOTT, Models 10050-12800 ARO EQUIPMENT CORP., MODEL 13100 ARO, MODEL 5503, C30, ALAR PRODUCTS, MODEL 14050 ARO; TESTING AND EVALUATION OF.
(U. S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR25 August 15, 1957.

ABSTRACT: Tests on the subject valves are being conducted at AMAL. Endurance tests specified in MIL-V-9370 A (ASG) para. 4. 3. 2. 1 have been made on all valves listed, with the exception of the Scott 7050-2. While complete, data is not yet available, the results of those tests made indicate that the valves tested perform as per specification.

1,775

Zabelicky, R.J. & R.Z. Snyder 1958 ANTI-BLACKOUT VALVE, MODEL 7050 MANUFACTURED BY SCOTT AVIATION CORPORATION; TEST AND EVALUATION OF.
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR37 Jan. 13, 1958

ABSTRACT: This report includes the procedures and results of qualification tests performed on the model 7050 anti-blackout valve, manufactured by the Scott Aviation Corporation, in accordance with the tests required by MIL-V-9370 A (ASG). Conformance to this specification is indicated by compliance with the tests specified in para. 4 and it is recommended that the anti-blackout valve model 7050 be entered on the Qualified Products List.

1,776

Zabelicky, R.J. & R.Z. Snyder 1958 ANTI-BLACKOUT VALVE, MODEL 5503-C20, MANUFACTURED BY ALAR PRODUCTS, INC.; TEST AND EVALUATION OF.
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR39 Feb. 6, 1958

ABSTRACT: This report includes the procedures and results of qualification tests performed on the subject valve in accordance with the tests required by MIL-V-9370 A (ASG). Conformance to this specification is indicated by compliance with the tests specified in para. 4 and it is recommended that the subject valve be entered on the Qualified Products List.

1,777

Zabelicky, R.J. & R.Z. Snyder 1958 ANTI-BLACKOUT VALVE, MODEL 13100, MANUFACTURED BY THE ARO EQUIPMENT CORPORATION; TEST AND EVALUATION OF.
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR40 Feb. 6, 1958

ABSTRACT: This report includes the procedures and results of qualification tests performed on the subject valve, in accordance with the tests required by MIL-V-9370 A (ASG). Conformance to this specification is indicated by compliance with the tests specified in para. 4 and it is recommended that the anti-blackout valve be entered on the Qualified Products List.

1,778

Zabelicky, R. J. & F. Gollub 1958 ANTI-BLACKOUT VALVES: LETTER REPORT CONCERNING TED ADC AE 5100 (SCOTT AVIATION CORP. MODEL 7050), AE 5100.0 (SCOTT AVIATION CORP. MODEL 7050-2), AE 5101 (ARO EQUIPMENT CORP. MODELS 10050 and 12800), AE 5101.1 (ARO EQUIPMENT CORP. MODEL 13100), AE 5102 (ALAR PRODUCTS MODEL 5503-C20), AE 5107 (FIREWEL CO., INC. MODEL 19400), AND AE 5108 (ARO EQUIPMENT CORP. MODEL 4050-1)
(U. S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR45 April 14, 1958.

ABSTRACT: This interim report indicates the status of the subject projects. Tests have been completed on Scott 7050, Alar 5503-C20, and Aro 13100. Endurance and heat tests have been completed on Aro 12800, 10050, and 4050-1 Scott 7050-2, and Firewel 19400.

1,779

Zabelicky, R.J. & F. Gollub 1958 ANTI-BLACKOUT VALVE; LETTER REPORT CONCERNING SCOTT AVIATION CORP., MODEL 7050-2
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR49 April 30, 1958

ABSTRACT: The Scott Model 7050-2 anti-blackout valve has been rejected due to lack of conformance with para. 4.4.1.2 - Trip Acceleration, MIL-V-9370 A (ASG) after having been subjected to the endurance tests specified in para. 4.3.2.1.

1,780

Zabelicky, R.J. & F. Gollub 1958 ANTI-BLACKOUT VALVE; LETTER REPORT CONCERNING ARO EQUIPMENT CORP. MODEL 4050-1.
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR53 May 22, 1958

ABSTRACT: The Aro Model 4050-1 anti-balckout valve has been rejected due to a ruptured diaphragm during endurance tests, in conformance with para. 4.3.2.1 of MIL-V-9370 A (ASG).

1,781

Zabelicky, R.J. & F. Gollub 1958 TEST AND EVALUATION OF ANTI-BLACKOUT VALVE, MODEL 19400 MANUFACTURED BY THE FIREWEL COMPANY
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR55 May 29, 1958

ABSTRACT: The Firewel Model 19400 anti-blackout valve has been rejected due to lack of conformance with para. 4.4.1.2. - Trip Acceleration, MIL-V-9370 A (ASG) after having been subjected to the endurance tests specified in para. 4.3.2.1.

1,782

Zabelicky, R.J. & F. Gollub 1958 ANTI-BLACKOUT VALVE (SCOTT AVIATION CORP. MODEL 7050-2)
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR60 August 13, 1958

ABSTRACT: The Scott Model 7050-2 anti-blackout valve has been rejected due to lack of conformance with para. 4.4.2.1, MIL-V-9370 A (ASG) - Pressure Output, after having been subjected to the endurance tests specified in para. 4.3.2.1.

1,783

Zabelicky, R.J. & F. Gollub 1958 ANTI-BLACKOUT VALVE; LETTER REPORT CONCERNING ARO EQUIPMENT CORP. MODEL 4050-1 (14084-5), SERIAL NO X101
(U.S. Naval Air Development Center, Johnsville, Pa. NADC-MA-LR63) Aug. 19, 1958

ABSTRACT: The Aro Model 4050-1 (14084-5) Serial No. X101 anti-blackout valve has been rejected due to lack of conformance with para. 4.4.2.5 - Recalibration, of MIL-V-9370 A (ASG), after having been subjected to all of the specified individual tests.

1,784

Zabelicky, R. J. & F. Gollub 1958 TEST AND EVALUATION OF ANTI-BLACKOUT VALVE, MODEL 19400, MANUFACTURED BY THE FIREWEL COMPANY.
(U. S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR70 November 12, 1958.

ABSTRACT: The Firewel Model 19400 anti-blackout valve has been rejected due to lack of conformance with para. 4.4.1.2 - Trip Acceleration, of MIL-V-9370 A (ASG) and para. 4.4.2.1 - Pressure Output, after having been subjected to the endurance tests specified in para. 4.3.2.1.

1,785

Zabelicky, R.J. & F. Gollub 1958 ANTI-BLACKOUT VALVE, MODEL 7050-2 MANUFACTURED BY SCOTT AVIATION CORP.; TEST AND EVALUATION OF.
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR69 Nov. 12, 1958

ABSTRACT: This report includes the procedures and results of qualification tests performed on the Scott Model 7050-2 anti-blackout valve in accordance with the tests required by MIL-V-9370 A (ASG). Conformance to this specification is indicated by compliance with the tests specified in para. 4 and it is recommended that the valve be entered on the Qualified Products List.

1,786

Zabelicky, R.J. & F. Gollub 1959 ANTI-BLACKOUT VALVE, MODEL 4050-1, MANUFACTURED BY ARO EQUIPMENT CORP.; TEST AND EVALUATION OF
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR93 Oct. 9, 1959

ABSTRACT: This final report includes the procedures and results of qualification tests performed on the Model 4050-1 anti-blackout valve manufactured by the Aro Equipment Corp. in accordance with the tests required by MIL-V-9370 A (ASG). Conformance to this specification is indicated by compliance with the tests specified in para. 4 and it is recommended that the valve be entered on the Qualified Products List.

1,787

Zabelicky, R.J. & F. Gollub 1959 ANTI-BLACKOUT VALVES, MODELS 10050 AND 12800, MANUFACTURED BY THE ARO EQUIPMENT CORP.; FINAL REPORT ON TEST AND EVALUATION OF.
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR94 Oct. 9, 1959

ABSTRACT: This report includes the procedures and results of qualification tests performed on Models 10050 and 12800 anti-blackout valves, manufactured by the Aro Equipment Corp. in accordance with the tests required by MIL-V-9370 A (ASG). Conformance to this specification is indicated by compliance with the tests specified in para. 4 and it is recommended that the anti-blackout valves be entered on the Qualified Products List.

1,788

Zabelicky, R.J. & R.Z. Snyder 1961 TEST AND EVALUATION OF ANTI-BLACKOUT VALVE MODEL 19400, MANUFACTURED BY THE FIREWEL COMPANY
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-L6043 Jan. 3, 1961

ABSTRACT: This report includes the procedures and results of qualification tests performed on Model 19400 anti-blackout valve, manufactured by the Firewel

Company in accordance with the tests required by MIL-V-9370 A (ASG). Conformance to this specification is indicated by compliance with the tests specified in para. 4 and it is recommended that the anti-blackout valve be entered on the Qualified Products List.

1,789

Zeigen, R. S., M. Alexander, E. Churchill, et al. 1960 A HEAD CIRCUMFERENCE SIZING SYSTEM FOR HELMET DESIGN
(Wright Air Development Division, Aerospace Medical Division, Wright-Patterson Air Force Base, Ohio) Project 7222, Task 71749 WADD TR 60-631. December 1960 ASTIA AD 251939

ABSTRACT: A system for the sizing and design of rigid and semi-rigid helmets based on a single key kimension, head circumference, is described. Anthropometric data largely obtained in the 1950 survey of Air Force flying personnel were analyzed. The three sizing programs discussed in terms of tabular data are also referred to in terms of headforms or three-dimensional representations of these data. These programs are a Six-Size Program based on mean values, a Three-Size Program based on mean values, and a Six-Size Program for helmet liner problems.

This report includes an account of the historical development of sizing systems, programs, and resultant headforms in the Air Force; a detailed statement concerning the designed rationale and statistical concepts used; comprehensive tables needed by the designer for all sizing programs discussed; a statement as to sculpturing techniques and problems; and a comment on preliminary validation results and on the overall design-material-sizing concept.

Appendices include a glassary of significant terms, descriptions of selected head and face dimensions, a detailed discussion of statistical concepts and formula referred to in the report and tables of comparative Four- and Six-Size Programs based on the key dimensions head length head breadth.

1,790

Zeller, A. F. 1957 PSYCHOLOGIC FACTORS IN ESCAPE.
J. Aviation Med. 28:90-95, Feb. 1957.

ABSTRACT: The ejection sequence begins with perception of the situation, involves a decision as to the action to be taken, and is followed by the initiation of the action. It can serve as a vehicle which can be used to analyze the various steps of the entire ejection procedure in terms of the important psychologic variables which affect the individual's behavior during this procedure.

The first step in the decision to initiate the ejection procedure is dependent upon recognition of the emergency. One other consideration which is important in the decision to eject in multi-place aircraft is adequate knowledge by other crew members of the action being taken by the pilot.

Difficulties during ejection include unfailiarity with ejection equipment and loss of consciousness or perspective after ejection. The general feeling of confidence a pilot has in the basic equipment which he is flying and in his ejection equipment can be spoiled by adverse criticisms.

One of the best preparations for an ejection should be an actual previous ejection in which the pilot has been successful. Somewhat less critical training experience is obtained from the ejection tower, demonstrations and lectures. One other over-all factor associated with ejection escape is the pilot's total flying experience. This to a great extend reflects his background and maturity as a pilot.

1,791

Ziegler, J. E. 1952 A NEUROSURGICAL AND MULTIPLE PURPOSE MONKEY CHAIR. J. Lab. & Clin. Med. 40:484-485

1,792

Ziegler, R. B., N. M. Burns, J. Lazo, & E. C. Gifford 1960 THE ROLE OF A FLEXIBLE COCKPIT IN HUMAN ENGINEERING RESEARCH. (Paper, 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960)

RESTRAINT, PROTECTION, AND EMERGENCY ESCAPE SYSTEMS

ANONYMOUS

1,793

Anon. AIR CARGO AND TROOP SEAT EQUIPMENT. (Oro Manufacturing Co., Adrian, Michigan)

1,794

Anon. ESCAPE BY PARACHUTE AT HIGH SPEEDS
(Air Technical Intelligence Center, Wright-Patterson AFB, Ohio)
F-TS-7321-RE, ASTIA ATI 160 665

ABSTRACT: With flight speeds of 500 km per hour, it has become necessary to find a way to enable the occupants of a plane to bail out without being thrown against the airplane's superstructure. A gas explosion is the simplest source of energy to react quickly and powerfully in seat ejection. However, the combustible mixture has to be proportioned to produce a force that will push the piston fast enough to eject the seat yet without exceeding a speed the human body can endure. The experiments on seat ejection and a description of the ejection seat are presented in this report.

1,795

Anon. n.d. STATIC AND DYNAMIC TESTS OF A TYPICAL TRANSPORT PILOT'S SEAT INSTALLATION FOR A 40 G CONDITION. (Naval Air Material Center) Rept. No. ASL NAM 24102, Part II and Part I

1,796

Anon. 1943 EFFICIENCY THROUGH COMFORT Flight :646-7 Dec. 9, 1943

1,797

Anon. 1943 SOLE CONSIDERATIONS ON STRATOSPHERE FLIGHT (Einiges Ueber Den Stratosphaerenflug) (Air Documents Division, T-2 AMC, Wright Field, Ohio) F-TS-2029-RE, ASTIA ATI 19023

ABSTRACT: The advantages of stratospheric flights and its effect upon aircraft and personnel are reviewed. Airborne personnel can operate safely without ocygen up to an altitude above 6 km. Operation in altitudes above 12 km is considered very dangerous; thus, pressurized suits and cabins are employed. Heating and airing of the cabin are discussed.

1,798

Anonymous, 1944 CATAPULT SEAT IN THE TA. 154
(Focke-Wulf, Report No. 20.009, Part 2. 1944)
R.A.E. Translation No. 54,

1,799

Anonymous, 1944 SEAT EJECTION EQUIPMENT FOR THE DO. 335
(Dornier Report 3240. June 1944)
R.A.E. Translation No. 55

1,800

Anon. 1944 THE SHOULDER HARNESS.
Air Surg. Bull., 1(10):8-9

ABSTRACT: When the seat belt alone is used many fractured skulls and cervical injuries result from belly landings since the flyers head is thrown forward against the cowling or other seat. The shoulder harness prevents forward motion. In 234 cases of crash landings in which the personnel wore shoulder harnesses, 175 were uninjured, 40 were hurt and 3 killed. In a group of 16 not using the harness, all were injured and one died.

1,801

Anon. 1945 ANTI-G SUIT FOR FIGHTER PILOTS.
Flight and Aircraft Engineer, 47(1881):37, Jan. 1945.

ABSTRACT: As early as 1945, Americans at Wright Field developed the Berger G-2 suit, consisting of 5 air cushions for the stomach, thigh and calves, to protect pilots against effects of excessive "positive g" during violent maneuvers. A short note about experiments and some particulars added.

1,802

Anon. 1945 THE G-SUIT: NOTES FROM THE AIR SURGEONS OFFICE. J. Aviation Med. 16:45-46

ABSTRACT: The earliest workable G suits were developed by the Canadian and the Australian air forces, followed closely by the U.S Navy. The AAF, experimenting with the Navy suit, modified and adapted it after extensive tests on the centrifuge at the Aero Medical Lab., Wright Field, and evolved the present suit now standard for the AAF.

The G-3 suit consists of a series of 5 air bladders positioned over the f soft tissue areas of the calves, thighs, belly. When inflated, the air bladders tense the inelastic cloth of the suit, exerting pressure upon the body to keep the blood from flowing downward rapidly and to force it back toward the heart.

The suit makes use of the "exhaust" compressed air from the aircraft's vacuum instrument pump connecting to the pump through a light-weight value which also supplies air pressure to the jettisonable gas tanks. This valve automatically inflates the suit in two seconds when the G force exceeds 2 G and empties it when the G force returns below two, giving the suit a pressure of 1 pound per square inch per G above 2 G. The flier needs only to plug the suit into the air line when he gets into the cockpit. The rest is automatic.

Although theoretically, the suit offers an extra tolerance of 1.9 G, fighter pilots wearing the suit have never reported a complete blackout, regardless of the violence of any combat maneuver experienced.

1,803

Anon. 1945 SUMMARY OF REPORTS ON THE DESIGN AND TESTING OF CATAPULTING PILOT'S SEAT IN THE SWEDISH J-21 AIRPLANE. (Kungl. Flygforvaltningen Materielavdelningen, Stockholm)
Translated as Appendix 19 to Lovelace, W. R., E. J. Baldes, & V. J. Wulff, The Ejection Seat for Emergency Escape from High Speed Aircraft, ATI No. 7245

1,804

Anon. 1946 ANNOTATED BIBLIOGRAPHY ON HUMAN FACTORS IN ENGINEERING DESIGN. (U.S. Navy, BuMed & Surg.) February 1946

1,805

Anon. 1946 DESIGN DATA FOR PILOT EJECTION SEAT AND CATAPULT-APPENDIX 3 (Wright-Patterson Air Force Base, Ohio) M.R. TSEAC11-4534-7-2, Add. 1. 1 May 1946. ASTIA ATI 12725

ABSTRACT: This publication lists the specifications that must be met by the designer of the pilot ejection seat and catapult.

1,806

Anon. 1946 IMPACT ABSORPTION MATERIAL
All American Aviation Magazine. 24 May 1946.

1,807

Anon. 1946 INTERNAL VIBRATIONS EXCITED IN THE OPERATION OF PERSONNEL EMERGENCY ESCAPE CATAPULTS
(Frankford Arsenal, Philadelphia, Pa.) Memo. Rept. No. Mr-340 Nov. 26, 1946 ASTIA AD 51 792

1,808

Anon. 1947 AEROMEDICAL RESEARCH
Abstract: Bulletin of U. S. Army Medical Dept. 7(3):256-257, Mar. 1947

ABSTRACT: Brigadier General Malcolm C. Grow, the Air Surgeon, has stated the problem of aeromedical research by reviewing some of the projects we must accomplish within the near future. The object of research in aviation medicine is to keep pace with aircraft design. Jet and rocket propulsion permit us to reach altitude hitherto impossible with reciprocating engines, and they create urgent problems o human physiology which we must solve if these aircraft are to be manned. The first of these has to do with acceleration and deceleration. Pilot escape at hig speeds is another problem. Intense temperatures is still another problem to be solved by aviation medicine personnel. (CARI)

1,809

Anon. 1947 CRASH INJURY RESEARCH--Reverse Seating in Transport Aircraft & The Case for the Backward-Facing Seat.
(National Research Council, 2101 Constitution Ave. Wash. 25, D.C.)

1,810

Anon. 1948 MEASUREMENT OF THE LOADS REQUIRED TO BREAK COMMERCIAL AVIATION SAFETY BELTS AS AN INDICATION OF THE ABILITY OF THE HUMAN BODY TO WITHSTAND HIGH IMPACT FORCES. (Naval Medical Research Institute) Rept. No. 12

1,811

Anon. 1948 PILOT SEAT AFFORDS QUICK 15G EJECTION
Aviation Week, p. 9. Oct 18, 1948

1,812

Anon. 1949 AHEAD OF THE TIMES.
The Aeroplane, 76(1976):444, 22 April 1949

ABSTRACT: Particulars of the P-1 protective helmet, evolved by the Aero-Medical Laboratory at Air Mat. Comm. Weighing only 2 lb., the P-1 helmet offers protection against projectile fragmentation, crashes and injuries while jettisoning.

1,813

Anon. 1949 EJECTION SEAT STUDY REPORT FOR AUG 1949 -MAY 1956 ON EJECTIONS AND BAILOUTS (Naval Aviation Safety Center, Norfolk, Va.)

ABSTRACT: The increasing ejection rate per unit hours flown and an increasing number of these units flown indicated a steady mounting of the frequency of ejections. There is a pronounced relationship between successful ejections and altitude. The relationship between altitude and successful ejection becomes apparent at 5000 ft and ejections become increasingly hazardous as the altitude decreases below this height. The mean altitude at which ejections occur did not increase during the period covered by this study. In terms of mach number, M = 0.70 is the beginning of the critically dangerous zone for ejections. Ejecting from the F9F, F7U, and TV model aircraft is significantly more dangerous than ejecting from the F2H and FJ models. Ejections from the swept-wing F9F are no more dangerous than those from the straight wing F9F. Ejections are more dangerous than bailouts with present equipment. No relationship existed between altitude and an injury in bailouts (as long as irreducible minimum is observed). Successful bailouts may be made at lower altitudes than ejections with present equipment. No relationship existed between speed and injuries resulting from bailouts within the speed range in which bailouts are made. The mean speed at which bailouts are made is substantially slower than the mean speed at which ejections are made. Bailing out from the F4U model aircraft is significantly more dangerous than bailing out of AD and SNJ models.

1,814

Anon. 1949 EMERGENCY EXIT.
Aeronautics, London (trilingual edit.) 31:94, 95, 97, and 98

ABSTRACT: The article deals with the emergency equipment introduced in the early days and with the mechanism of the Martin-Baker ejection seat. Live ejections made at high speed with the Martin-Baker ejection seat between 24-7-1946 and 17-7-1948 are tabulated.

1,815

Anon. 1949 HANDBOOK OF HUMAN ENGINEERING DATA FOR DESIGN ENGINEERS. (Office of Naval Research, Special Devices Center) Tech. Rept. SDC-199-1-1. December 1, 1949

1,816

Anon. 1949 SYNOPSIS OF THE AERO MEDICAL ASPECTS OF JET PROPELLED AIRCRAFT (Aero Medical Lab., Air Materiel Command) January 1949. ASTIA ATI 56134

ABSTRACT: Brief reviews of recent developments and current practices are presented on the following subjects: requirements and equipment, decompression sickness, cabin pressurization, explosive decompression, long term positive and negative acceleration, pilot's pneumatic suit for positive acceleration, cockpit design and temperatures, flight instruments, psychological limitations, sound problems, the ejection seat, protective helmets, wind-blast protection, and vision. Future research will be concerned with protection under emergency conditions in a vacuum, etc.

1,817

Anon. 1950 PILOT EJECTION SEAT BEING TESTED AT SUPERSONIC SPEEDS TO DETERMINE ITS LIMITATIONS. Techn. Data Digest, 15(3):9, March 1950.

ABSTRACT: To find out the speed limitations of the currently used USAF pilot ejection seat, AmC-Northrop Aircraft engineers have created a system which propels an F-89 ejection seat along a track at speeds up to 1100 mph.

1,818

Anon. 1950 SAFETY BELTS AND HARNESS.
National Safety News 60:98, 102, March 1950.

1,819

Anon. 1950 SPECIAL VALVE IN BRITISH G-SUIT.
Aviation Week, 53(8):28 Aug. 21, 1950

ABSTRACT: Hymatic Engng. Corp. and R.A.F. developed an improved "anti-g-valve", to diminish the influence of acceleration forces on human organs, e.g. blood circulation, when maneuvering with high-speed aircraft, now tested in de Havilland Venom and in the Spitfire. The problem of the compressed air supply was solved with this valve.

1,820

Anon. 1951 ESCAPE
Air University Quarterly, 4:37-39, Summer 1951

1,821

Anon. 1951 EXCERPT FROM "THE DANGEROUS SAFETY BELT"
Scientific American, Vol. 184-185, Dec. 1951. P. 36.

ABSTRACT: When an airplane crashes, the safety belt that passengers are required to fasten around their waists may become a deadly hazard. A British physician named Donald Teare examined 28 victims of a crash at the London Airport and found that 16 of them were killed by chest and abdomen injuries resulting from acute flexion of the body over the safety belt. Eight of the victims had suffered a rupture of the aorta- an extremely rare injury, almost never found except in plane accidents.

One of the two survivors of the crash was the stewardess, who was in the tail of the plane, apparently the safest spot. Teare urged, as many others have proposed, that the passenger seats in planes be arranged to face the rear of the plane. The specific injuries that killed most of the victims of the London crash, he said, might have been avoided if the passengers "had been seated with their backs to the engine and supported by cushioned upholstery."

1,822

Anon. 1951 FITNESS FOR DUTY.
Flight, 59(2192):104-107; 25 Jan. 1951

ABSTRACT: Survey of the work of the R.A.F. Institute of Aviation Medicine at Farnborough from 1939 till now. On the improvements of ejector-seats, pressure cabins and air-conditioning, g-suits, pressure waistcoats, ventilated suits and other items of specialized clothing.

1,823

Anon. 1951 HYMATIC ANTI-G VALVE.
The Aeroplane, 81(2101):563, 26 Oct. 1951.

ABSTRACT: The New Hymatic Anti-G valve, when used in conjunction with a special anti-G suit, enables the aircrew to retain their faculties unimpaired under G-loadings as great as the airframe itself will stand.

1,824

Anon. 1951 IMPROVED PILOT SHOULDER HARNESSES WITHSTAND 38.6 G CRASHES
Techn. Dat. Digest, 16:8 Jan. 1951.

ABSTRACT: Designed to provide better protection in case of a crash, the new Air Force shoulder harness features increased strength of webbing and better distribution of forces to the strongest parts of the human body. The latter is accomplished by an inverted "V" crossing the pilot's thighs, which thus absorbs some of the pressure across the upper abdomen encountered with the old harness.

1,825

Anon. 1951 PROBLEMS OF PILOT EJECTION
The Aeroplane, 80(2071):378-379 March 30, 1951

ABSTRACT: Summary of lecture before Roy. Aero. Soc. on physiological aspects, trajectory and control problems of ejection-seats, which requirements are to be fulfilled.

1,826

Anon. 1951 SERVICING MEMORANDUM (STS-29-3) AND TEST REPORT (UM-29-9.04:RI) FOR SAAB EJECTION SEAT (Swedish) Translated by F.W. Read, Royal Aircraft Establishment, Farnborough Library Translation No. 370. ASTIA ATI 113 968 or AD 26 614.

ABSTRACT: A number of new points of view have emerged concerning the production of ejection seats. Among others, an ejection velocity of about 18 mps is desired together with retention of the earlier max. acceleration and rate of rise of acceleration. This performance agrees with the possibility of safe ejection at max. speed under the influence of the mass inertia forces operating in the line of ejection. Another more recent desirable feature is that the acceleration is balanced so that a high finishing acceleration is obtained, by means of which a better balance is attained by means of inertia forces and aerodynamic forces. The higher limit of flying speed, where there is a risk of breaking up the seat at the end of an ejection, may then be further increased. Concerning the calculations for free trajectory and safe speed se S.A.A.B. report KFB-0-110 and UM-29-9-12. The objectives already mentioned have been allowed for in the test equipment on which these series of tests are being continued. By means of a higher testing railway rig at S.A.A.B. it is now possible to test with Vo values up to 21 m.p.s. The accelerations can, to a certain extent, be influenced by the use of different cordite and throttling than has been so far used, although the dimensions of the pressure chambers which may now be regarded as finalised, can limit the possibilities; even so due allowance must be made for the density of the charge, max. pressure, and dimensions of the cordite etc.

1,827

Anon. 1952 AF REVEALS (T-1) HIGH ALTITUDE PRESSURE SUIT Aviation Week 57(15):17 Oct. 1952

ABSTRACT: In the thin atmosphere above 50,000 ft a flier's lungs must be supercharged in order to function, pure oxygen alone being insufficient. At 63,000 ft in the absence of some sort of pressure suit, blood will "boil" resulting in body expansion to twice normal size and almost instant death. Discarding earlier cumbersome patterns in pressure suits, the Air Force T-1 combines altitude protection with anti-g suit, crash helmet, earphones, microphones, oxygen mask, goggles, defroster and oxygen bailout bottle. The T-1 is inflated automatically if cabin pressurization is lost. The problem of applying counter pressure to the surface of the body was solved by a new method and pilot's lungs are charged with high-pressure breathing oxygen from the inflated suit and helmet, thus preventing this collapse.

1,828

Anonymous 1952 AIRCRAFT TYPE 29. EJECTIONS BY CATAPULT SEAT
Translated by Air Technical Intelligence Center
Wright-Patterson AFB, Ohio
ATIC-235370; F-TS-8748/III ASTIA AD 153 353

ABSTRACT: This report describes the circumstances leading up to an ejection and the procedures used during several ejections. He also describes the injuries to personnel as a result of ejection.

1,829

Anon. 1952 NEW CAPSULE FOR HIGHSPEED BAILOUT
Aviation Week 57(4):36, July 28, 1952

ABSTRACT: A new escape developed by Douglas Aircraft Co. is discussed. The capsule is expelled clear of the speeding plane by a rocket charge and is stabilized in flight by three rear fins. Forward speed is first slowed by a small auxiliary chute decelerating from 1,100 to 300 feet per second in about 5 seconds, then, at a safe speed, the main chute opens. The capsule is sealed and pressurized for use in atmospheric conditions above 50,000 ft. Fresh air is fed in "by wave motion". Survival gear similar to that carried in Navy life rafts is supplied. A test run under simulated conditions was tolerated well and without discomfort by the test subject.

1,830

Anon. 1952 CHUTE TESTING DUMMY
Canadian Aviation 25(8):62, August 1952

ABSTRACT: The need for a dummy for testing parachutes and ejector seats, that simulates closely the behavior of an unconscious man during a free fall, was realized early in 1951. The requirements were based upon the physique of an average RAF aircrew member, the data being provided in collaboration with the medical department of the Air Ministry and the London University.

To reproduce human behavior during free fall from a great height, it was necessary to discover the weight, center of gravity, and moment of gyration about various axes of all bodily components. This data was obtained from the dissection of about 1200 bodies of the correct size and weight.

The "GQ-Hairlok Dummy Man" consists of a steel skeleton, supporting rubberized hair mouldings which give the correct external shape. The components are assembled by screws. Spring joints minimize the damage from excessive movement. The rubberized hair material which gives the

dummy its outer shape is normally an upholstery filling. Resilient and durable, it is covered by a sectioned canvas suit which takes the place of the human skin. In addition, the dummy wears a flying suit of normal design, patterned with black and white segments to make it easier to see during a fall. (Journal of Aviation Medicine 23(6):631, December 1952)

1,831

Anon. 1952 HEAD-GEAR FOR SAFER FLYING.
Research Reviews NAVEXOS, p. 510, Oct. 1952

ABSTRACT: A comparatively minor head injury can cause a pilot to lose control of his craft with disastrous results. Consequently researchers at the Cornell Aeron. Lab. have been devoting a lot of time to devising protective helmets. Eight different types of helmets were tested and results are given.

1,832

Anon. 1952 HOW MUCH IS GREATER FLIGHT SAFETY WORTH?
American Aviation 15(46):30, May 26, 1952

ABSTRACT: For the air industry, the price of safer flying will be close to half a billion dollars. The alternative is a drastic tightening of government controls. Harry F. Guggenheim, chairman, presented this opinion in the second annual progress report of the Foundation Committee of the Cornell-Guggenheim Aviation Safety Center. Lack of money has resulted in a failure to apply all the information that is already available. Also, traffic ground facilities; until these are adequately provided, far stricter government regulation must be imposed. Mathematical calculations based on the laws of probability are showing great promise in accident analysis, pilot performance studies, weather forecasting, and similar fields. Anti-collision devices are also drawing attention; a combination of airborne and ground-monitored radar continues to look like the best solution at present. Seat strength studies are a promising area of development. The British have advanced fire control by the innovation of suspending a large plastic sphere filled with fire suppressant over the crashed aircraft.

1,833

Anon. 1952 SAFER AIR TRAVEL OUTLOOK BRIGHT
Aviation Week 56(20):21-22, May 19, 1952

ABSTRACT: An exhaustive survey of current aviation safety research by the Guggenheim Aviation Safety Center indicates that recent progress justifies an optimistic view for safer air travel of tomorrow. The United States, Canada and Great Britain together are conducting about 900 individual research projects, costing over $50 million annually, to promote aviation safety. Some samples of advancement in safety work are cited.

1,834

Anon 1952 A SELF-RELEASING SEAT-BELT.
Flight, (London) 61:767, June 27, 1952

ABSTRACT: A coupling device for seat belts so designed as to open up automatically under excess g-loads (under crash conditions) is described. The inventor, Mr. J. R. Stuge Whiting of Great Britain, has applied for patent protection.

1,835

Anonymous 1952 SHOULDER HARNESS SAVES THREE PILOTS
Aviation Week 57(15):15. Oct. 1952.

1,836

Anon. 1953 EJECTION PROCEDURES
Flying Safety, 9(12):14-15

1,837

Anon. 1953 EJECTION SEAT DEVELOPMENT IN SWEDEN.
The Aeroplane, 85(2209):692-694 , Nov. 20, 1953

ABSTRACT: Some information is given about the ejector seats developed by S. A. A. B. in Sweden.

The first dummy ejection was made by S.A.A.B. as early as January 1942 to test their model I ejection seat. A description of this seat is given in the article The Mark II is a special light weight seat (installed weight 70 lb.) which is intended for installation in the Folland Gnat.

The ejection velocities are considerable lower than the British equivalents. A drawing with installation dimensions is given.

1,838

Anon. 1953 INTRODUCING THE BONE-BOX.
Flight, 64(2341):723-724, 4 Dec. 1953

ABSTRACT: The crash helmet reaches the R.A.F.: its purpose and capabilities.

1,839

Anon. 1953 SAVE PILOTS IN CRASHES.
Sci. News Letter, 63(13):206

ABSTRACT: A description of a shoulder harness, seat belt, and gravity reel combination for low-level crashes is given. The safety device was developed by F. E. Weick, director of the Personal Aircraft Research Center at Texas A. and M. College, College Station, Texas.

1,840

Anon. 1953 SUITED FOR SAFETY. Flying Safety, 9 (5):5.

Summary: Notes on the new T-1 altitude suit assembly are given. The suit assembly under research for seven years at the Aero Medical Laboratory at the Air Research and Development Command's Wright Air Development Center has been successfully tested to sustain life at 106,000 ft. in altitude chambers. The assembly includes an anti-g component, communication equipment, oxygen valves and regulators, a protective helmet, a visor with defrosters, and an oxygen bailout cylinder.

1,841

Anon. 1953 SUIT FOR SURVIVAL Flying Safety, 9 (7): 18-19

Summary: A short outline of rules to follow in making the M-4 anti-exposure flying suit watertight is given. The method of donning the suit is described. Accessory equipment and special hints to aid survival in water or in extreme cold are mentioned.

1,842

Anon. (initials only: C.M.L.) 1954 GETTING AWAY WITH IT.
MARTIN-BAKER EJECTION SEATS, MKS 2,3 AND 4.
Flight pp 748-751, 19 November 1954.

1,843

Anon. 1954 HELMET STAYS ON AT MACH 1.04
Modern Plastics, 31(6):100 Feb. 1954

ABSTRACT: Illustrated note on experimental helmet which is fitted to individual pilot by making initial plaster cast of pilot's head; material of helmet is fibrous glass reinforced plastics based on polyester resin; slots are cut into crown to reduce windshock and airlift during bail-out.

1,844

Anonymous Nov. 1954 SAFE TEST EJECTIONS MADE FROM 50 FEET.
Aviation Week 61(20):64.

1,845

Anon. 1954 SAFETY BELT FIRM MAKES PLANE-AUTO BELTS. Flying 55(6):50.

1,846

Anon. 1954 UNDERWATER CANOPY-JETTISON
Flight 66(2387):613

ABSTRACT: M.L. Aviation Co., Ltd., of White Waltham, Berks, has now developed a mechanism, which forces the canopy open even if the aircraft is deeply submerged in water, as in the case of carrier based aircraft missing the carrier deck and hitting the sea. This mechanism can be applied to any clam-shell type of canopy hinged at the rear and secured at the front by an orthodox latch.

1,847

Anon. 1954 THE WELL DRESSED AIRMAN Flight 64(23333):500-501

ABSTRACT: From items of equipment exhibited in the station show at Farnborough was possible to form a picture of how aircrew of the near future will be dressed and equipped. From the research carried out in Germany during war and in the U.S and Great Britain, 3 methods of pressurization have emerged. The first, cabin pressurization, is already in every day use and is sufficient for present requirements up to 50,000 ft.
The second and third methods of pressurization have therefore emerged. They are known as the partial pressure suit and full pressure suit. The partial pressure suit is a garment which does not cover the whole body - the feet and hands are generally left free. It performs its functions be applying a direct constructive pressure to the body in much the same way as a g-suit and straitjacket which nevertheless allows the pilot full freedom of movement. The full pressure suit is in effect a tailored pressurized cell enclosing the whole body.

1,848

Anon. 1955 DOUGLAS DESIGNS COMPACT LIGHTWEIGHT EJECTION SEAT. Aviation Age, 23(3):50-53, March 1955

ABSTRACT: A new ejection seat has been designed for the A4D-1, which possesses a carrying skin. During ejection, the chair is automatically loosened from the pilot. He possesses no adjustable head or foot rest. The chair and the equipment of the pilot weighs over 50 lbs. less than the comparable installation of the Douglas A2D-1 and F4D1 manufactured for 25 g force and a 40 g crach force. It withstood a dloay of 60 g.

1,849

Anon. 1955 NEW HARNESS LETS YOU MOVE FREELY. Aviation Age 24(5):206-207. Nov. 1955

1,850

Anon. 1955 OPERATIONAL EXPERIENCE WITH EJECTION ESCAPE SYSTEMS FROM 1 JANUARY 1949 THROUGH 31 DECEMBER 1954. (Directorate of Flight Safety Research, Norton Air Force Base, Calif.) 1 Aug. 1955. ASTIA AD 72809

ABSTRACT: Current ejection escape systems provided a means for successful escape from aircraft in a wide range and combination of airspeeds (up to 560 knots), altitudes (500 to 38,000 ft), and attitudes. Improvements in design and maintenance and greater familiarity with the operation of ejection escape equipment reduced fatalities from 27% in 1951 to 21% in 1954. Further reduction was believed obtainable by (1) better training of aircrew, maintenance, and inspection personnel; (2) better design, maintenance, and inspection of ejection escape systems; (3) providing all personnel using ejection seats with both automatic opening lap belts and automatic opening parachutes; and (4) expeditious retrofit of in-service aircraft with improvements which have been approved for ejection escape systems.

1,851

Anon. 1955 PROJECT DETAILS OF TED ADC AE-1407, HUMAN PERFORMANCE LIMITATIONS IN AIRCRAFT CATAPULTING AND ARRESTING. Bureau of Aeronautics letter, AE-14/36 of 17 Oct. 1955.

1,852

Anon. 1955 ROCKING, NOT TUMBLING, IS BAILOUT HAZARD.
Aviation Week 63(26);21-23 26 Dec. 1955

ABSTRACT: Dummy tests on sled mockup of Convair's F-102A give researchers new design data for advanced supersonic ejection system.

1,853

Anon. 1955 TESTS AT FORD PROVIDE PASSENGER-PACKAGING INFORMATION
CEC Recordings, 9(6) Nov. Dec. 1955.

1,854

Anon. 1956 AIRCRAFT EMERGENCY PROCEDURE OVER WATER.
(U.S. Coast Guard, 1956) CG-306

1,855

Anon. 1956 AIRCRAFT PASSENGER SEATS: SAFETY WITH ACCELERATION OF 9G.
Engineering (London) 181(4693):19- , Jan. 6, 1956

ABSTRACT: A new type of aircraft passenger seat is described designed to withstand an acceleration of 9 g, facing forward or aft. When forward facing, in an emergency landing, the back of seat, which is padded, will fold forward when struck behind.

1,856

Anonymous Dec. 1956 ARDC SLED TESTS EJECTION IMPACT FORCE.
Aviation Week 65(24):81;83.

1,857

Anon. 1956 DEVELOPING THE MARTIN-BAKER EJECTION SEAT.
The Aeroplane 90(2324):141-143

,858

Anon. 1956 DEVELOPING THE MARTIN-BAKER EJECTION SEAT.
The Aeroplane 90(2325):168-171. Feb. 1956.

1,859

Anon. 1956 DOWN, BOY, DOWN Flying Safety 12(2):16-20. Feb. 1956.

1,860

Anon. 1956 EJECTION EQUIPMENT FOR MACH 3
Flight (London) 70(2497):856, Nov. 30, 1956

ABSTRACT: An ejection seat designed by Lockheed Aircraft for downward ejections at speeds up to Mach 3 features: (1) brackets to hold the pilot's helmet steady and to reduce loads on the neck; (2) knee guards to prevent spraying of the legs, with a webbing harness to restrain the arms; (3) automatic straps to prevent flailing of the legs; (4) fins extending beneath and beside the seat to provide stabilization; and (5) an airflow deflector plate forming an "atmosphere capsule" to reduce transverse forces and air blast.

1,861

Anon. 1956 EJECTION SEAT DEVELOPED FOR MACH 3 AFTER ARDC DECIDES ON CAPSULES. Aviation Week, 65(15):72, Oct. 1956

ABSTRACT: A supersonic escape ejection seat has been developed which is designed to permit safe escape limits exceeding 800 kts. at sea level and Mach 3 at altitude. The development comes in the face of a decision by Air Research and Development Command to require escape capsules incorporating protective and survival devices for all new aircraft with performance exceeding 600 knots IAS and 50,000 altitude.

1,862

Anon. 1956 RESCU
Flight (London) [illegible], Nov. 23, 1956.

ABSTRACT: A RESCU rocket-assisted ejection gun was tested by Talco Engineering Company through ejection of dummies from a cockpit section mounted on a rocket-propelled sled. RESCU lifted the ejection seat 124 feet at a sled speed of Mach 0.3, while an M3 telescopic, cartridge-operated gun lifted the seat only 55 feet. At Mach 0.73, RESCU achieved an altitude of 60 feet. It is suggested that the rocket thrust tends to stabilize the seat after ejection and to reduce deceleration forces to a level within endurance limits.

1,863

Anon. 1956 ROCKET-PROPELLED EJECTOR SEAT
Engineering (London) 182(4734):691- , Nov. 30, 1956

ABSTRACT: A rocket-propelled ejector seat is briefly described, designed to permit pilots of Convair TF 102A combat trainer aircraft to escape safely even at emergencies near ground level. The new Rescu Mark 1 seat combines a normal cartridge-actuated catapult with a rocket incorporated in the inner tube and brought into action by the cartridge catapult. Comparative tests with a standard M3 cartridge-actuated ejector seat indicate that rocket-propelled escape systems ensure greater clearance from the aircraft, a reduction in the deceleration rate as the man-seat mass is catapulted in the air, and a greatly increased "on-the-deck" escape probability.

1,864

Anon. 1956 SEAT BELTS Consumer Reports 21(5):212-217, May 1956

ABSTRACT: Consumers Union bought 39 brands of seat belts and put them through a series of tests devised by Cornell Aeronautical Laboratory. All but three of the brands tested were designed for use by one person; the others were of the seat-wide type. Only 13 brands survived CU's initial test series. Among the 26 brands judged Not Acceptable -- two-thirds of those tested -- were the belts offered as optional equipment on Chevrolets, Pontiacs, Studebakers, and Packards; a Sears-Roebuck belt; and two Montgomery Ward belts. Belts were tested for fabric strength, quick-release buckles, and color fastness.

1,865

Anon. 1957 CUSHIONING THE PILOT.
Flight, 71(2518):540

ABSTRACT: Chance Vought uses a 3 ft. long stainless-steel ejection seat-mounting strap interposed between the aircraft structure and the seat. It is designed to stretch several inches thus absorbing heavy-landing loads. A seat cushion consisting of a layer of foam-rubber padding applied to a shaped pad made of rigid foamed plastic which collapses under load, absorbs hard-landing shocks.

1,866

Anon. 1957 THE EJECTABLE SEAT OF THE MARTIN-BAKER MK4.
Aviation Magazine, (238):24,25, 1 November 1957

ABSTRACT: A detailed description of the ejection seat of the Martin-Baker MK4 type is given in this article. The discharge mechanism and the ignition is described. Furthermore, the parachute and the opening of the head parachute are discussed. Several ties are fastened to the chair to prevent the legs from moving around during firing. The ignition is 83 ft/sec the maximum acceleration 20 g. The chair is 40 kilo

1,867

Anon. 1957 OPERATION AND MAINTENANCE INSTRUCTIONS FOR POWDER TYPE STORES CATAPULT (Naval Gun Factory, Washington, D.C.) Rept. no. NGF-T-30-57; NAVORD rept. no. 5519, 16 Sep 1957, ASTIA AD-143 563

1,868

Anon. 1957 SHOCK ABSORBING SEAT REDUCES INJURIES
Aviation Week 66(14):61. April 1957.

1,869

Anon. 1957 TELESCOPING BOOMS STABILIZE SUPERSONIC EJECTION SEAT.
ARDC Newsreview, Oct. 1957, p. 4

1,870

Anon. 1957 TWO GROUND EJECTION SEATS TESTED IN LIVE AND DUMMY RUNS.
Aviation Week, 67(11):88,89 16 September 1957.

ABSTRACT: A 6-picture series illustrating the use of the Martin Baker Mark V ground level ejection seat, demonstrated by a pilot of the R.A.F. who ejected himself out of a Grummon F9F-8T with a speed of 120 Kt on the runway.

1,871

Anon. 1957 TWO NEW ESCAPE SEATS DEVELOPED
Aviation Week 66(17):37 April 1957

1,872

Anon. 1957 U. S. AIR FORCE FULL PRESSURE SPACE SUIT IS LIGHT, PERMITS FREE MOVEMENT. Aviation Week 67(23):29, Dec. 9, 1957.

1,873

Anon. 1958 BANG! YOU'RE ALIVE!
Air Clues, 13(3):66-73 Dec. 1958

ABSTRACT: This article traces the development of ejection seats. The name of the British firm of Martin-Baker is synonymous with ejection seat history and much help has been received from them in writing the article. The many changes in the design of the seats are not detailed and an outline only of the main events is given. The article contains many new facts, and a number of the photographs have not previously been published.

1,874

Anon. 1958 BIBLIOGRAPHY OF UNCLASSIFIED HUMAN ENGINEERING REPORTS, U.S. NTDC NAVEXOS P-1491, Jan. 1, 1958

1,875

Anon. 1958 ENERGY ABSORPTION.
The Project Engineer (The Thermix Corp., April 1958)

1,876

Anon. 1958 MOUSE IN LIQUID SUIT SHOWS HOW MAN MAY SURVIVE STRESS OF GRAVITY IN SPACE TRIPS
Wall Street J. 8 Feb. 1958

1,877

Anon. 1959 AEROMED FACILITY STUDIES SHOCK ABSORBER SEATS FOR JET PASSENGERS Aviation Week 70(21):136- , May 1959

ABSTRACT: This brief article describes a hydraulic shock absorber system whereby passengers in jet transports would be able to survive fairly high impact accelerations. The data from which the proposed system was designed were obtained by Cornell Automotive Crash Injury Research. Two methods of applying the shock absorbers for deceleration are described and seat fitting are indicated.

1,878

Anon. 1959 AIRCREW COMFORT AND SURVIVAL
The Aeroplane, (London), 96(2481):348-350, March 20, 1959.

ABSTRACT: A general discussion is presented of control systems, equipment, and techniques utilized by the Royal Air Force to insure the comfort and survival of its airmen in the newer high speed, high altitude aircraft. General performance capabilities and operating procedures are outlined for cabin pressure control systems, temperature and ventilation control systems, oxygen systems, and pressure suits and helmets. Ejection seats, parachute assemblies, aircraft dinghies, and emergency radio units are also discussed. Names of manufacturers and illustrations of various items of equipment are included.

1,879

Anon. 1959 BACKGROUND TO BELTS: A SUMMARY OF KNOWN FACTS ABOUT A LITTLE-KNOWN BUT VITAL SUBJECT. Motor, (Lond) 115 (2973): 243-7.

1,880

Anon. 1959 ESCAPE FROM SINKING AIRCRAFT.
British Medical Journal (5127):965, 11 April 1959.

ABSTRACT: The serious concern of the Royal Navy, especially, stimulated by a survey showing that up to 1954 30% of aircrew involved in any kind of ditching did not survive, led to research into the practicability of using the ejection seat to escape from submerged aircraft. In aircraft the cockpit canopy may be locked and the pilot strapped tightly into the seat. If the aircraft ditches and sinks before he can open the canopy and climb out, his situation is grave. The canopy is held fast by the differential pressure of the water, which rises by approximately one atmosphere for every 33 ft. (1 Om.) in depth. The pilot will have to wait until the cockpit has "flooded-up" to a differential pressure favorable for jettisoning the canopy. If the rate of sinking is disproportionately greater than the rate of flooding up, the anopy may cave in, or the aircraft sink too deep for successful escape. The physiological reactions to underwater ejection need careful evaluation.

1,881

Anon. 1959 ESTABLISHMENT OF THE CRITERIA FOR THE DESIGN OF A PASSENGER SEAT THAT OFFERS A MAXIMUM OF PROTECTION TO THE OCCUPANT IN A CASE OF A CRASH. (Royal Netherlands Aircraft, Factories Fokker) Rept. No. FS-3A.

1,882

Anon 1959 ILLUSTRATION OF PROJECT MERCURY RESTRAINT HARNESS
Aviation Week Oct. 19 1959 p. 30

1,883

Anon. 1959 MARTIN-BAKER EJECTION SYSTEM HIGH SPEED-HIGH TEST AND EVALUATION (Joint Parachute Test Facility, El Centro, Calif.) Technical rept. no. 2-59, Proj. TED no. ELC AE-5242.2; ASTIA AD 244 200

ABSTRACT: Of the total of twelve test flights conducted, ejection was successful and satisfactory in all firings. Seat-dummy separation was accomplished ten times, the two malfunctions resulting from interference between seat system components and auxiliary test equipment items. The dummy was recovered on nine (of the ten) tests, a hardware malfunction causing the one failure. As a result of the test program, ejection seat function was adjudged satisfactory. As stated by Appendix A, evaluation of the general parachute performance was to be made on the basis of data gathered on the free bailout facility, the maximum performance capability required, and the effect of drogue or other component failure. In addition, the possible use of a 28-foot parachute and/or the integrated torso harness was to be investigated. In this connection, a Bureau of Aeronautics instruction of 9 December 1958 required the employment of the integrated harness on all tests made subsequent to that date. The twelve tests were conducted in three basic phases such that six were made with the standard Martin-Baker 24-foot parachute and harness system, two with the MBA parachute and Naval Parachute Unit integrated harness, and four withPioneer-NPU integrated harness. Minor malfunctions were frequently encountered, but generally satisfactory results were obtained with all three parachute-harness assemblies. The over-all results of the test program conducted demonstrate the serviceability of the subject ejection system. (Author)

1,884

Anon. 1959 SAFETY AND SURVIVAL EQUIPMENT
Navaer 00-8- T-52, 1959

ABSTRACT: This manual is prepared for the survival officer and the Flight Surgeon as a training guide with general but comprehensive coverage of the various items of safety and survival equipment. The write-ups for most items list some technical features.
The described equipments are:
1. Oxygen equipment
2. Parachutes
3. Safety belts and harnesses
4. Ejection seat
5. Flight clothing
6. Emergency protective clothing

1,885

Anon. 1959 SPACE CRAFT SEATS ARE DESIGNED TO FIT PILOT.
MSV Department General Electric News Jan. 23, 1959, p. 3.

1,886

Anon. 1959 UNDERWATER ESCAPE FROM AIRCRAFT
Instrument Practice, 13(3):293.

ABSTRACT: A series of experiments made by the Ballistic Research Establishment Measuring methods, problems and result.

1,887

Anon. 1959 URETHANE FOAM PROTECTS MISSILE INSTRUMENTS
Electrical Engineering 78(1):282-283, March 1959

ABSTRACT: Urethane foam is used to package sensitive instruments carried in the nose cone of Thor and Atlas missiles. The foam is molded into a sphere no larger than an oversized basketball and withstands impacts up to 45,000 g's. It protects the equipment from vibration and shock from the launching to the time it is ejected and returns to impact with the earth.

1,888

Anon. 1960 B-70 ESCAPE CAPSULE
Flying, 66(4):36 April 1960

1,889

Anon. 1960 EJECTION SEAT STUDY (Naval Aviation Safety Center, Norfolk, Va.) June 1960, ASTIA AD-238 492

ABSTRACT: A statistical analysis is presented showing the degree of personnel injuries sustained during ejection from disabled aircraft. Factors analyzed include altitude, speed, seat systems, attitude, and types of emergency. Ejection frequency and fatality rates per 10,000 hours flying time are also presented. A comparison is made between injuries resulting from ejections and bailouts.

1,890

Anon. 1960 LUNAR JOURNEY
Lancet (London) 1(7134): 117-118, 21 May 1960

ABSTRACT: The physiological problems of orbital and space flight are briefly reviewed, including: (1) the typical aviation stresses of acceleration, low barometric pressure, and temperature and humidity extremes, for which adequate measures of protection are available; (2) prolonged weightlessness, the "breakof phenomenon," and primary cosmic radiation, about which little is known; and (3) problems of lunar flight which will require further development of existing techniques, such as increased acceleration stress, the mental strain of extended flight, the additional radiation hazard of the Van Allen belts, and the necessit for the provision of large quantities of food and oxygen.

1,891

Anon. 1960 PERSONNEL RESTRAINT DEVICES FOR ADVANCED FLIGHT VEHICLES, PART I. (Goodyear Aircraft Corporation) June 1960

1,892

ANON. 1960 TECO PRODUCING FORM FITTING SEAT FOR 200 PASSENGERS IN JETS. Aviation Daily, 6 Dec. 1960, P. 214

SUMMARY: Describes new "Mason Seat" (after E. Gilbert Mason, President, Teco, Inc.) Form-fitting plastic contour seat with only 70 parts (500 in standard). Has two prototype models, one 19 inches between arms for 1st class, and other 17 inches between arms. Claims will cut maintenance 90%, and costs 30% lower at $350-400 per seat. A first-class double seat, including leg rest, weighs 54 lbs.

The seat incorporates energy absorption and will take loads in excess of 30 Gs. It obtains flexibility by simple forged legs which quick lock to a three-inch tube which universally fits all track tie-downs, including wall mounts. Mason says it can be removed in 5 minutes by 1 man.

Prototype seats have been demonstrated to Boeing, Convair, Douglas, Lockheed and some airlines.

1,893

Anon. 1961 AEROSPACE YEAR BOOK. (1961 Edition)(Wash., D. C.: Amer. Aviat. Pub. Inc., 1961).

1,894

Anon. 1961 AIR FORCE TESTS CONVAIR SUPERSONIC EJECTION SEAT Aviation Week Feb. 13, 1961, 106-107.

1,895

Anon. 1961 AT SUPERSONIC VELOCITY
(Sovetskaya Litva, July 28, 1961, p. 3)
Prepared by: Translation Services Branch, Foreign Technology Division, WP-AFB, Ohio FTD-TT-61-203/1 ASTIA AD 268 072

ABSTRACT: This is an article from the Russian Newspaper Sovetskaya Litva. It discusses the characteristics of ejection seats and how they operate.

1,896

Anon. 1961 DYNA-SOAR EJECTION SEAT AND SURVIVAL SYSTEM
(Boeing Co., Seattle, Wash.)
Rept. no. 10-81000, Rev. B to Rept. no. 10-81000, 15 Sept 1961, AD-269 506L

ABSTRACT: The design, fabrication, performance, and testing requirements for a type of equipment designated Ejection Seat and Survival System is reported. It is designed for pilot escape and survival from the Dyna-Soar glider in instances when a satisfactory landing site cannot be reached or when other conditions made an attempted glider landing impractical. (Author)

1,897

Anon. 1961 INSTRUMENTATION BIBLIOGRAPHY
(Ministry of Aviation, Gt. Brit.) Rept. No. TIL/BIB 50; Jan. 1961; ASTIA AD 253 346

ABSTRACT: This bibliography contains material on the following subjects: general instrumentation; calibration; combustion; electrical and electronic devices; test facilities; accelerometers; computers; displacement measurements; flow measurement and control; pressure and thrust measurement; recording; shock and vibration; strain gauge measurements; temperature measurement; and time measurement.

1,898

Anonymous 1961 MICE-BEARING ROCKET LAUNCHED IN KRAKOW.
Warsaw Polish Home Service.
11:05 GMT 11 April, 1961. (translation).

ABSTRACT: (Text) Two successive rockets of the meteorological type were launched in the Bledowska Desert near Olkusz. One of them carried two white mice in a special container. The first rocket, weighing 10 kilograms and measuring one and a half meters in length, reached the planned altitude of 1,700 meters. The rocket traveled at a speed of 550 kilometers an hour. At a certain time the first stage with the container separated from the rocket and landed with its passengers by a special parachute. The animals felt well after the experiment. The next experiments are to take place in May. The experiments, organized by the experimental aviation and rocket technology circle of the Krakow Aero Club, take place under the auspices of the Polish Astronautical Society and Krakow scientists.

1,899

[illegible] 1961 MTSS. GENERAL HUMAN FACTORS CONSIDERATIONS. VOLUME III. (Martin Co., Denver, Colo Contract AF 33(600)42456, ASD-CR-61-14, Vol. 3; ASD-TR-61-211, Vol. 3; July 1961, ASTIA AD-273 005

1,900

Anon. 1961 SPACESHIP CAPSULE
Vestnik Vozdushnogo Flota, no. 1, 1961, 95.

ABSTRACT: The best solution for protecting man from the effect of overloading and appreciable angular acceleration is an anti-g force detachable capsule. The capsule should be provided with a special device for automatic regulation of the position of the astronaut so that the accelerations originating during the flight will always be in a direction perpendicular to the axis of the human body.

1,901

Anon. 1961 SUPERSONIC EJECTION CAPSULE TESTED.
Aviation Week, Mar. 20, 1961, p. 30.

1,902

Anon. 1962 DYNA-SOAR EJECTION SEAT AND SURVIVAL SYSTEM (Boeing Co., Seattle Wash.) Contract AF 33(657) 7132, ASTIA AD-282 004L

ABSTRACT: Military requirements, specifications, and design are given for the Dyna-Soar ejection seat and survival system.

1,903

Anon. 1963 AIR FORCE ORDER MAKES SEAT BELTS MANDATORY
Aerospace Medicine 32(2):187 Feb. 1963.

ABSTRACT: Final stage has been reached in the Air Force's concerted drive to install seat belts in all passenger-type USAF vehicles, with issuance of technical order No. 36A-1-6.

Effective immediately, all such vehicles anywhere in the world must be provided with government-approved seat belts. The technical order spells out procedures for the procurement, installation, and use of seat belts in Air Force owned or operated vehicles.

Excluded from the mandatory ruling are cranes, fork lifts, farm-type tractors and wreckers, as the order pertains only to ground vehicles which are capable of carrying passengers. These include everything from ambulances to snowplows, buses, cargo and dump trucks, and tractor-trailers.

1,904

Anon. 1963 DROPPING THE CARGO WITHOUT A PARACHUTE
(Translation Services Branch, Foreign Technology Division, WP-AFB, Ohio) FTD-TT-62-1842/1 Feb. 15, 1963 (Polish Periodical, Przeglad Techniczny, Nr. 14, 1962, p. 2) ASTIA AD 400530.

ABSTRACT: A special device for this purpose was designed in the USSR. It is made in form of a sphere consisting of several inflated rubber layers lined with a layer of porous rubber. The sphere may contain various shock-sensitive instruments or glass vessels with medicines which are to be dropped from aircraft.

This device finds an ever increasing application in the Soviet Union in dropping medicines, surgical instruments, spare parts for machines, and other objects on predetermined places.

1,905

Anon. 1963 UP---UP---UP RIDES
The Daily Oklahoman, May 8, 1963

ABSTRACT: Up-up-up rides a 220 lb. dummy in the co-pilot's seat from a B-47 je bomber during an ejection test Tuesday at Tinker AFB. The air force has given Tinker technicians the job of ironing out problems encountered in the ejection equipment. What takes place when a pilot ejects can be seen in the dummy's ri He comes out of the plane at lower left, arches over and flies through the air lands in a heap. Big difference is, pilots use parachutes to let them down ea (AUTHOR)